



Anatomy of Dural Folds & Sinuses

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M N U



Intended Learning Outcomes (ILOs)

- 1. Identify the meninges.**
- 2. Recognize the parts of dura matter.**
- 3. Identify dural folds.**
- 4. Recognize the dural venous sinuses:**
 - A. Beginning.**
 - B. Termination.**
 - C. Site.**

Agenda

1. What are the meninges?
2. What are the parts of dura matter?
3. What are the dural folds?
4. What are the dural sinuses?



Meninges

❖ Layers of the meninges:

❑ Pia Mater (inner layer):

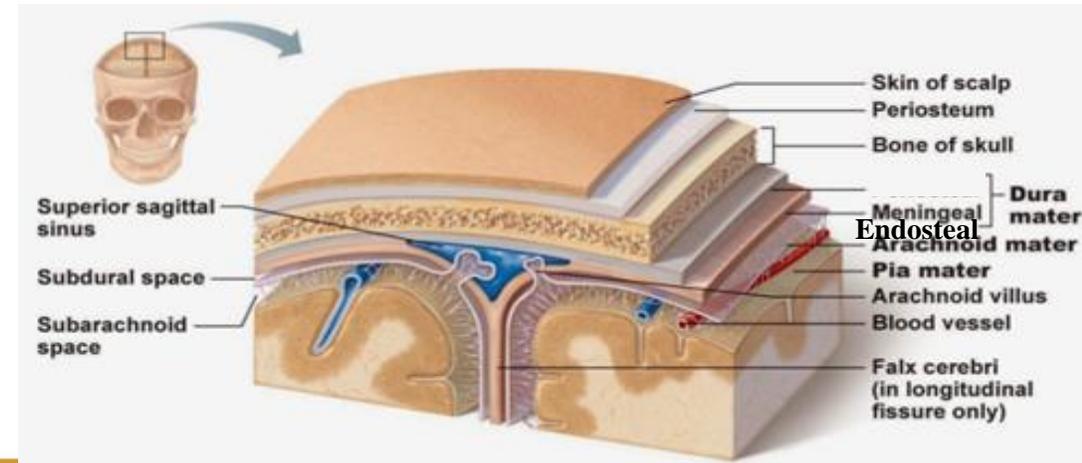
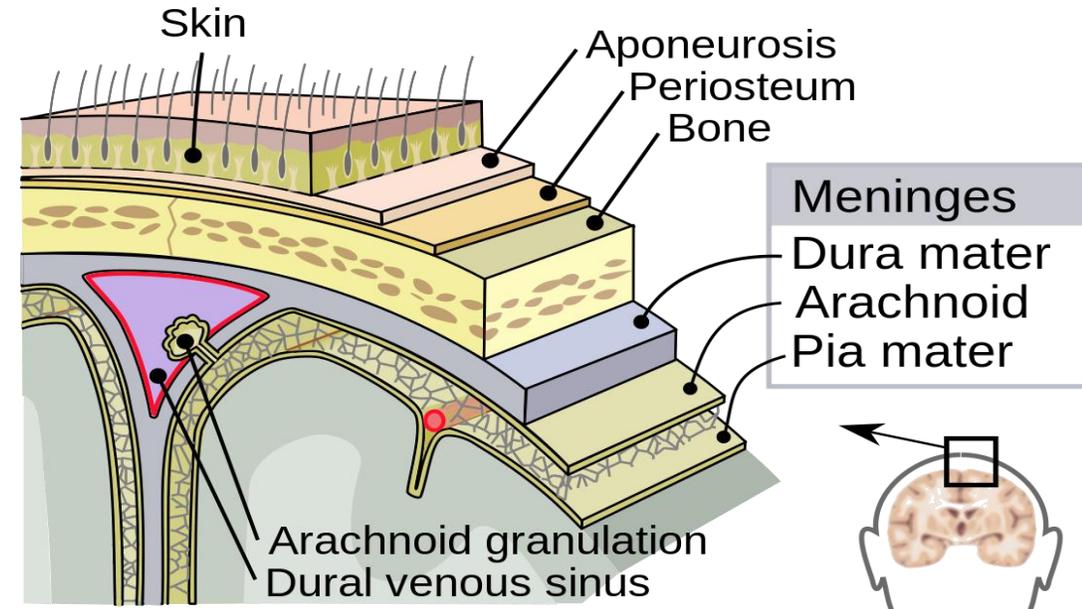
- Delicate.
- Highly vascular.
- Closely adherent to brain & Spinal cord.

❑ Arachnoid Mater (Middle layer):

- Delicate.
- Non-vascular.
- Forms arachnoid granulations & villi.

❑ Dura Mater (outer layer):

- Dense & Fibrous.
- Cranial dura has 2 layers:
 - ❖ Outer Endosteal layer.
 - ❖ Inner Meningeal layer.



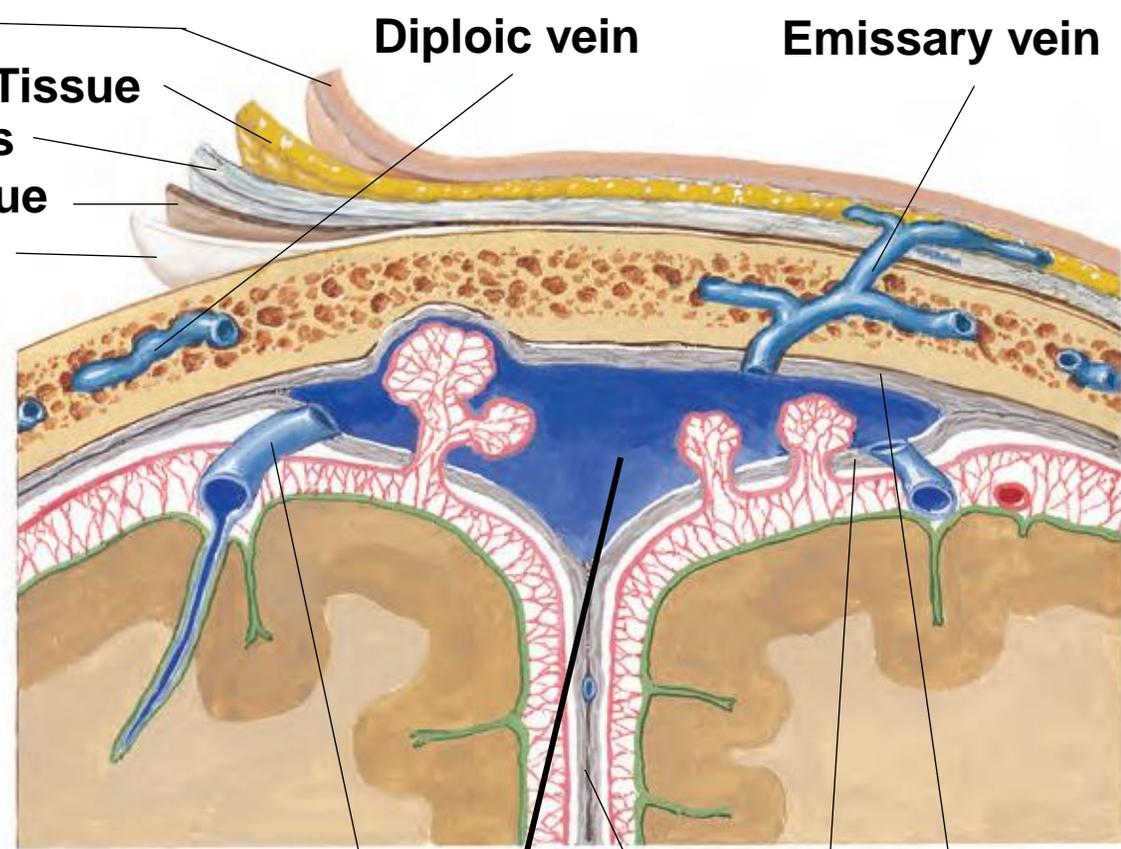
Dura Mater

- Cranial dura has 2 layers:
 - ❖ Outer Endosteal layer.
 - ❖ Inner Meningeal layer.
- Between the two layers are endothelial-lined spaces called **Dural Venous Sinuses**
 Drain into **Internal jugular veins**.
- Reduplication of the inner meningeal layer forms **Dural Folds**.

Skin
Connective Tissue
Epicranial Aponeurosis
Connective (Loose) Tissue
Periosteum

Diploic vein

Emissary vein



Bridging vein

Outer endosteal layer

Dural fold

Dural Venous sinus

Inner Meningeal layer

- ❖ **Bridging veins:** Veins which connect the cerebral cortex with dural venous sinuses.
- ❖ **Emissary veins:** Valveless veins that pass from outside the cranial cavity to the dural venous sinuses through different foramina of skull.
- ❖ **Diploic veins:** Valveless veins which run between the internal and external tables of compact bone in the roof of the cranial cavity

Dural Folds

❖ Dura Folds:

❑ **Definition:** reduplication of the inner meningeal layer of the dura

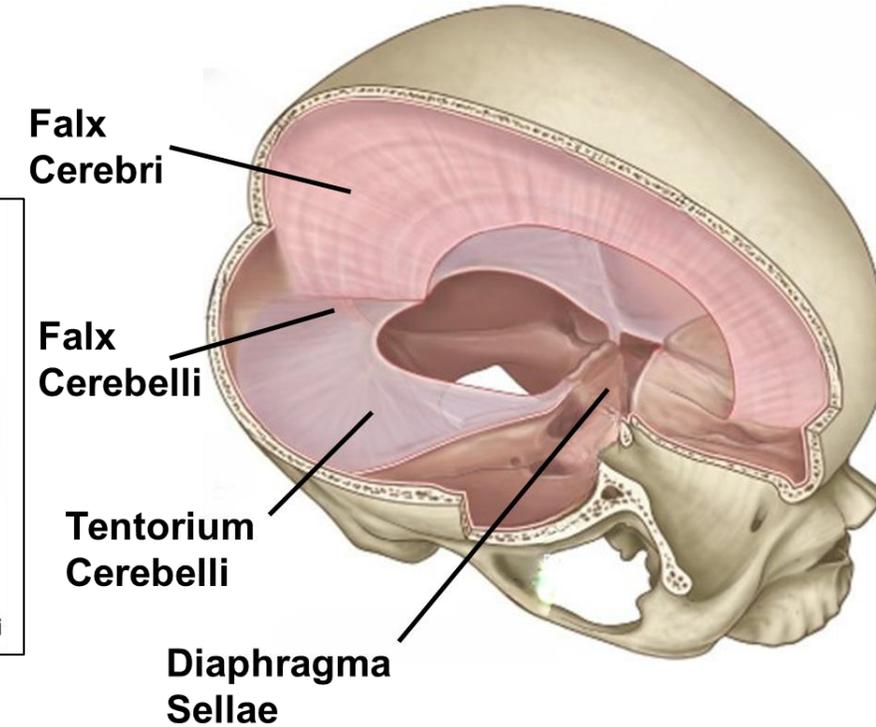
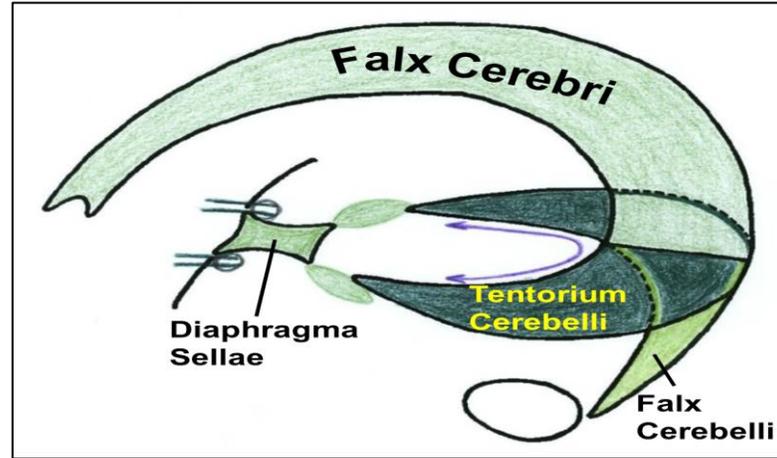
❑ **Number:** 4

❑ **The name has two parts:**

- **Shape**
- **Site**

❑ **Names:**

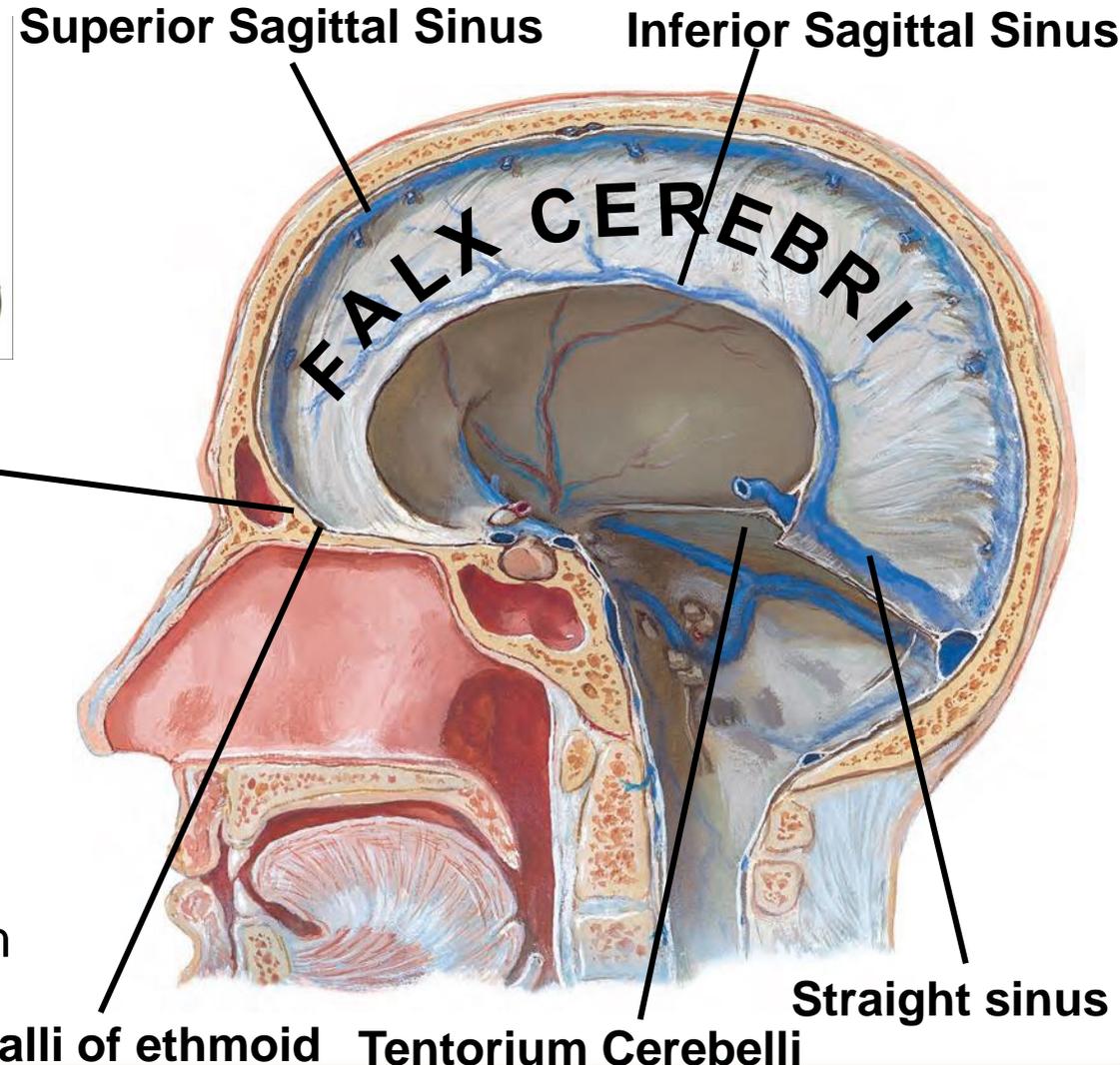
- **Falx Cerebri**
 - **Falx Cerebelli**
 - **Tentorium Cerebelli**
 - **Diaphragma Sellae**
- } Vertical
- } Horizontal



Dural Folds: Falx Cerebri

❖ Falx Cerebri:

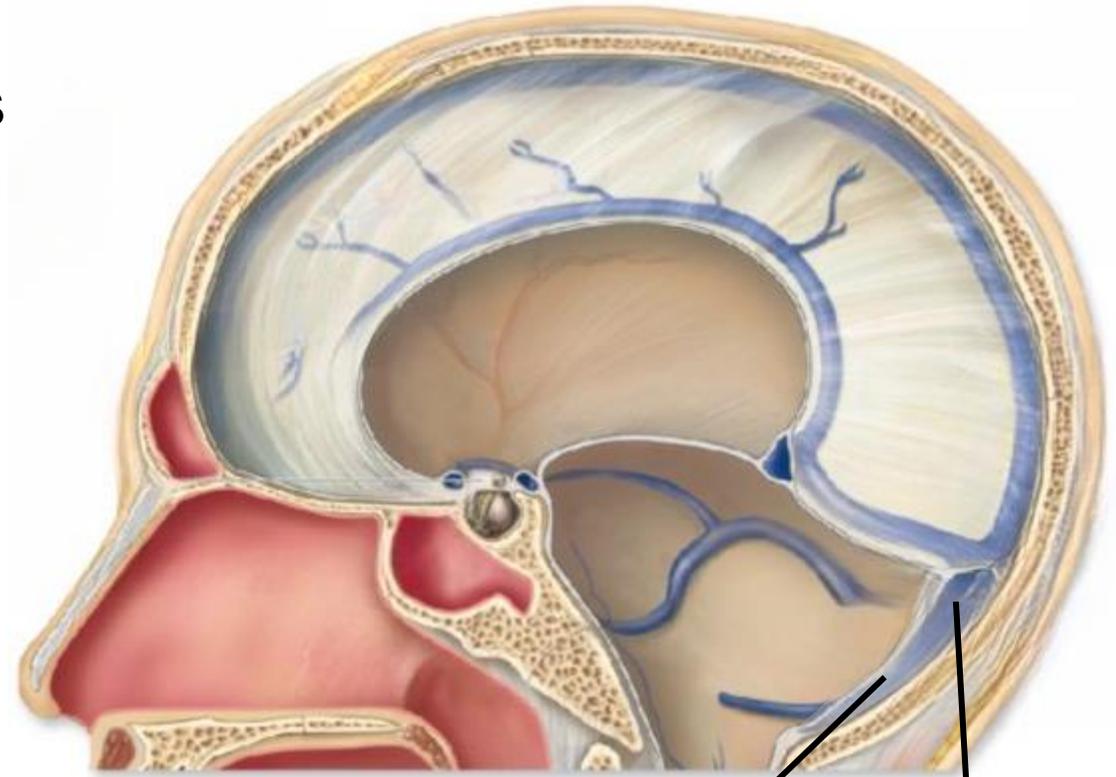
- ❑ **Site:** Between the two cerebral hemispheres
- ❑ **Shape:** Sickle-shaped (crescent) fold
- ❑ **Attachment:**
 - **Apex:** attached to the frontal crest and crista galli.
 - **Base:** attached to the superior surface of the tentorium cerebelli.
- ❑ **Sinuses:**
 - **Superior sagittal sinus:** in the upper margin.
 - **Inferior sagittal sinus:** in the posterior two thirds of the lower margin.
 - **Straight sinus:** at the junction of the falx cerebri with the tentorium cerebelli in the median plane.



Dural Folds: Falx Cerebelli

❖ Falx Cerebelli:

- ❑ **Site:** Between the two cerebellar hemispheres
- ❑ **Shape:** Triangular fold ▲
- ❑ **Attachment:**
 - **Apex:** attached to the posterior border of the foramen magnum.
 - **Base:** attached to the inferior surface of the tentorium cerebelli.
- ❑ **Sinuses:**
 - **Occipital sinus:** in its posterior border.



Occipital sinus

Falx Cerebelli

Dural Folds: Tentorium Cerebelli

❖ Tentorium Cerebelli:

❑ **Site:** Between the cerebrum & cerebellum

❑ **Shape:** Tent-shaped fold

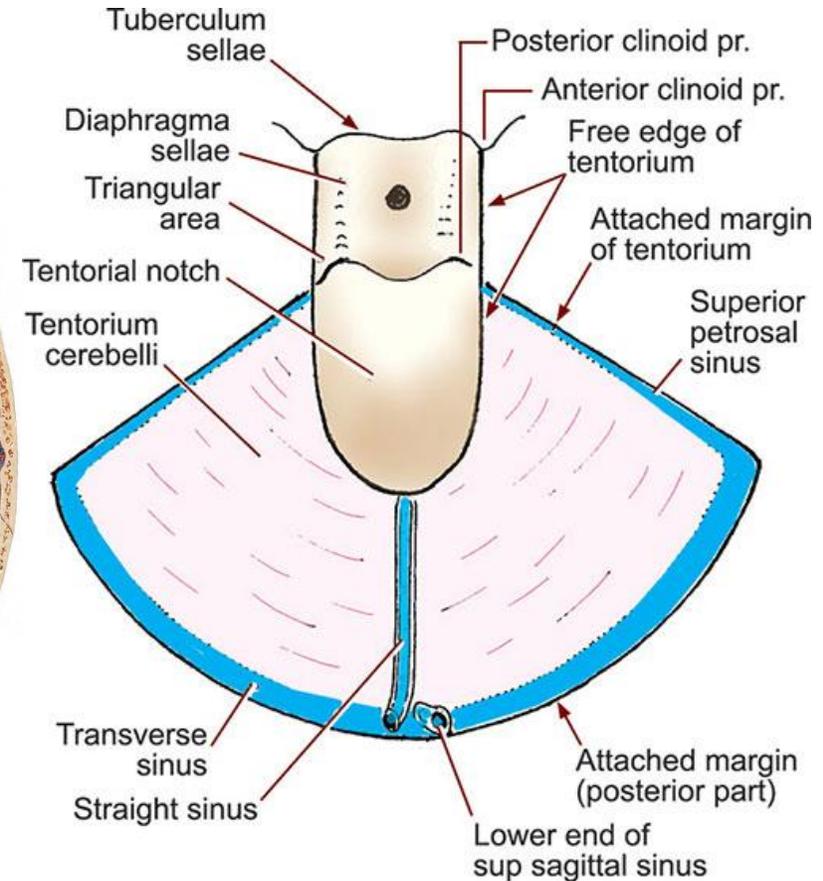
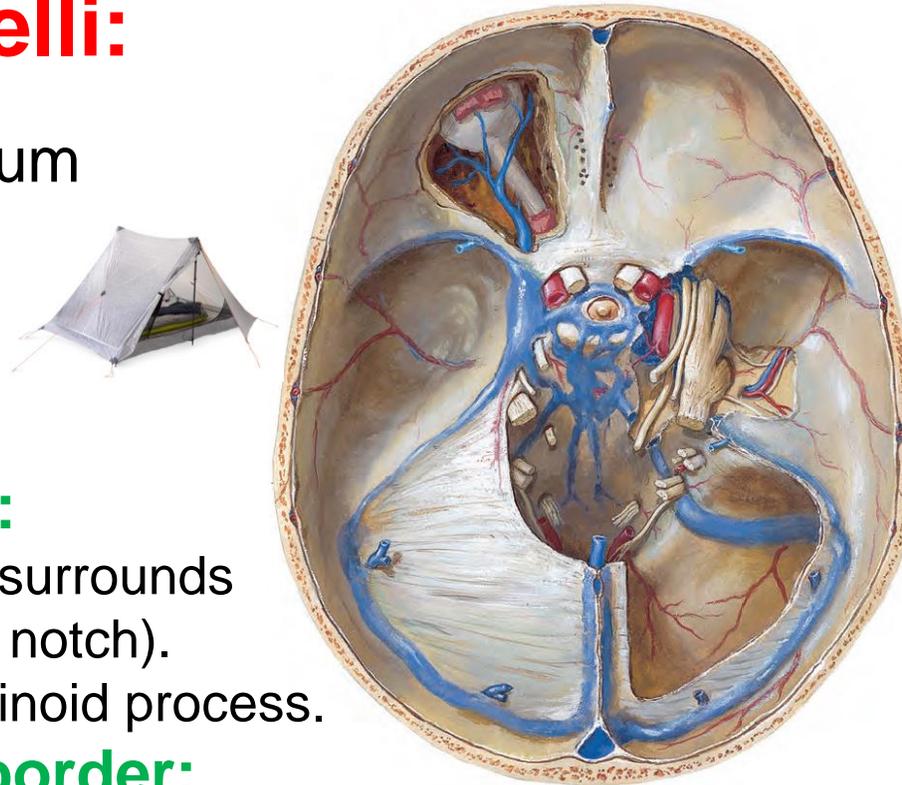
❑ **Attachment:**

▪ Free anterior border:

- ❖ U-shaped border that surrounds the midbrain (tentorial notch).
- ❖ Attached to anterior clinoid process.

▪ Attached Posterior border:

- ❖ Posterior clinoid process.
- ❖ Upper border of petrous part of temporal bone.
- ❖ Margins of groove for the transverse sinus.

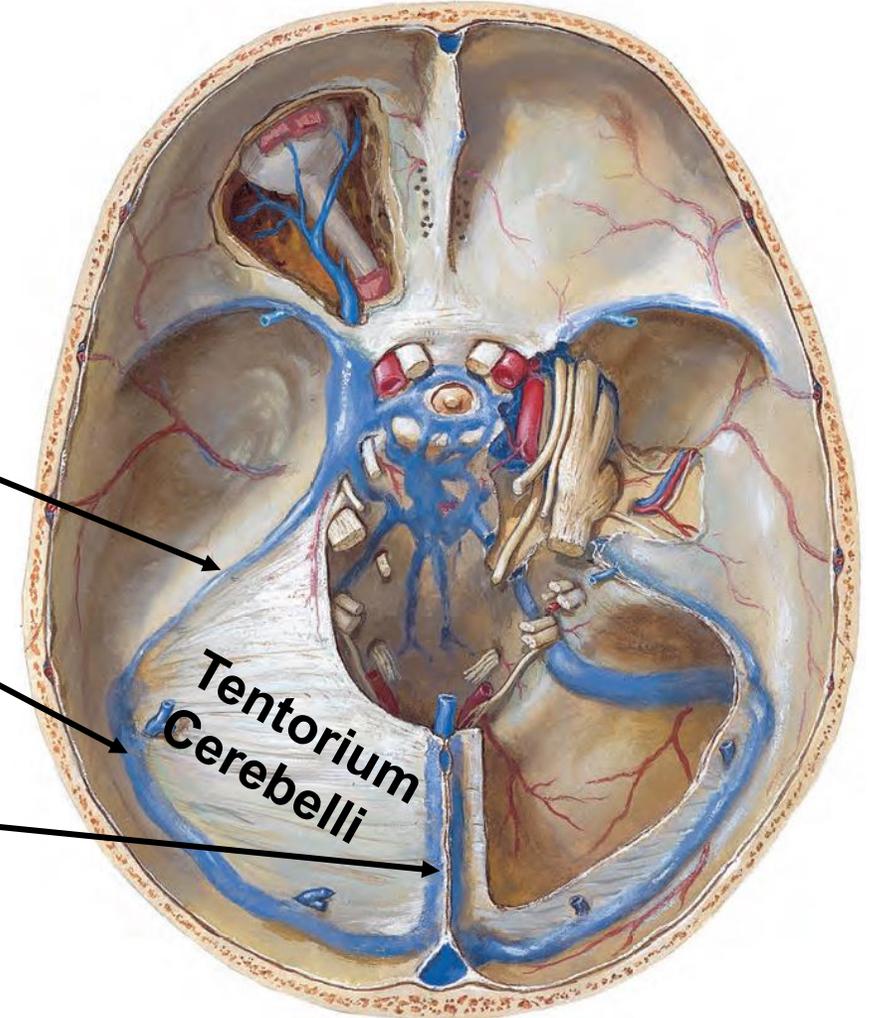


Dural Folds: Tentorium Cerebelli

❖ Tentorium Cerebelli:

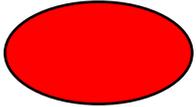
□ Sinuses:

- **The superior petrosal sinus:** at the upper border of petrous part of the temporal bone.
- **The transverse sinus:** at the groove of the transverse sinus
- **The straight sinus:** at the junction of the falx cerebri with the tentorium cerebelli in the median plane.



Dural Folds: Diaphragma Sellae

❖ Diaphragma Sellae:

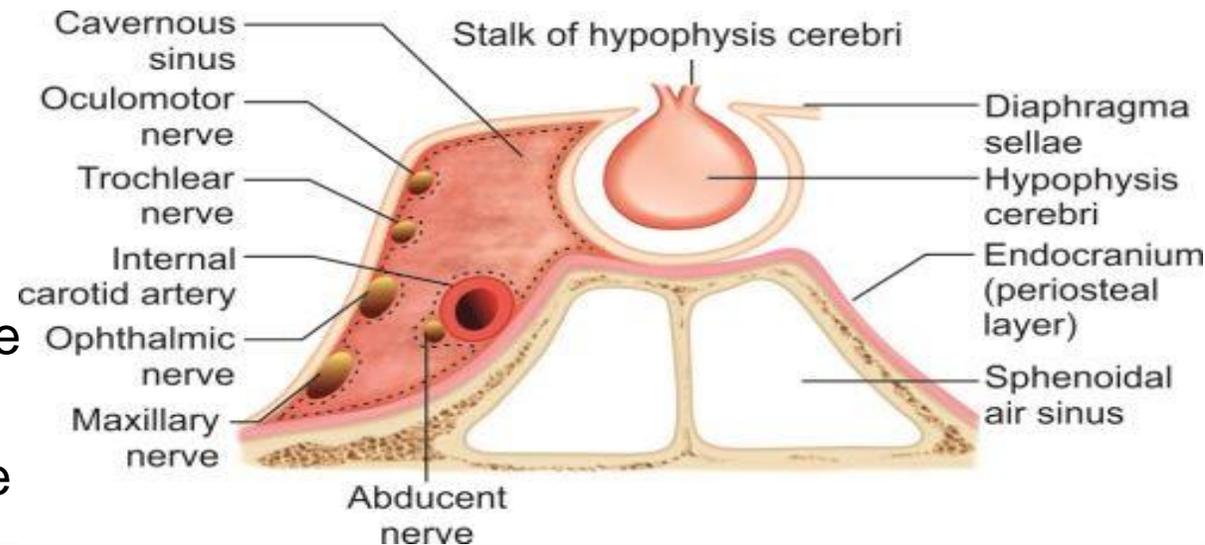
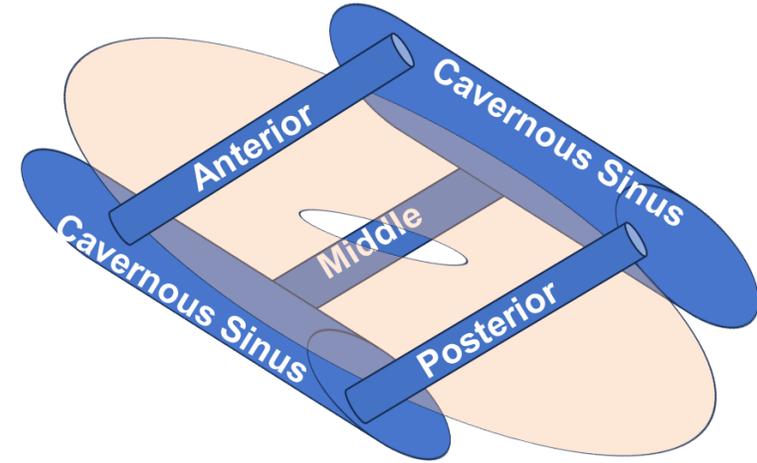
❑ **Shape:** Oval 

❑ **Attachment:**

- **Anteriorly:** to the tuberculum sellae between the anterior clinoid processes.
- **Posteriorly:** to the dorsum sellae between the posterior clinoid processes.
- Transmits the **infundibulum (stalk)** of the pituitary gland through a central hole.

❑ **Sinuses:**

- **Inter-cavernous Sinuses:** Connect the two cavernous sinuses
 - ✓ Anterior → Above diaphragma sellae
 - ✓ Middle: below it
 - ✓ Posterior → Above diaphragma sellae



Dural Sinuses

Single Sinuses

1. Superior Sagittal Sinus
2. Inferior Sagittal Sinus
3. Straight Sinus
4. Occipital Sinus
5. Basilar plexus of veins
6. Inter-cavernous sinuses:
 - a) Anterior
 - b) Middle
 - c) Posterior

For each sinus:

1. Site
2. Origin
3. Termination

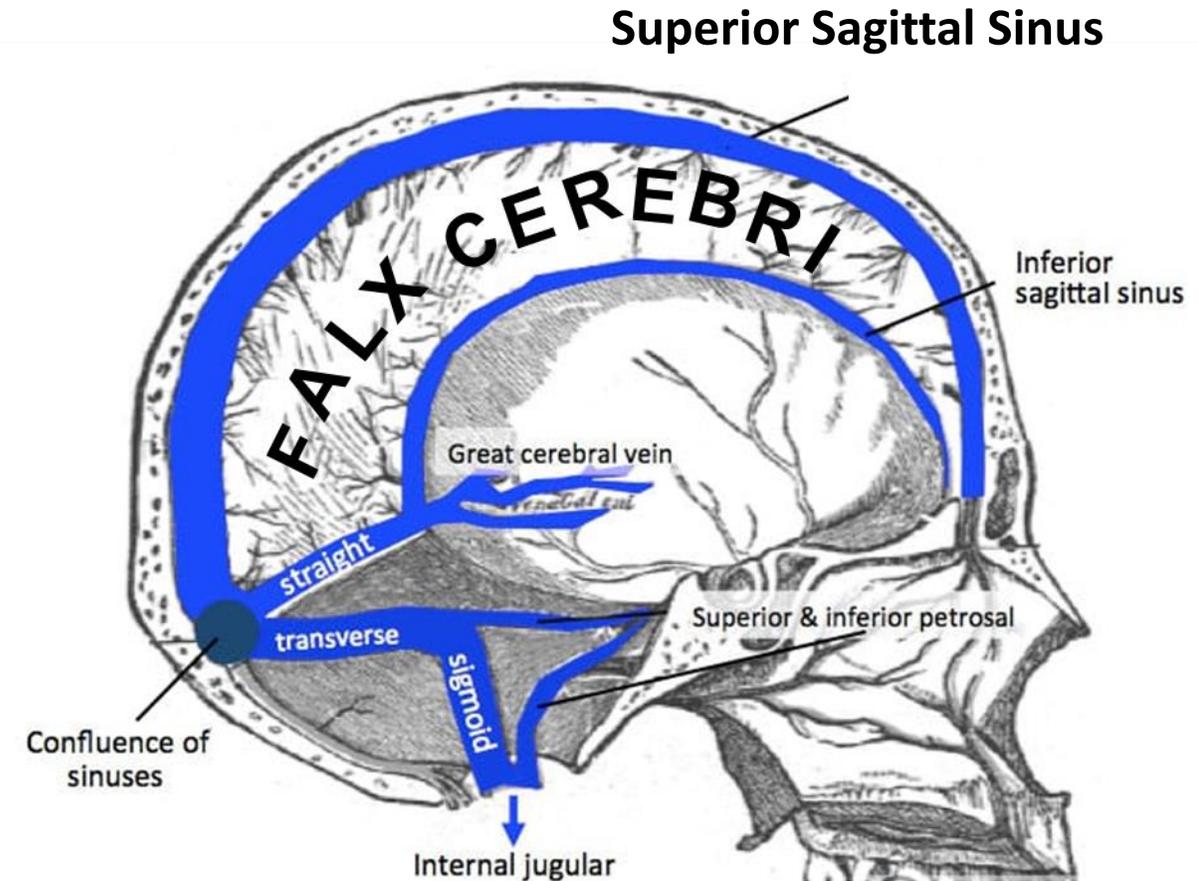
Paired Sinuses

1. Spheno-parietal Sinus
2. Cavernous Sinus
3. Superior Petrosal Sinus
4. Inferior Petrosal Sinus
5. Transverse Sinus
6. Sigmoid Sinus



Superior Sagittal Sinus

- ❑ **Beginning:** At the apex of falx cerebri above crista galli
- ❑ **Site:** In the upper convex border of falx cerebri
- ❑ **Termination:**
 - **Usually:** turns to the right and continues as the **right transverse sinus**.
 - **Sometimes,** unites with the straight sinus to form **confluence of sinuses**, which gives right and left venous sinuses



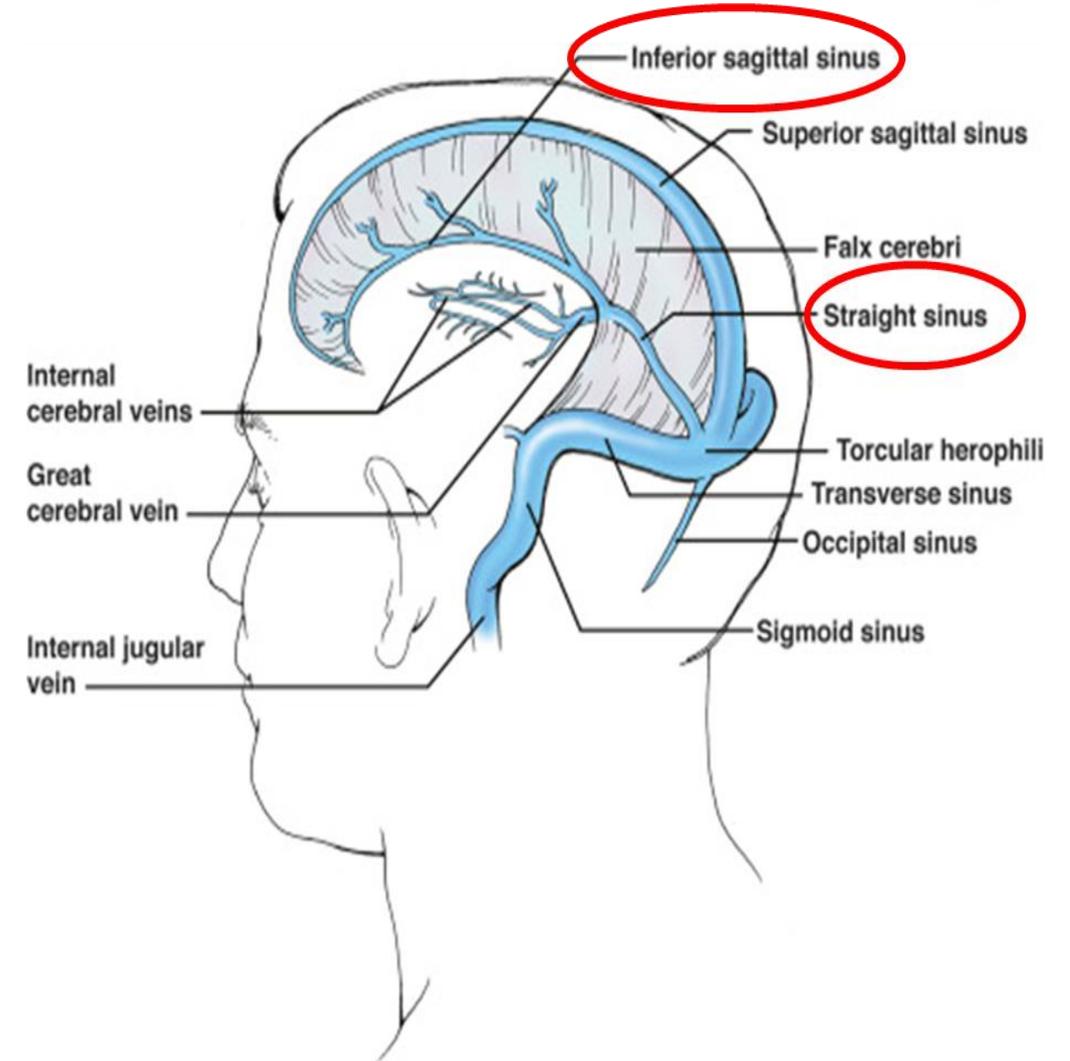
Inferior Sagittal & Straight Sinuses

❖ Inferior Sagittal Sinus:

- ❑ **Site:** In the posterior 2/3 of the lower free margin of falx cerebri
- ❑ **Termination:**
Joins the great cerebral vein (of Galen) to form **the straight sinus** at the anterior free border of tentorium cerebelli.

❖ Straight Sinus:

- ❑ **Site:** along a line at the junction of the base of the falx cerebri with the tentorium cerebelli
- ❑ **Termination:**
 - Mainly turns to the left forming the left transverse sinus
 - May open into confluence of sinuses



Transverse Sinuses

❖ Transverse Sinuses:

❑ Beginning:

❑ Usually:

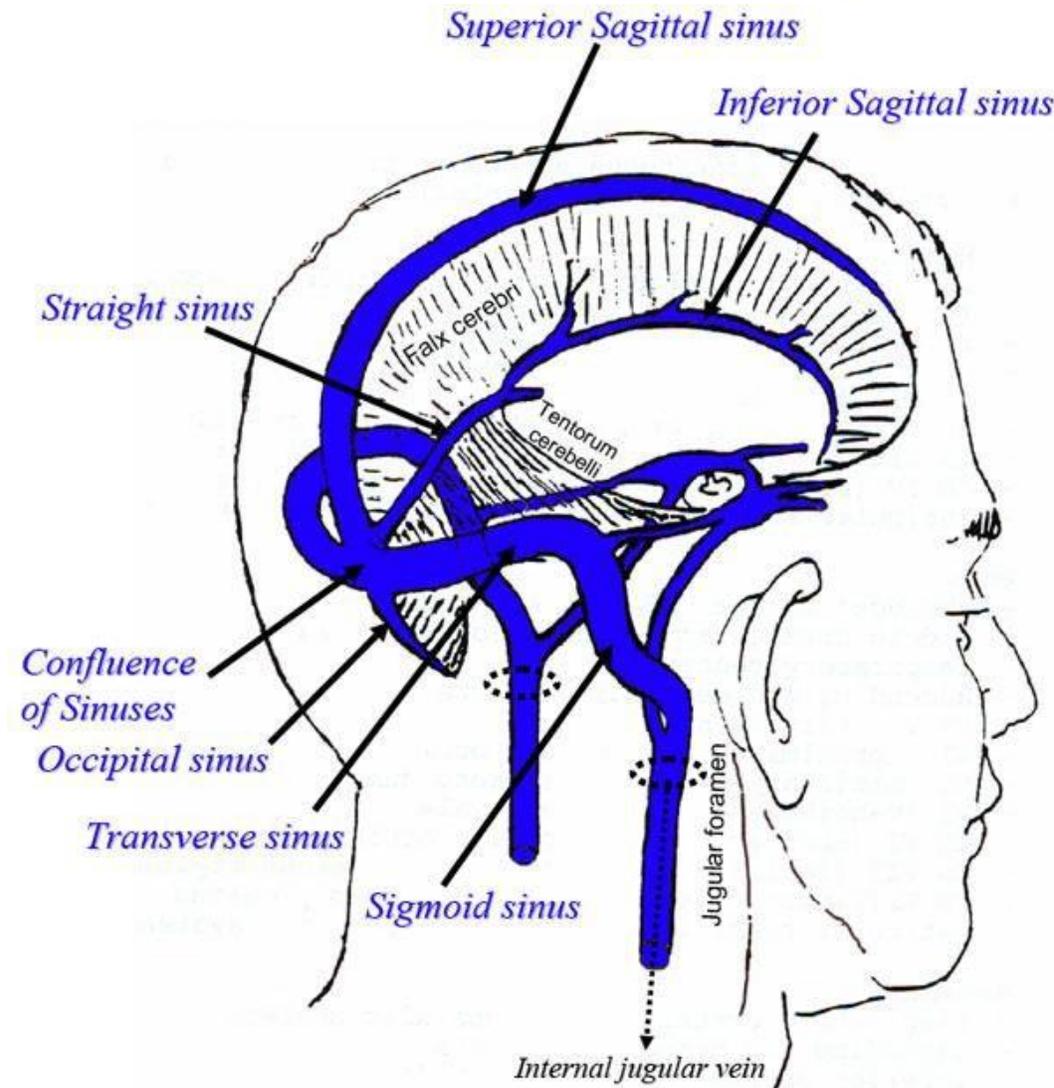
- Right side from the superior sagittal sinus
- Left side: from the straight sinus

❑ Or may come from confluence of sinuses.

❑ Site: Along the transverse groove of the occipital bone in the attached margin of the tentorium cerebelli.

❑ Termination: Opposite the mastoid process by becoming the sigmoid sinus.

❑ Tributaries: Superior petrosal sinus.



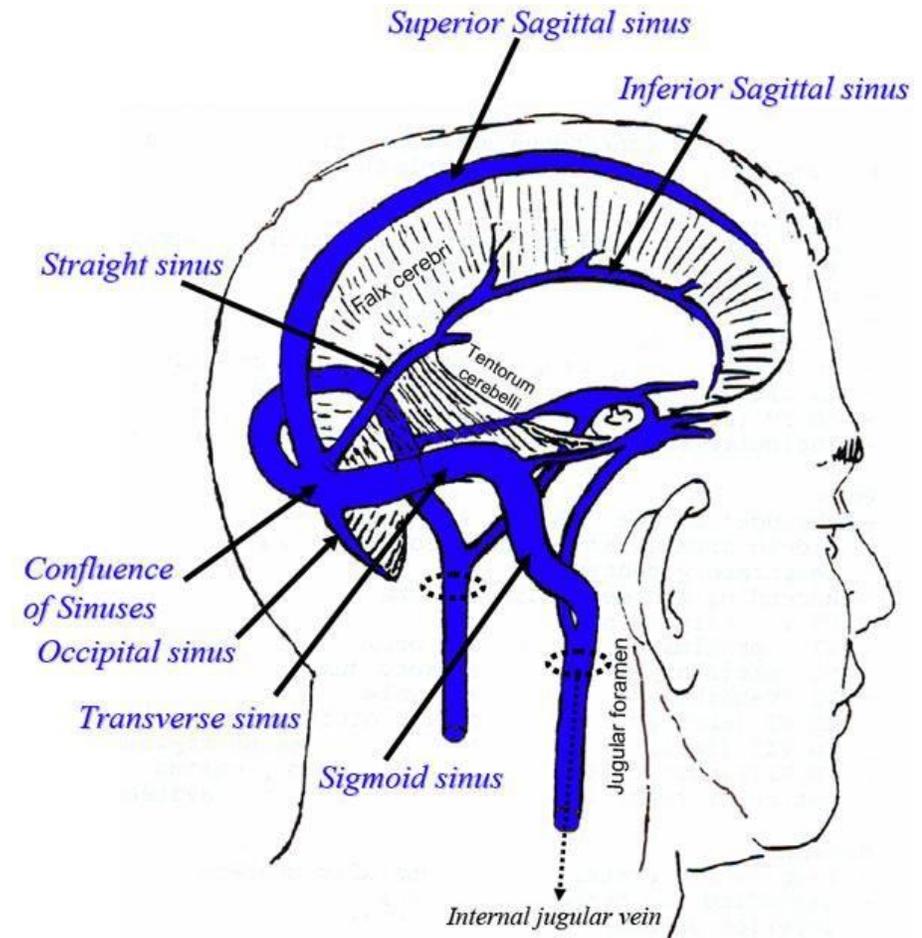
Sigmoid and Occipital sinuses

❖ Sigmoid Sinuses:

- ❑ **Beginning:** Continuation of the transverse sinuses opposite the mastoid processes.
- ❑ **Site:** In the grooves for sigmoid sinus.
- ❑ **Termination:** Passes through the jugular foramen of the temporal bone to become the Internal jugular vein on each side.
- ❑ **Tributaries:** Occipital Sinus

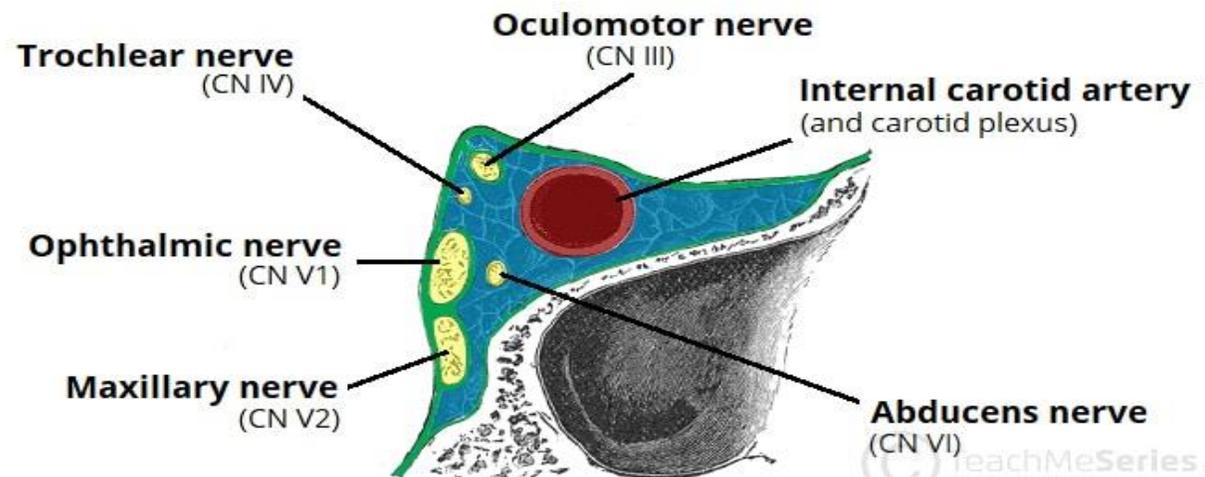
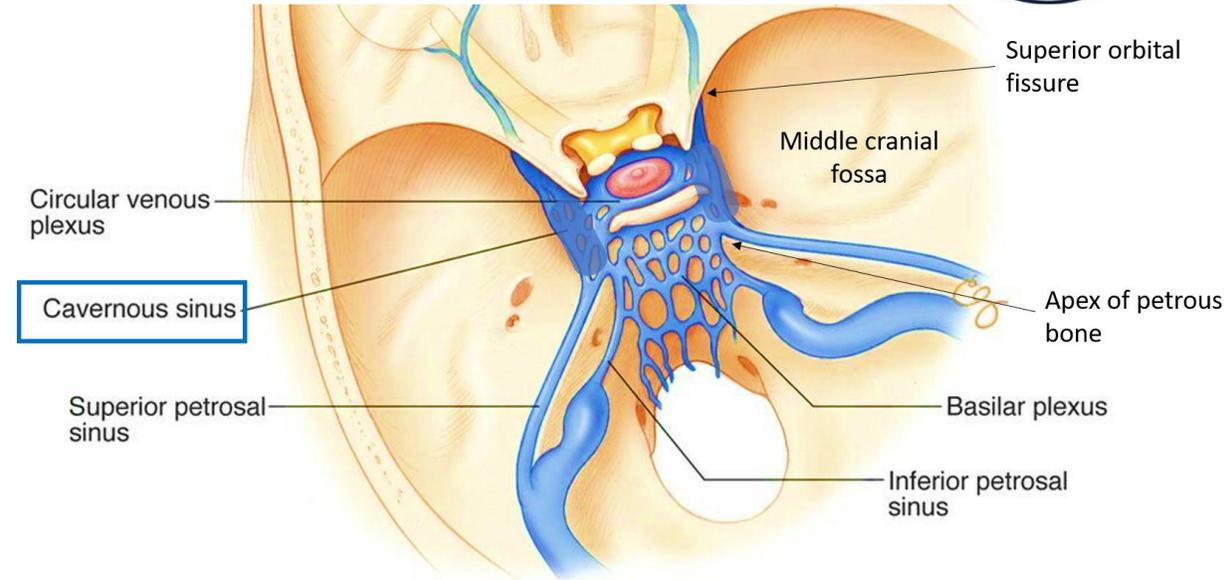
❖ Occipital Sinus:

- ❑ **Beginning:** From the 2 transverse sinuses
- ❑ **Site:** In the attached margin of the falx cerebelli.
- ❑ **Termination:** Into confluence of sinuses or Sigmoid sinus.



Cavernous Sinus

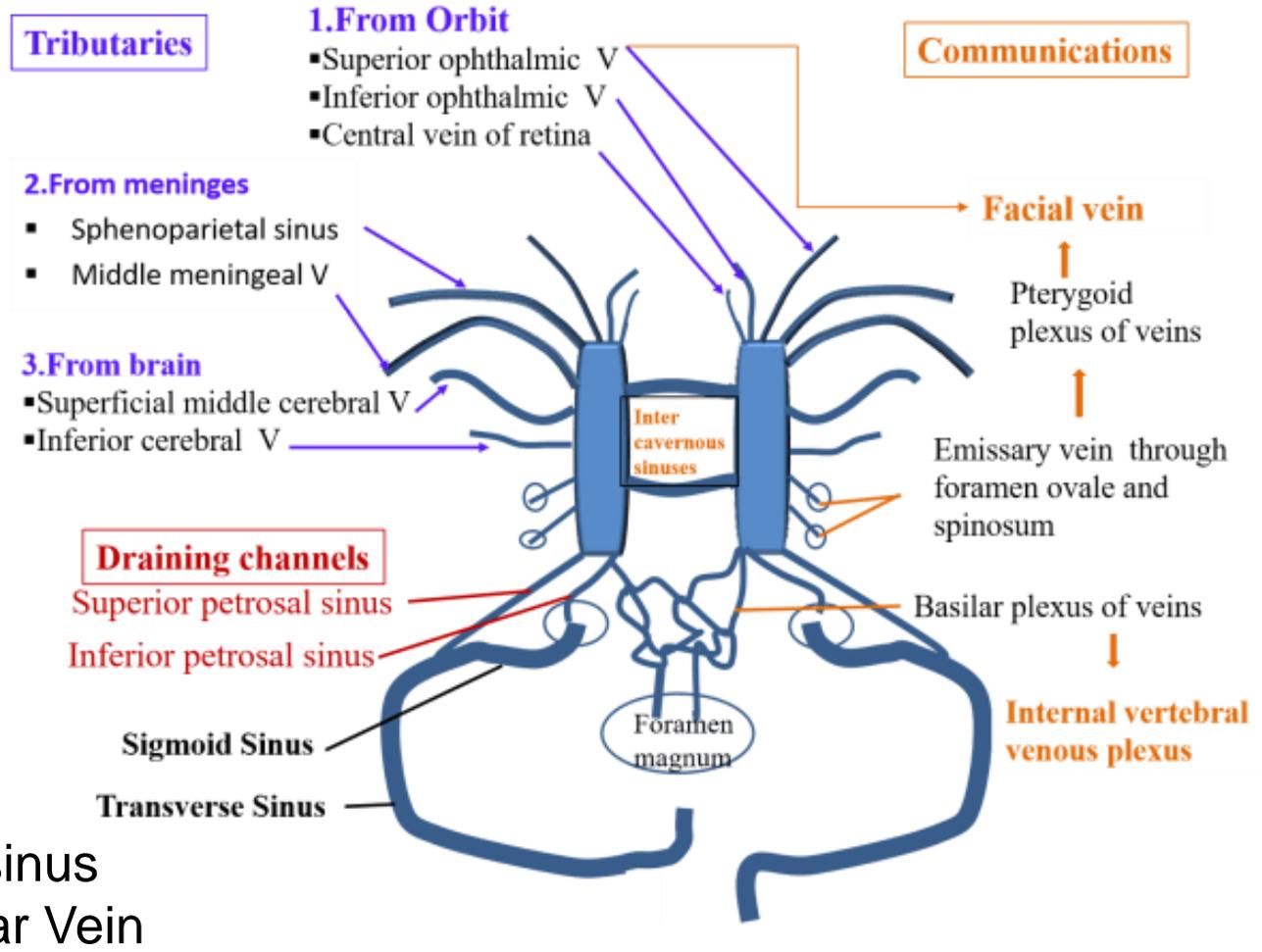
- ❑ **Site:** In the middle cranial fossa on either side of the pituitary gland and sella turcica.
- ❑ **Extent:** from the medial end of the superior orbital fissure to the apex of the petrous part of temporal bone.
- ❑ **Relations:** Medially & Inferiorly to the body of the sphenoid & pituitary gland
- ❑ **Structures inside:**
 1. Internal Carotid Artery (ICA).
 2. Abducent nerve: lies inferolateral to the ICA.
- ❑ **Structures in the lateral wall:**
 1. Oculomotor nerve (CN III)
 2. Trochlear nerve (CN IV)
 3. Ophthalmic nerve (CN V1)
 4. Maxillary nerve (CN V2)



Cavernous Sinus

□ Tributaries & Communications:

- ❖ **Medially:** Communicate with each other with 3 inter-cavernous sinuses
- ❖ **Anteriorly:**
 1. Ophthalmic vein: connecting it with anterior facial vein.
 2. Central vein of the retina.
 3. Sphenoparietal sinus.
- ❖ **Superiorly:** Cerebral veins.
- ❖ **Inferiorly:** emissary veins connecting it with the pterygoid and pharyngeal plexus.
- ❖ **Posteriorly (Termination):**
 1. Superior petrosal sinus → Transverse sinus
 2. Inferior petrosal sinus → Internal Jugular Vein



Sphenoparietal and petrosal sinuses

❖ Sphenoparietal sinus:

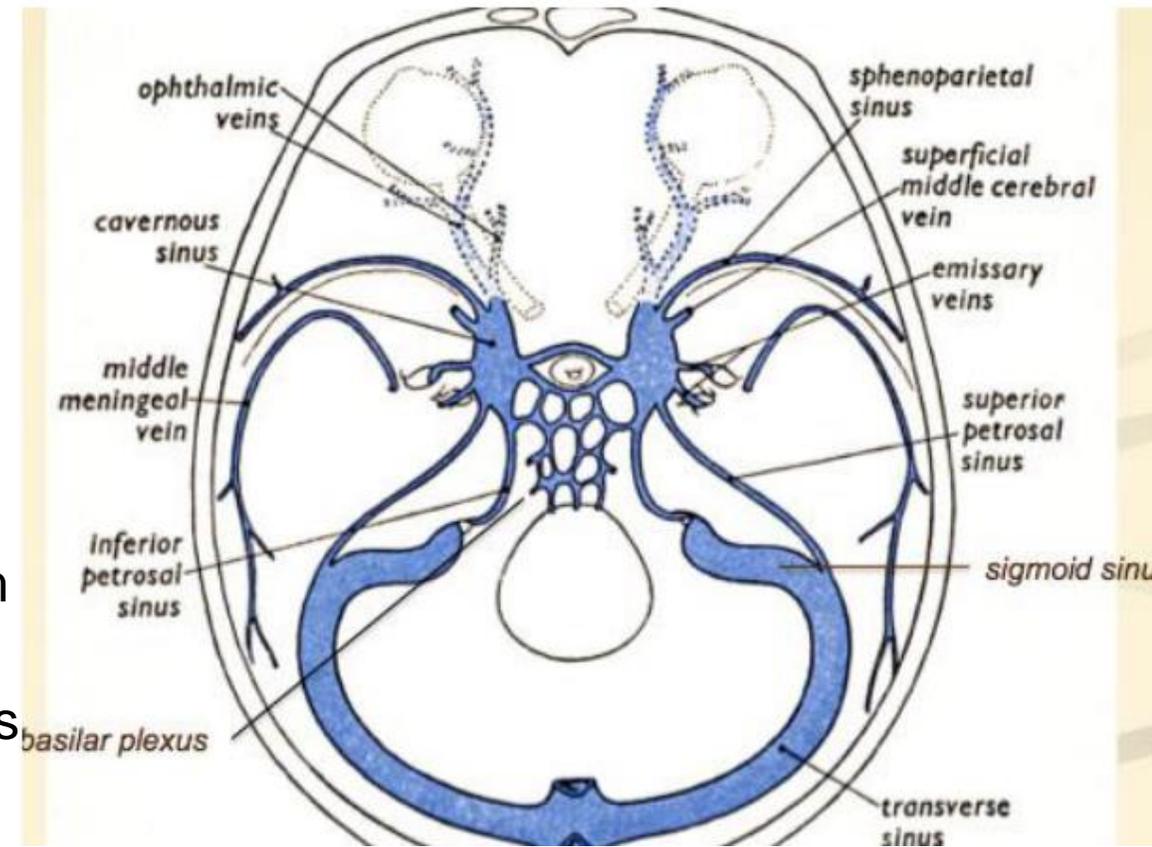
- ❑ **Site:** Along the free border of the lesser wing of sphenoid.
- ❑ **Termination:** Into the anterolateral aspect of the cavernous sinus

❖ Superior petrosal sinus:

- ❑ **Site:** along the upper border of petrous part of the temporal bone in the attached margin of the tentorium cerebelli
- ❑ **Connection:** Cavernous sinus → Transverse Sinus

❖ Inferior petrosal sinus:

- ❑ **Site:** between the petrous temporal and occipital bones.
- ❑ **Connection:** Cavernous sinus → Internal Jugular vein



Basilar plexus and Intercavernous sinuses

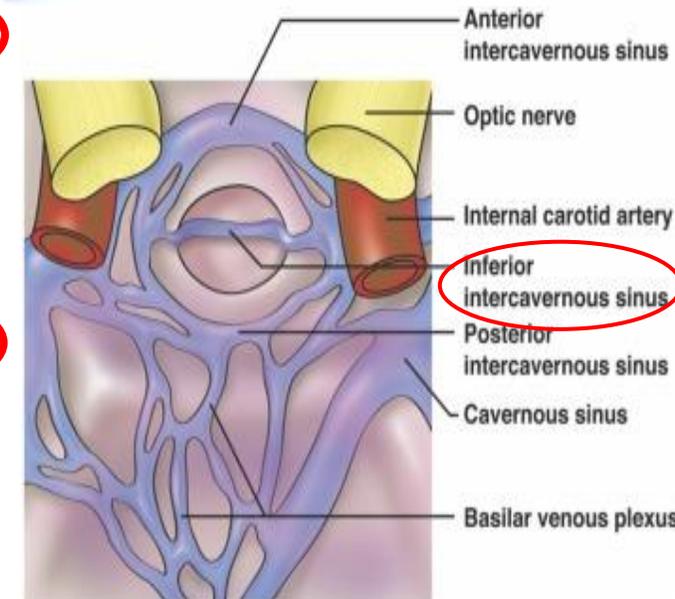
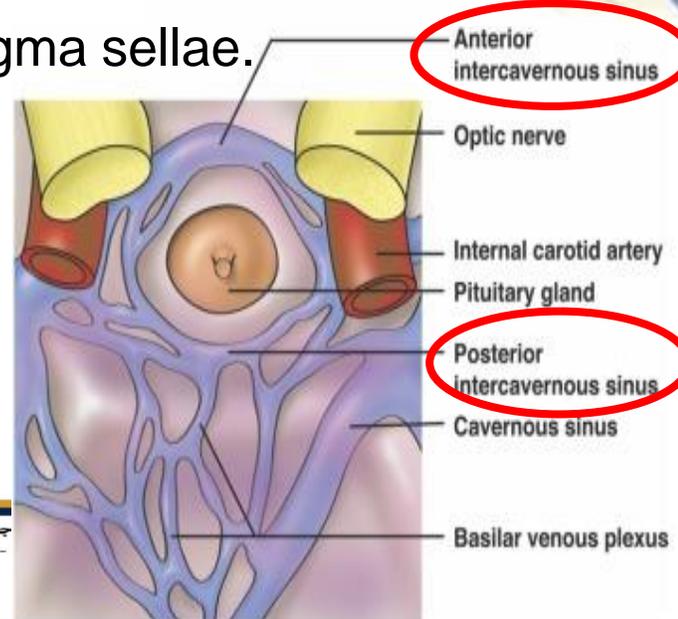
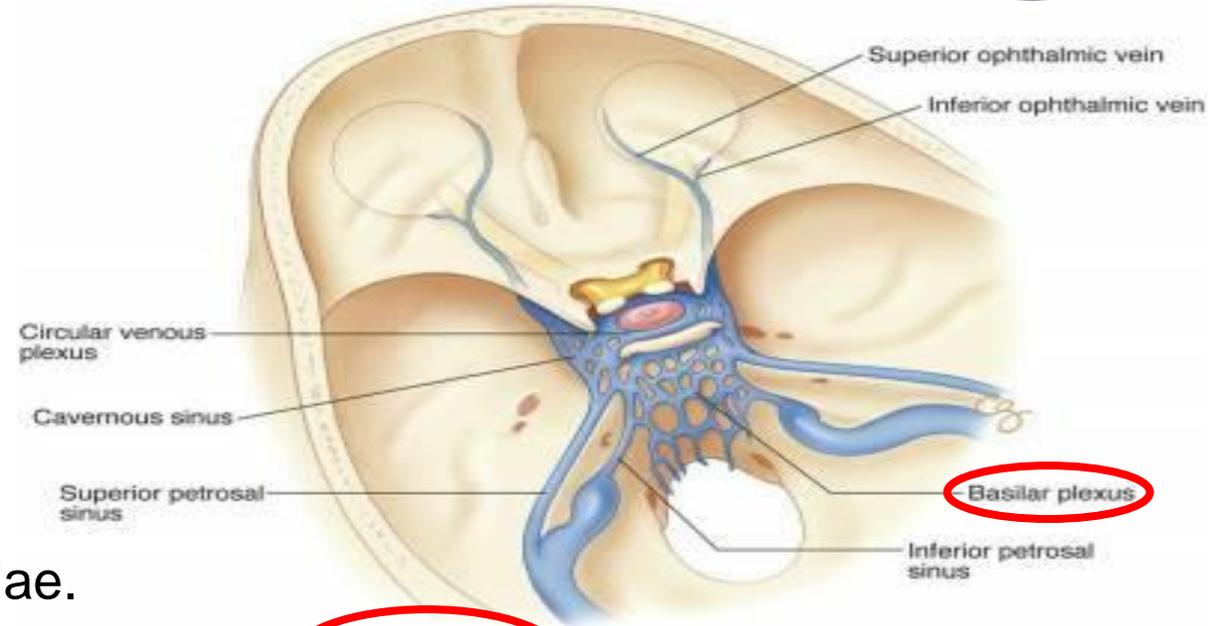
❖ Basilar Venous Plexus:

- ❑ **Site:** Lying on the clivus of the skull
- ❑ **Connection:** Connects the two inferior petrosal sinuses together.

❖ Inter-cavernous Sinuses:

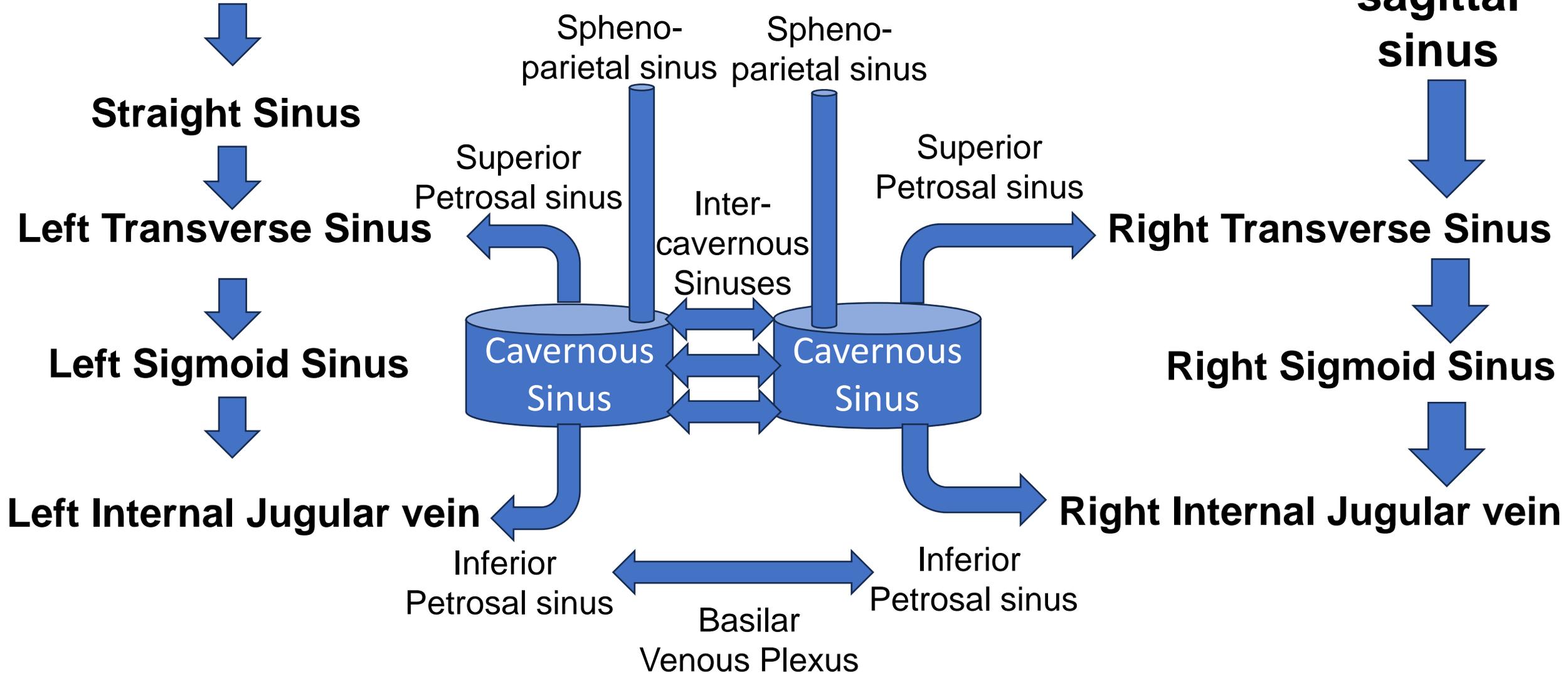
- ❑ **Site:**
 1. **Anterior:** in the anterior margin of diaphragma sellae.
 2. **Posterior:** in the posterior margin of diaphragma sellae.
 3. **Middle:** below the pituitary gland.

- ❑ **Connection:**
Connect the two cavernous sinuses



Summary of Dural venous Sinus connections

Great cerebral vein + Inferior sagittal sinus





THANK

YOU

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