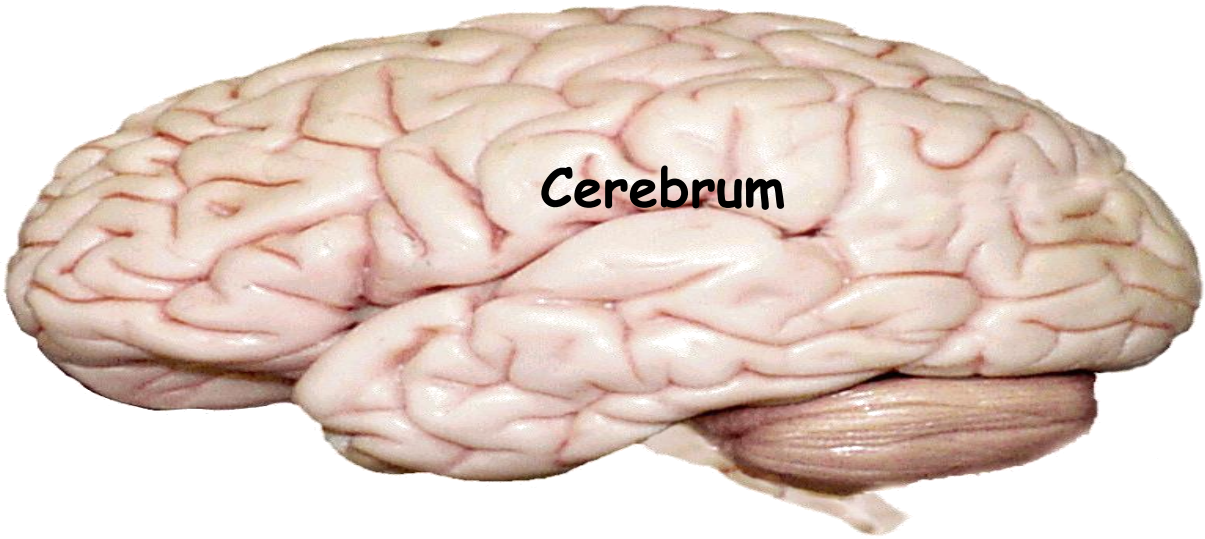
Objective

- Describe the divisions of the brain
- Describe the arrangement of the meninges and their relationship to brain and spinal cord.
- Explain the occurrence of epidural, subdural and subarachnoid spaces.
- Locate the principal subarachnoid cisterns, and arachnoid granulations

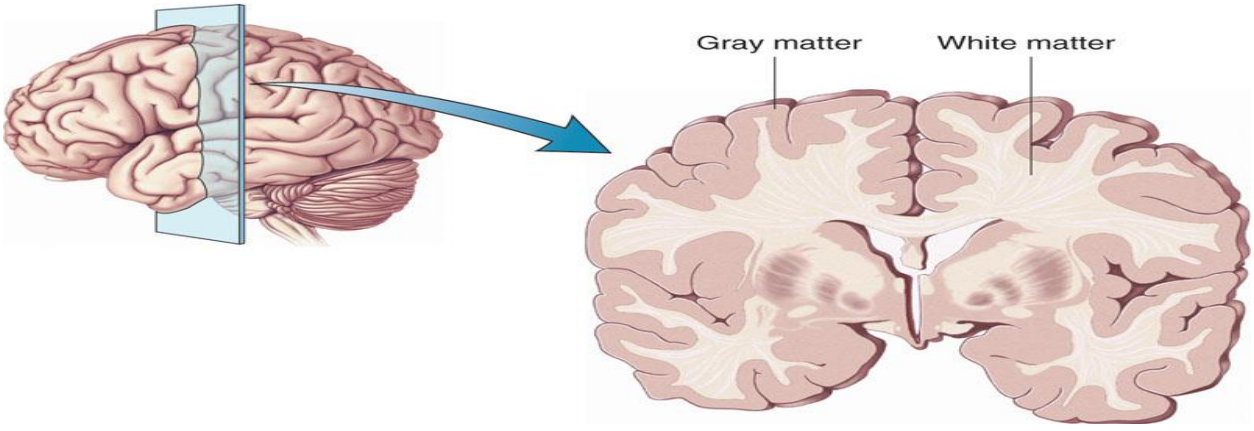
Brain :

- Forebrain (cerebrum)
- Midbrain
- Hindbrain (pons, medulla and cerebellum

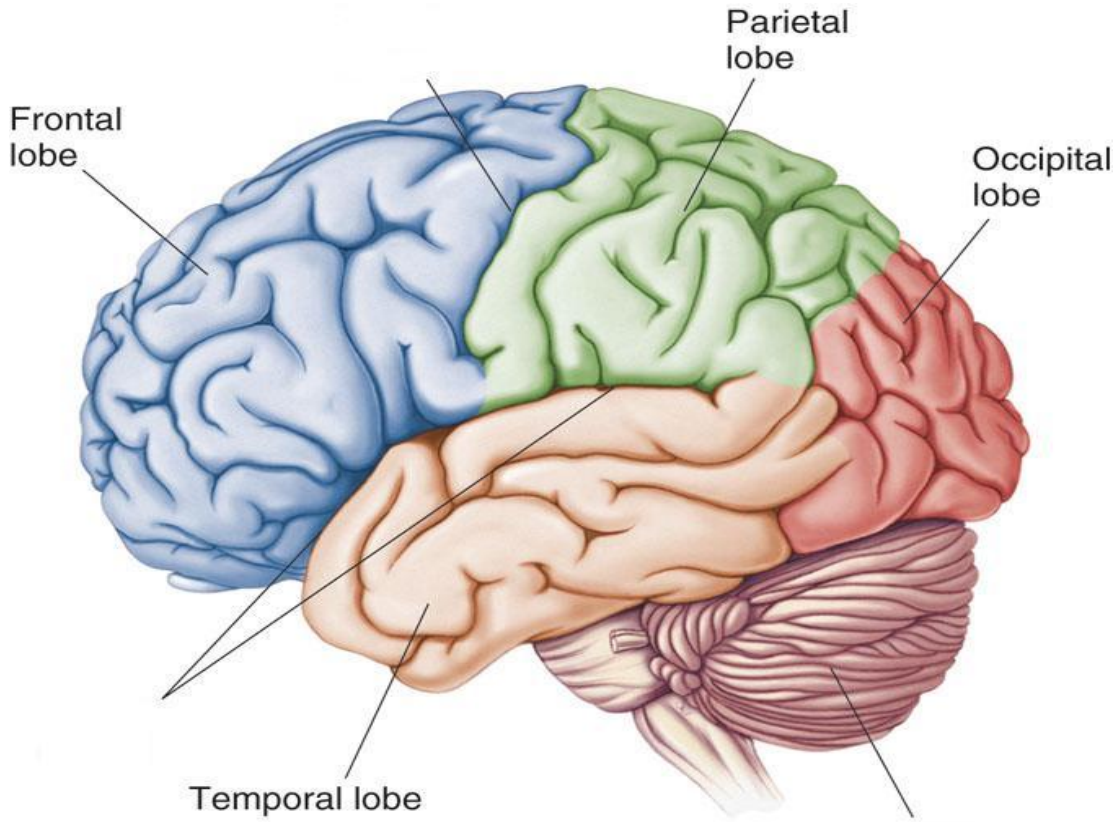
Cerebrum : The largest division of the brain. It is divided into two hemispheres, each of which is divided into four lobes.



Cerebral Cortex - The outermost layer of gray matter making up the superficial aspect of the Cerebrum.



Lobes Of The Brain:

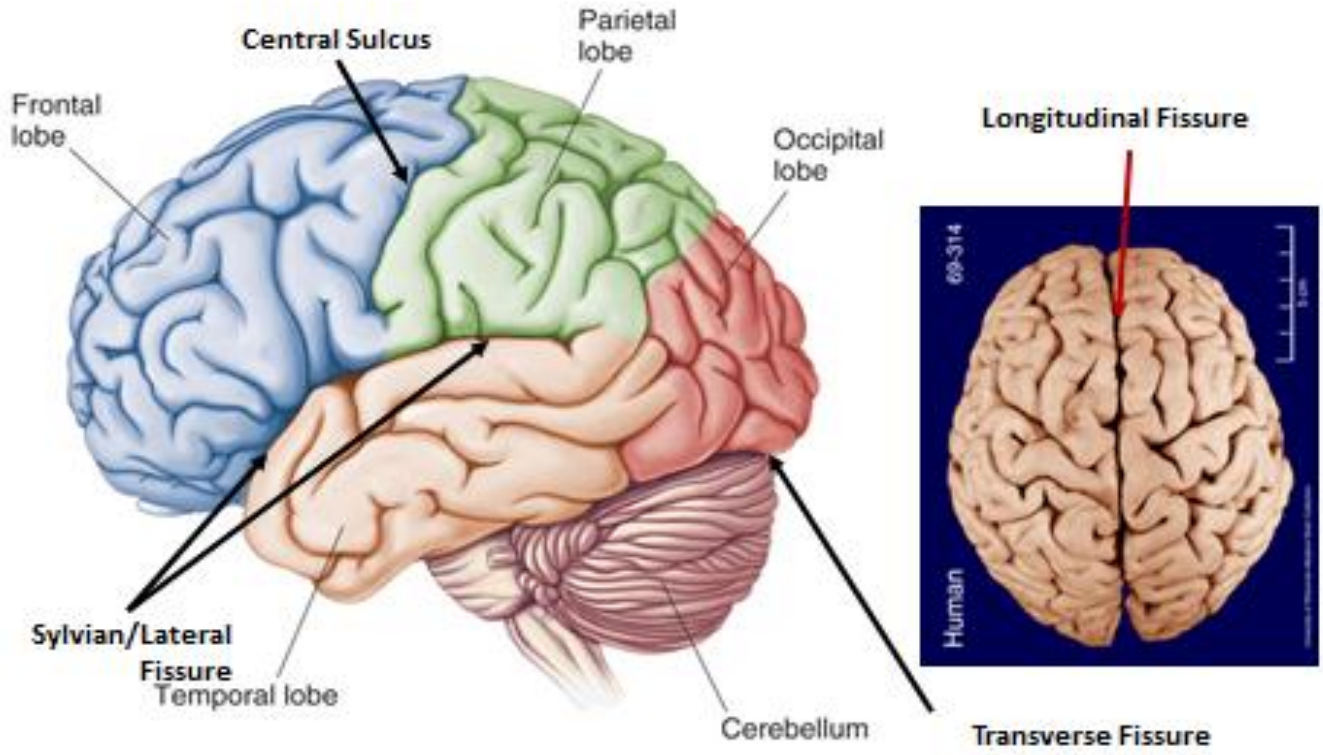


- **Gyri – Elevated ridges "winding" around the brain**
- **Sulci – Small grooves dividing the gyri.**
- **Fissures – Deep grooves, generally dividing large regions/lobes of the brain**

Longitudinal Fissure – Divides the two Cerebral Hemispheres

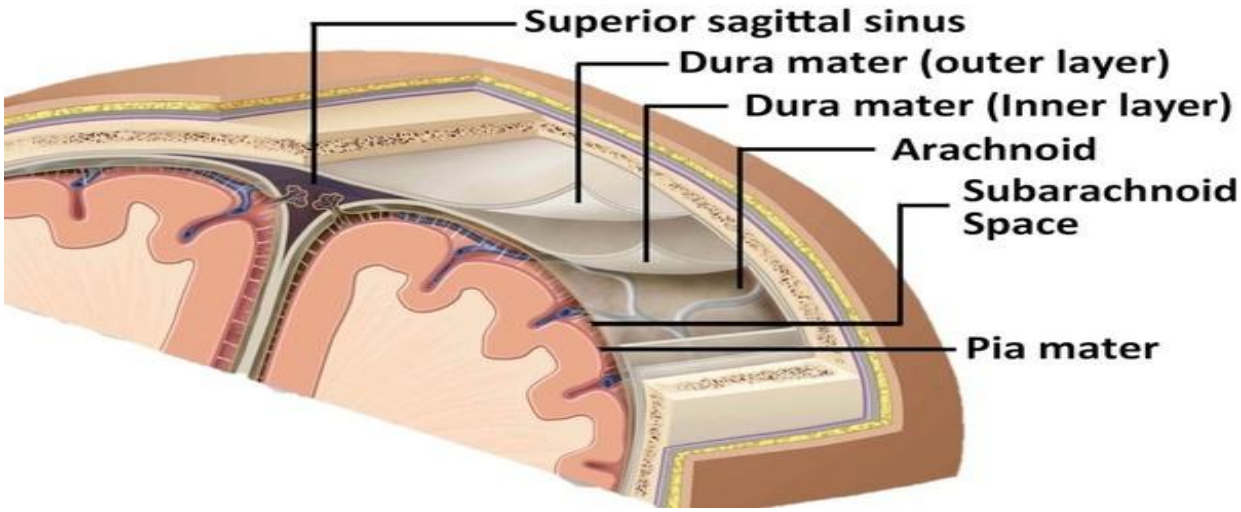
Transverse Fissure – Separates the Cerebrum from the Cerebellum

Sylvain/Lateral Fissure – Divides the Temporal Lobe from the Frontal and Parietal Lobes .



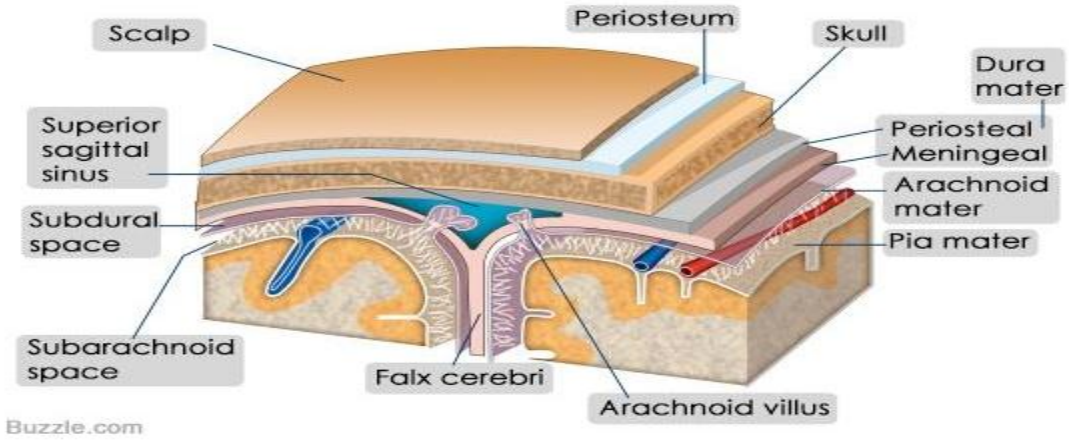
Meninges Of The Brain

The brain and spinal cord are surrounded by three protective membranes, or meninges:
***Dura mater.**
***Arachnoid mater.**
***Pia mater.**



❶Dura Mater:

Dura mater of brain has two layers:
1. Endosteal layer.
2. Meningeal layer .
These are closely united except along certain lines, where they separate to form venous sinuses.

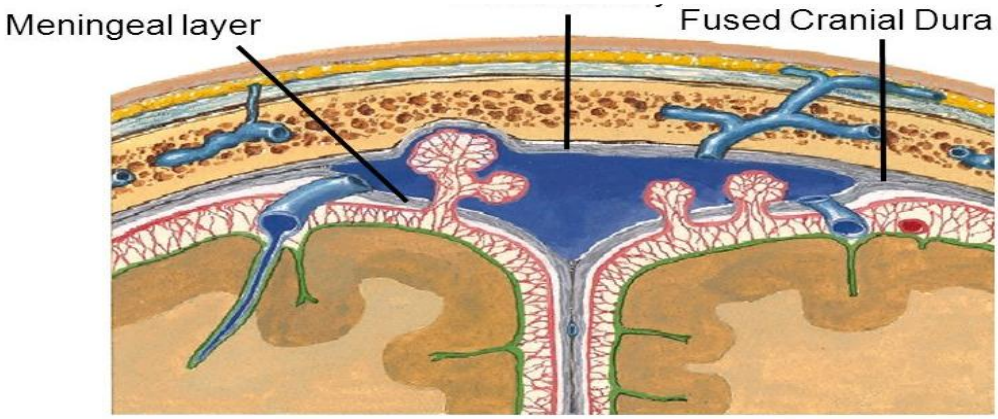


1.Endosteal Layer:

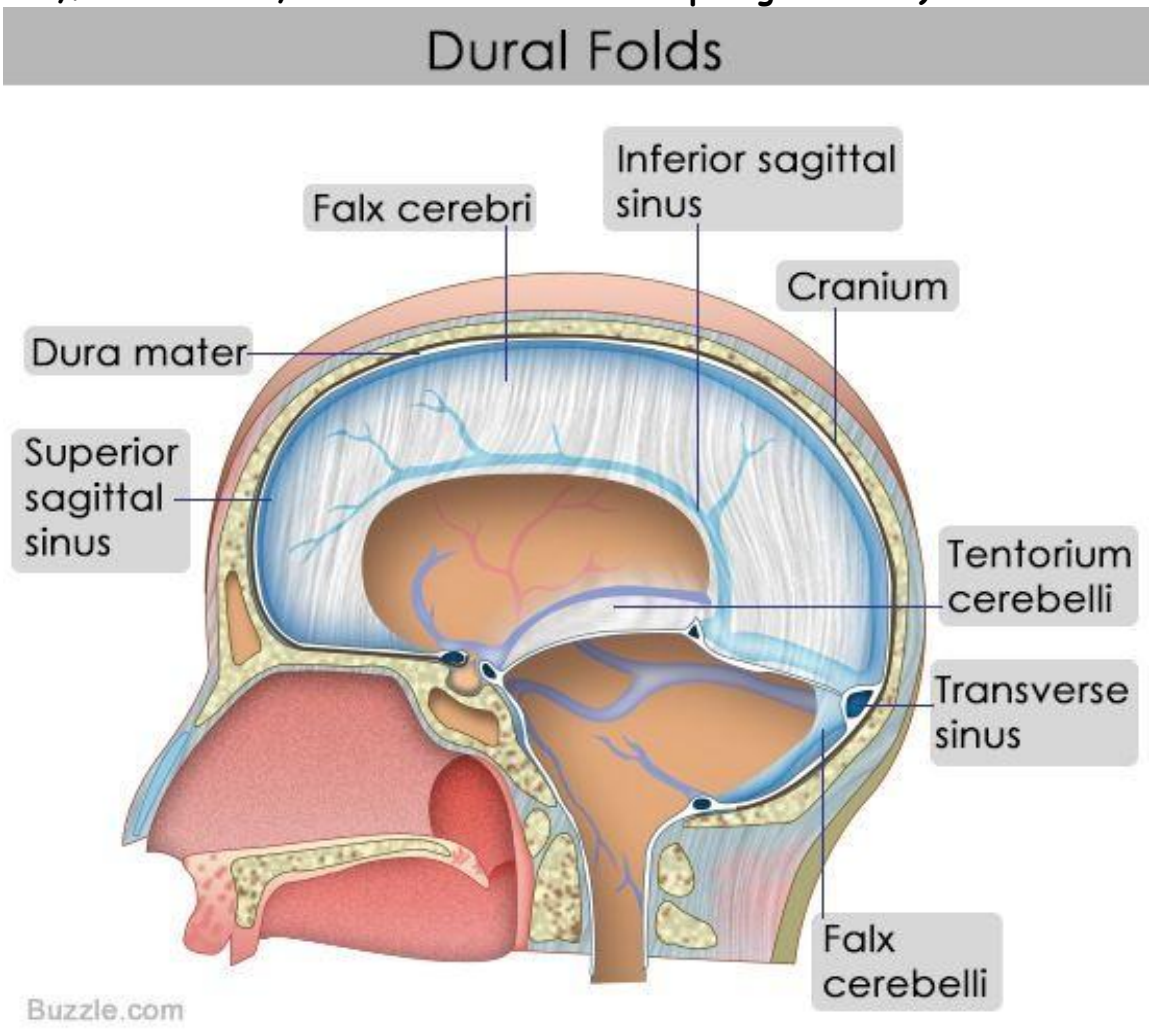
*** Covers the inner surface of the skull bones.**
***Continuous with pericranium via suture &foramen**
***At foramen magnum, it does not become continuous with the dura mater of the spinal cord.**
***Continuous with periosteal lining of orbit via superior orbital fissure**

2.The meningeal layer

***Dense fibrous membrane covering the brain (the dura mater proper)**
***Continuous through the foramen magnum with the dura mater of the spinal cord.**



The meningeal layer sends inward four septa(dural folds)
(falx cerebri,falx cerebelli, tentorium cerebelli & diaphragma sellae).



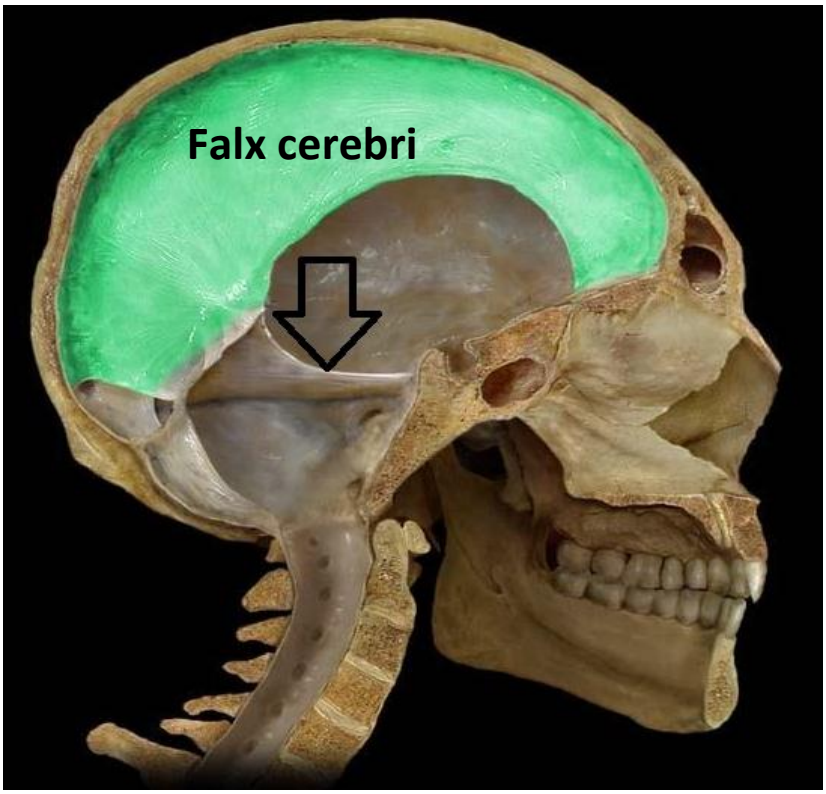
Function Of Dural Folds

***Restrict the displacement of the brain when the head is moved.**
*** provides tubular sheaths for the cranial nerves as they pass through the foramina in the skull. Outside the skull, the sheaths fuse.**
*** Separates the parts of the brain .**
***Contains the dural venous sinus.**

1.Falx Cerebri:

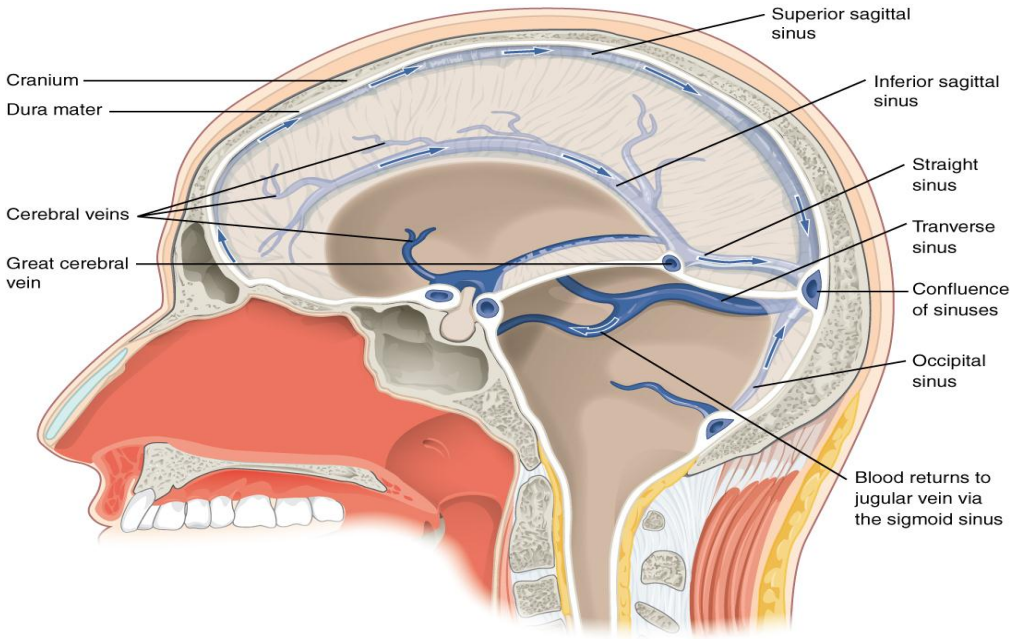
- **is a sickle-shaped fold of dura lies in the midline between the two cerebral hemispheres .**
- **Narrow anterior end attached to the internal frontal crest & crista galli.**

- **Broad posterior part blends in the midline with the upper surface of the tentorium cerebelli.**



***The superior sagittal sinus runs in its upper fixed margin.**

***The inferior sagittal sinus runs in its lower concave free margin. & the straight sinus runs along its attachment to tentorium cerebelli.**

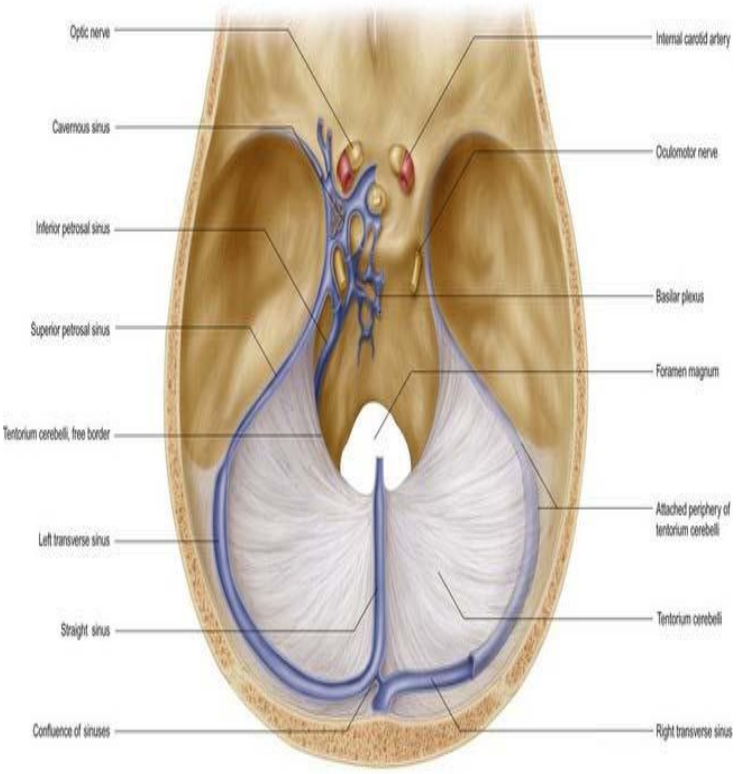


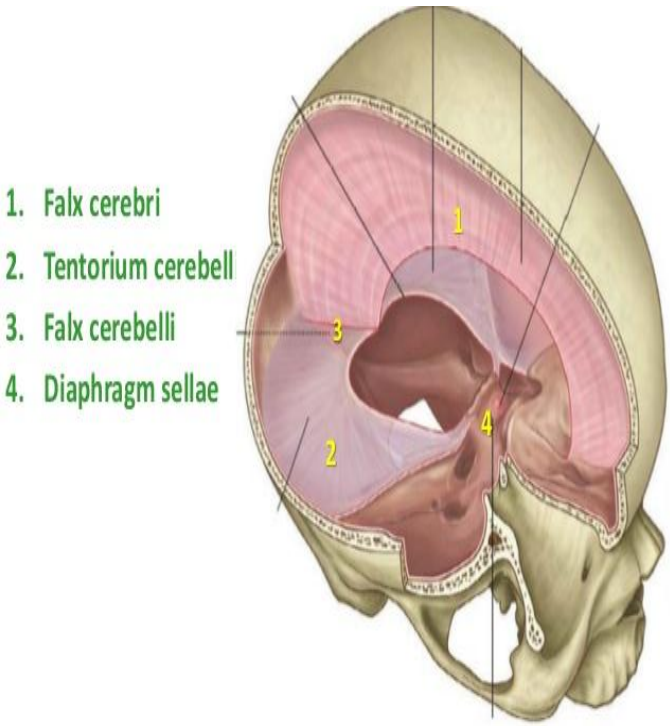
2.Tentorium Cerebelli

Is a crescent-shaped fold of dura mater that roofs over the posterior cranial fossa.

*** covers the upper surface of the cerebellum**

*** has is a gap, tentorial notch, for the passage of the midbrain.**





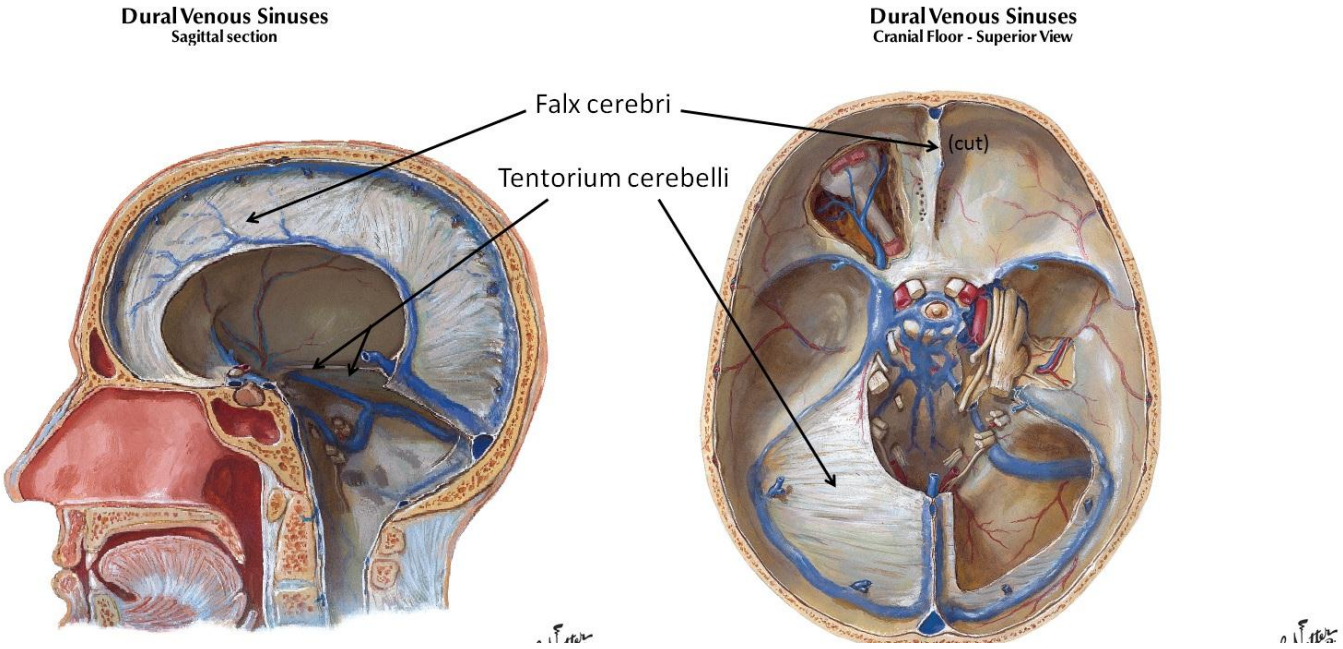
It has an 2 borders :

***inner free border :fixed to the anterior clinoid processes**

***fixed outer border: attached to the posterior clinoid processes, the superior border of the petrous bones and the margins of the grooves for the transverse sinuses on the occipital bone.**

The falx cerebri & the falx cerebelli are attached to the upper & lower surfaces of the tentorium.

The superior petrosal sinus runs along its attachment to the petrous bone, and the transverse sinus along its attachment to the occipital bone. The straight sinus runs along its attachment to Falx cerebri.

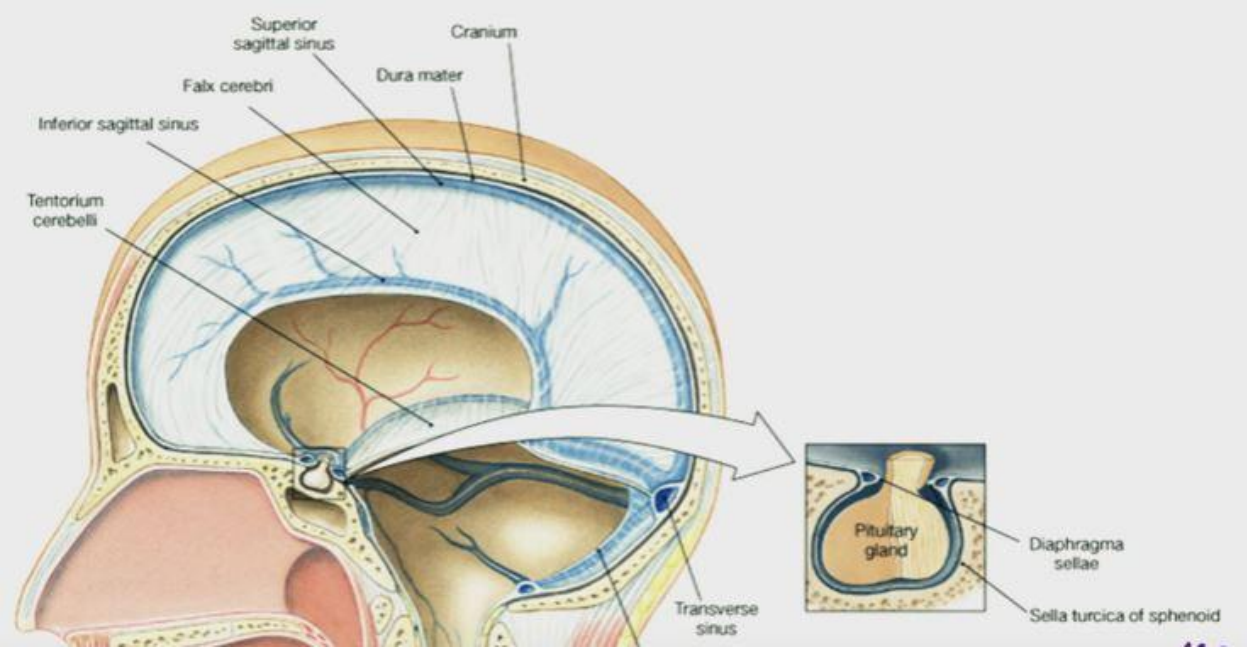


3.Falx cerebelli:

- **It is a small sickle- shaped fold of dura mater that is attached to the internal occipital crest and projects forward between the two cerebellar hemispheres . Its posterior margin contains the occipital sinus.**

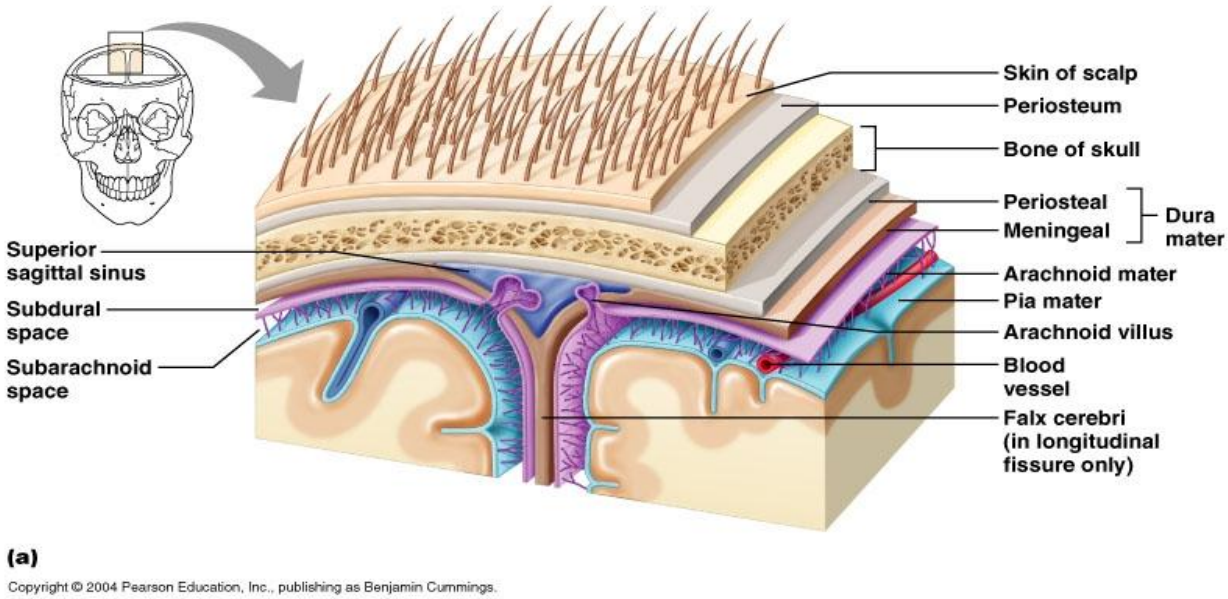
Diaphragm Sella:

It is a small circular fold of dura mater that forms the roof for sella turcica .
A small opening in its center allows passage of the stalk of the hypophysis cerebri



Subdural space:

The subdural space (or subdural cavity) is a potential space that can be opened by the separation of the arachnoid mater from the dura mater as the result of trauma.



(a)

Dural Nerve Supply:

*Dura of anterior cranial fossa- supplied by anterior ethmoidal nerve & partly by maxillary nerve

*Dura of middle cranial fossa- supplied by maxillary nerve in the anterior part & by branches of mandibular nerve and from the trigeminal ganglion in the posterior part

*Dura of posterior cranial fossa- supplied by recurrent branches of 1st, 2nd and 3rd cervical spinal nerves & by meningeal branches of 9th and 10th cranial nerves

Dural arterial Supply:

*Dural lining of anterior cranial fossa is supplied by :
Anterior and posterior ethmoidal and ophthalmic arteries.

*Dural lining of middle cranial fossa is supplied by:*Middle meningeal ,accessory meningeal and meningeal branch of pharyngeal artery

*Dural lining of posterior cranial fossa is supplied by:
meningeal branch of vertebral ,occipital and ascending pharyngeal artery.

Dural venous drainage:

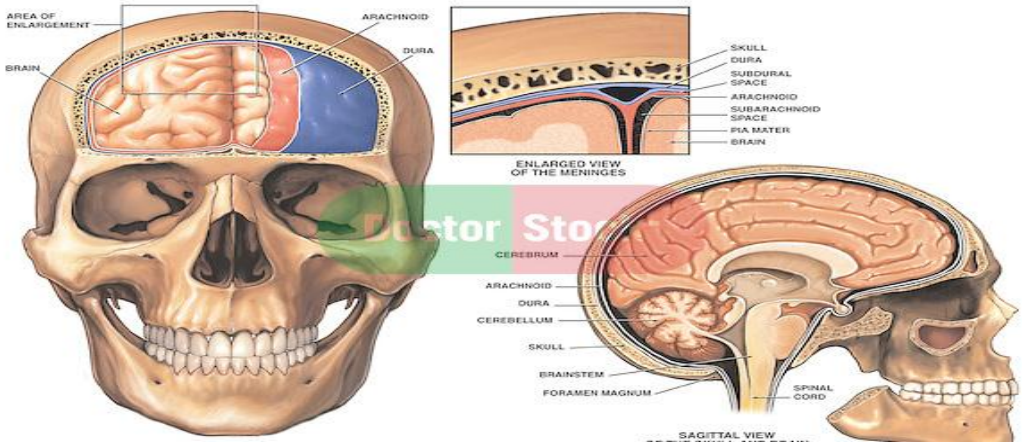
Meningeal veins lie in the Endosteal layer of Dura. The middle meningeal vein follows the branches of the middle meningeal artery and lies lateral to it. It drain into pterygoid venous plexus

❷Arachnoid Mater:

*delicate a vascular membrane covering the brain lies between the pia mater and the dura mater

*separated from the dura by a potential subdural space, filled by a film of fluid.

*separated from the pia by subarachnoid space, which is filled with cerebrospinal fluid.

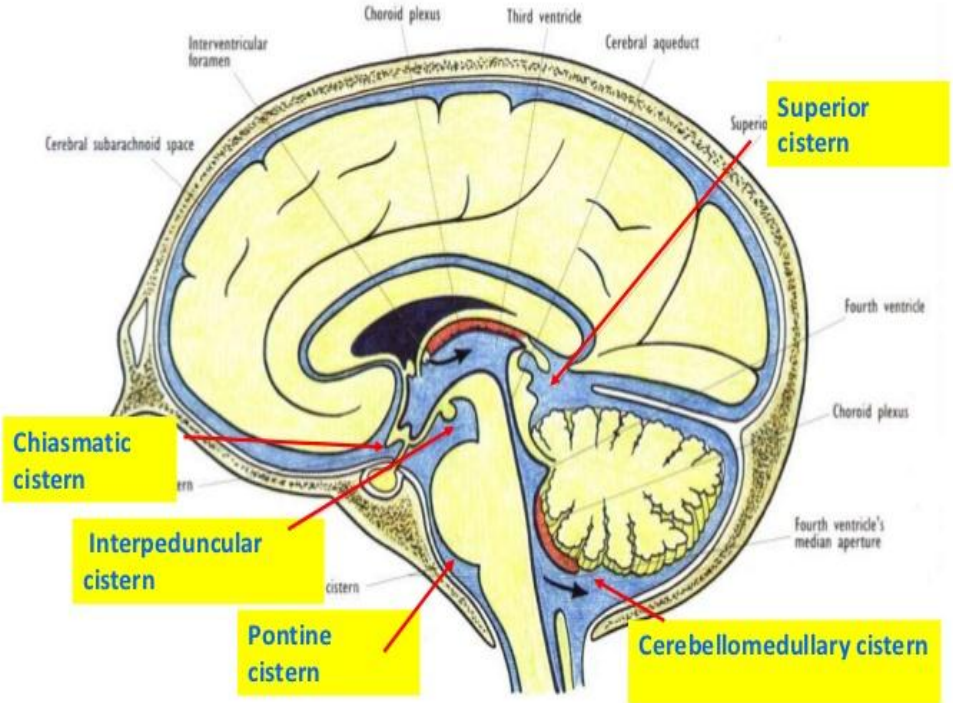


Subarachnoid space

Is the anatomic space between the arachnoid mater and the pia mater. It is occupied by spongy tissue consisting of trabeculae. This space is small on the surface of the hemispheres of the brain. On the gyrus the pia mater and the arachnoid are in close contact, but in the sulci ,a triangular spaces are left, in which the subarachnoid trabecular tissue is found. The pia mater closely follows the surface of the brain and dips into the sulci, the arachnoid bridges across them from gyrus to gyrus.

Arachnoid Cisterna

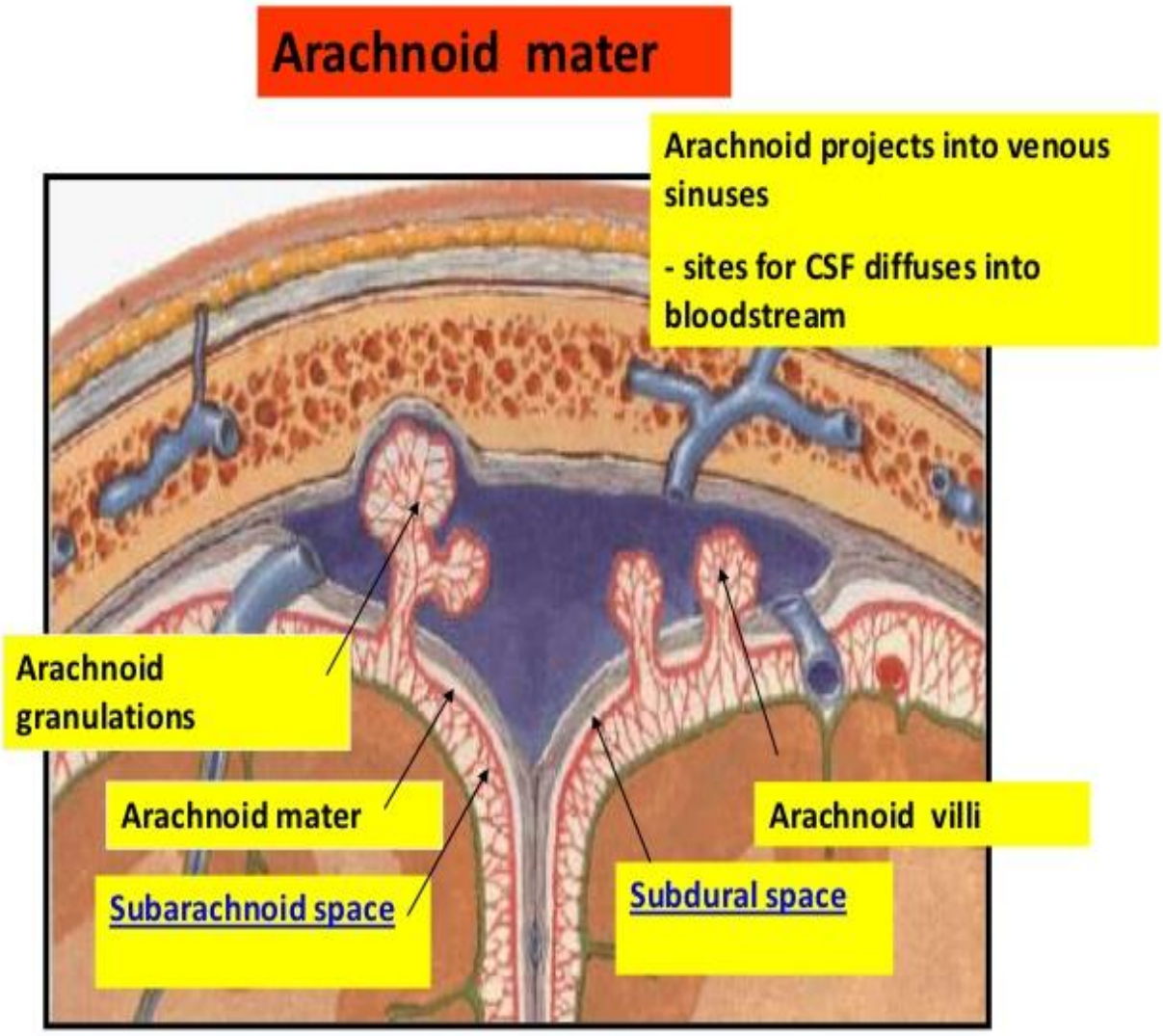
Arachnoid and pia in some spaces are widely separated to form the subarachnoid cisternae.
Cisterna cerebellomedullaris lies between cerebellum and roof of the fourth ventricle.
Cisterna interpeduncularis lies between the two cerebral peduncles.



Median sagittal section to show the subarachnoid cisterns & circulation of CSF

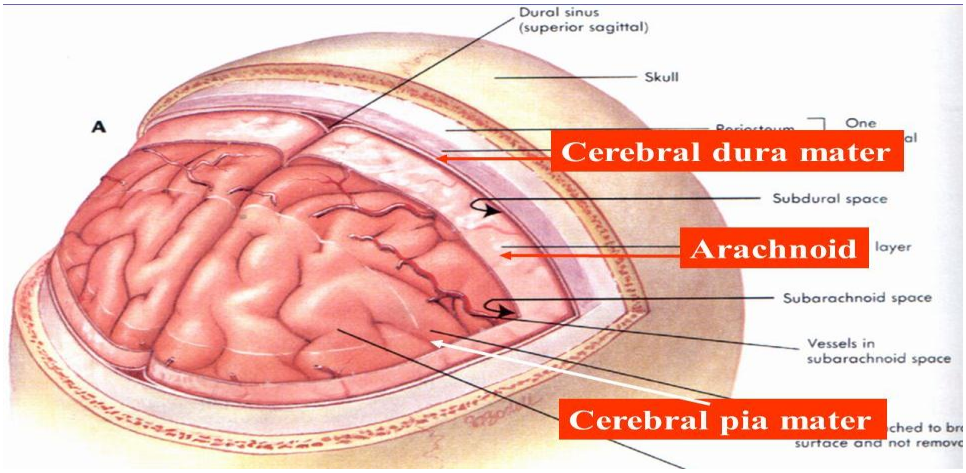
Arachnoid granulation :

are small protrusions of the arachnoid mater (through the dura mater They protrude into the venous sinuses of the brain, and allow cerebrospinal fluid (CSF) to exit the subarachnoid space and enter the blood stream. .Largest granulations lie along the superior sagittal sinus



❸Pia Mater

*located underneath the sub-arachnoid space
*very thin, & tightly adhered to the surface of the brain and spinal cord.
*the only covering to follow the contours of the brain (the gyri and fissures).



Applied Anatomy :

Epidural hematoma

Epidural bleeding, is a type of traumatic injury to artery (middle meningeal artery) in which arterial blood occurs between the dura mater and the skull. The condition is potentially deadly because the buildup of blood may increase pressure in the intracranial space, compress delicate brain tissue

Subdural hematoma :

Blood gathers between the inner layer of the dura mater and the arachnoid mater. Usually resulting from tears in bridging veins which cross the subdural space, subdural hemorrhages may cause an increase in intracranial pressure which can cause compression of and damage to delicate brain tissue.

Subarchnoid Hemorrhage

is bleeding into the subarachnoid space — the area between the arachnoid membrane and the pia mater surrounding the brain

SAH may occur as a result of a head injury or spontaneously, usually from a ruptured cerebral aneurysm.

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