A NEET SS (SURGERY) PREPARATION COURSE BY MARROW, WITH A TEAM OF SELECTED SUPER-SPECIALITY FACULTY

SURGERY NEET SS

NEURO SURGERY

PREPARATION COURSE BY MARROW, WITH A TEAM OF SELECTED SUPER-SPECIALITY FACULTY

NEET SS SURGERY

NEUROLOGY

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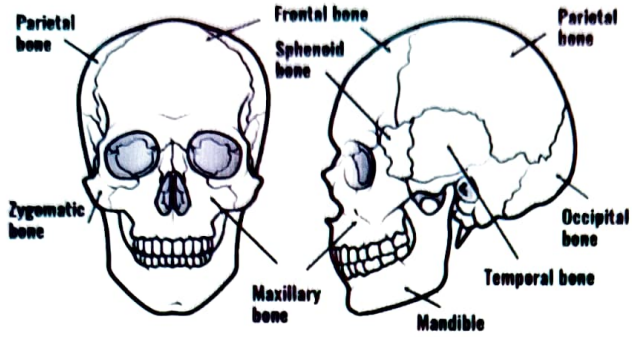
CONTENT

NEUROANATOMY & LOCALIZATION

GROSS ANATOMY OF BRAIN

Skull bones

00:00:11



Major skull bones :

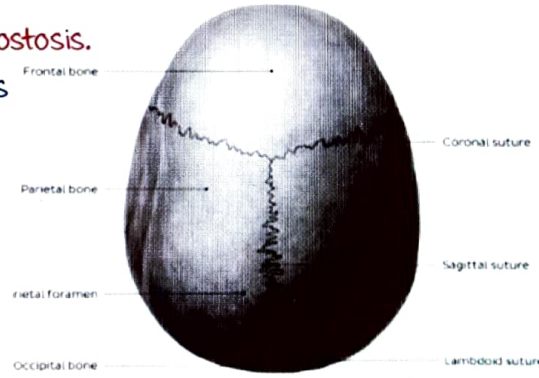
- Frontal
- Parietal
- Temporal
- Sphenoid bone → covers more of base of skull.
- Occipital.

Fusion of sutures :

Pathological : craniosynostosis.

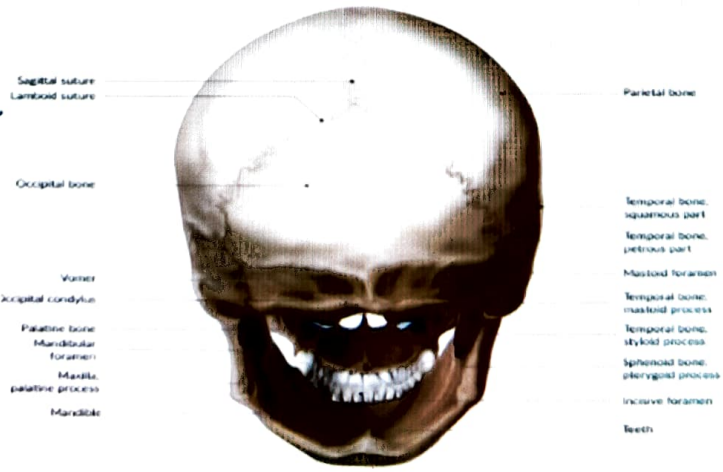
Surgically significant as defines landmark and window for surgery.

No intraoperative exploration followed nowadays.



Sutures :

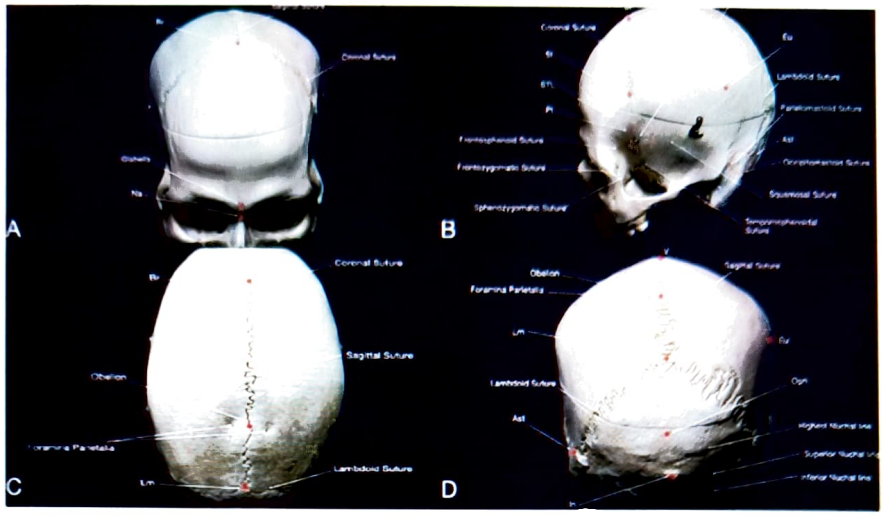
- Coronal
- Sagittal
- Lambdoid.

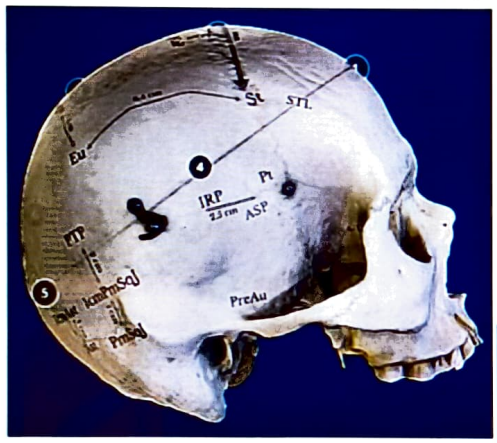


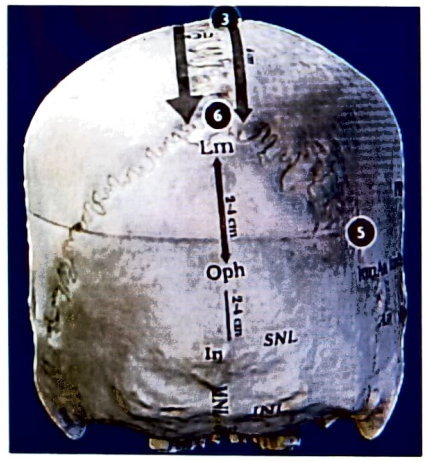
Craniometric points :

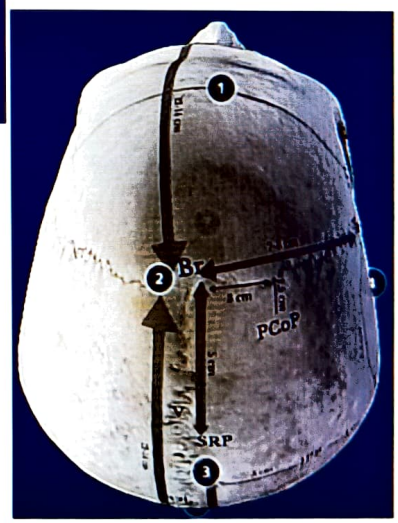
Cranio : skull, metric : measure .

Defines locations of various structures of brain









Inion :

Lowest part.

Below it is subocciput.

Significant :

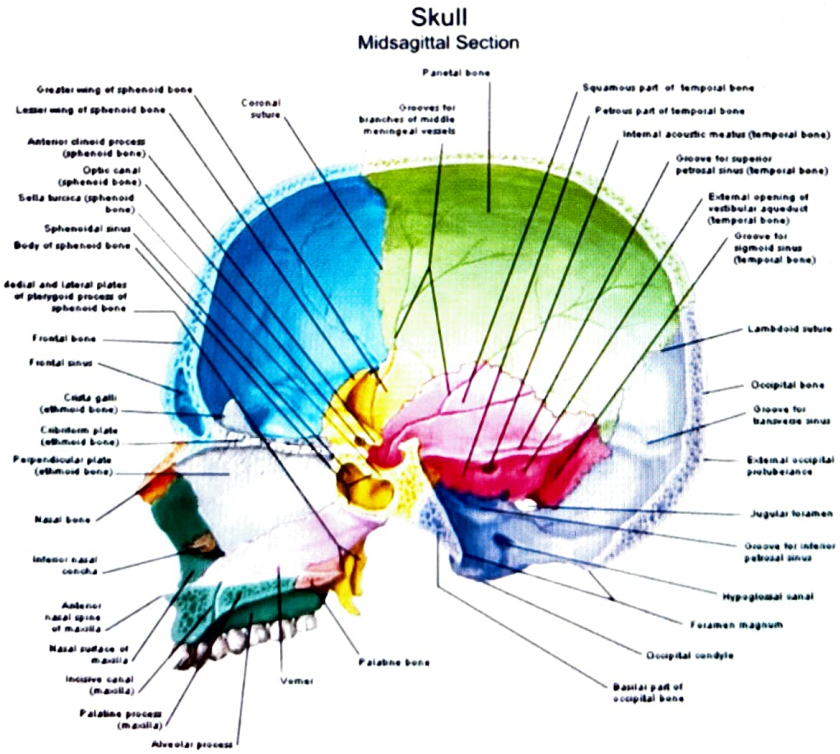
Measurements done from nasion & inion .

Points are described from these points.

Opisthion : Posterior bulge on skull.
Lambda : Lambdoid & sagittal suture joins.
Bregma : Coronal & sagittal suture joins.
Vertex : Topmost point
Nasion : Nose joins skull.
Glabella : Above nasion.

Example :
Central sulcus : 5 cm behind coronal suture.
Significant : Location of motor strip.
If enters through it → motor dysfunction/paralysis of patient.
Safe point of entry : Enter at coronal suture.

Pteriyon :
Point where sphenoid, temporal & frontal bone joins.
Marks sylvian fissure.
Sylvian fissure : Entry point of aneurysm surgery.
Asterion :
Few cms behind mastoid point.
Access point for cerebellopontine angle tumors.

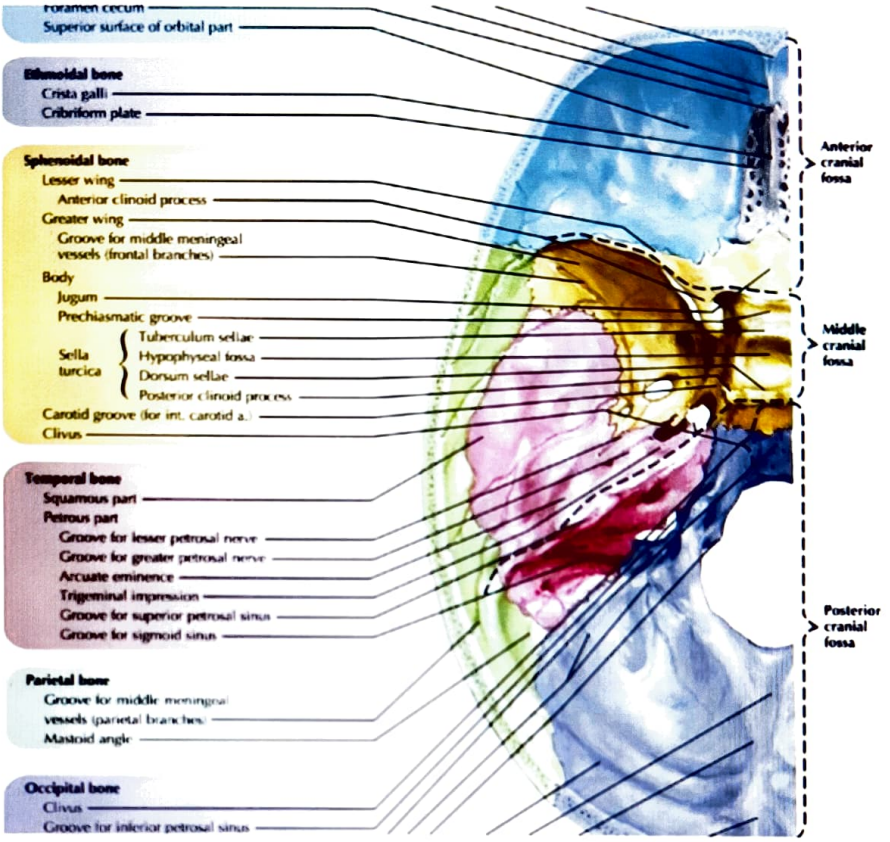


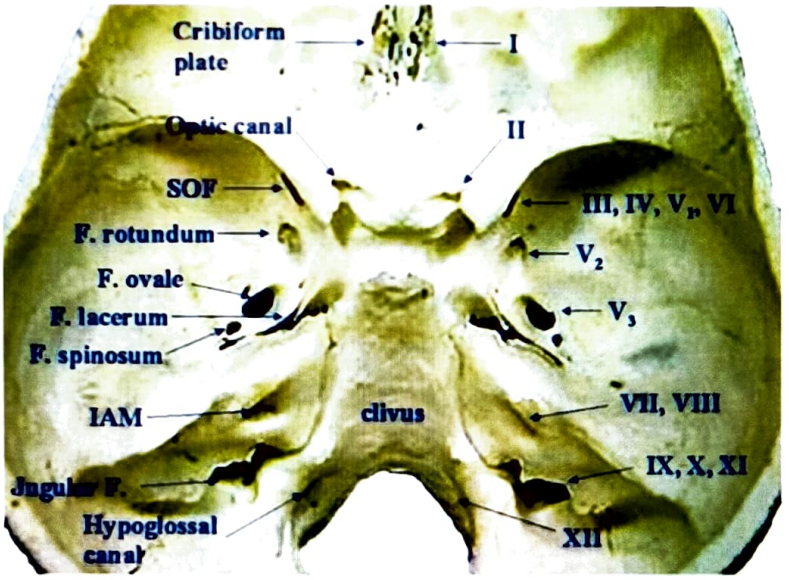
Ethmoid : base of anterior part of skull.

Crista galli.

Vomer : helps define trajectory in pituitary surgery.

Foramens :





Key foramens :	
Foramen calcum	Emissary veins
Olfactory foramina	Olfactory nerve
Optic canal	Optic nerve (CNIII), ophthalmic artery, dural sheath of optic nerve
Superior orbital fissure	Oculomator nerve (CNIII), trochlear nerve (CN IV), ophthalmic division of the trgeminal nerve (CNV), abducent nerve (CNVI), ophthalmic veins
Foramen rotundum	Maxillary division of the trigeminal nerve (CN V2)
Foramen ovale	Mandibular division of the trigeminal nerve (CN V3), accessory meningeal branch ofmaxillary artery, emissary vein (lesser petrosal nerve)
Foramen spinosum	Middle meningeal artery
Foramen lacerum	Greater petrosal nerve
Carotid canal	Internal carotid artery
Internal acoustic foramen	Facial nerve (CNVII), Vestibulocochlear nerve (CNVIII)
Jugular foramen	Glossopharyngeal nerve (CNIX), vagus nerve (CNX), descending portion of the spinal accessory nerve (CNXI), internal jugular vein
Hypoglossal canal	Hypoglossal nerve (CNXII)
Foramen magnum	Brainstem/spinal cord, vertebral arteries, ascending portion of the spinal accessory nerve(CNXI)

Anterior fossa :

Cribriform plate → olfactory nerves.

Posterior fossa :

Clivus with internal acoustic meatus.

Significant in vestibular schwannoma surgery.

Carries 7th & 8th CN.

Jugular foramen : Large veins of internal jugular through it.

Hypoglossal canal → Hypoglossal nerve (CN XII).

Middle cranial fossa :

Optic canal.

Superior orbital fissure.

Foramen rotundum.
Foramen ovale.
Foramen spinosum
Foramen lacerum.

Hydrocephalus :
Blockage of ventricles.
In pressure relieving → drains inserted.
Points for insertion of ventricular catheters are :
Kochers > Keens > fraziers > Dandy's point.

Kochers- 3 cm lateral to midline and 1 cm anterior to coronal suture or 11 cm posterior t nasion

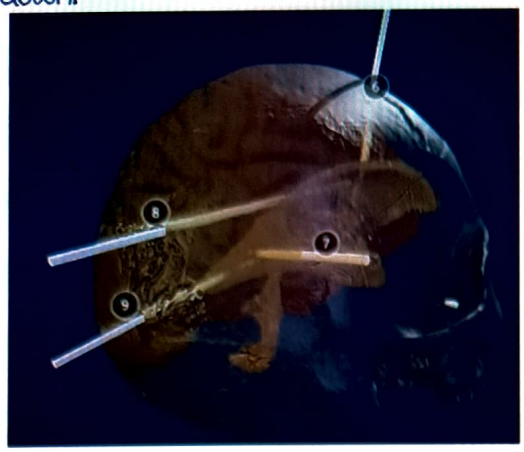
Keens- 3 cm above and 3cm lateral to helix of the pinna

Fraziers- 3 cm lateral to midline and 6 cm superior to the inion

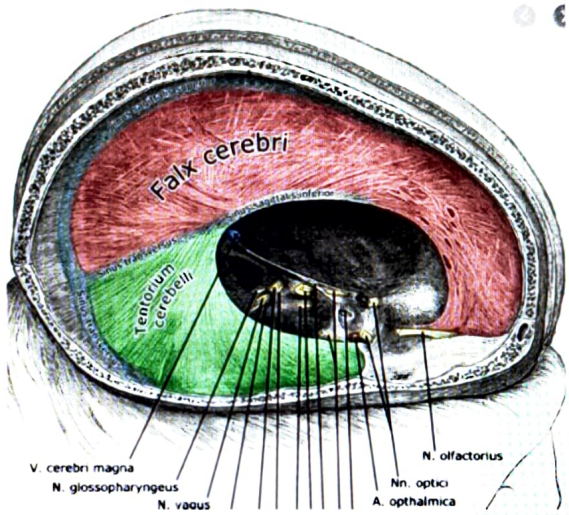
Dandy's- 3 cm lateral to the midline and 3 cm superior to the inion

6 : Kochers point
7 : Keens point

Fraziers point : enters posterior part of ventricular system.
Dandy's point : enters occipital ventricles but from lower down.

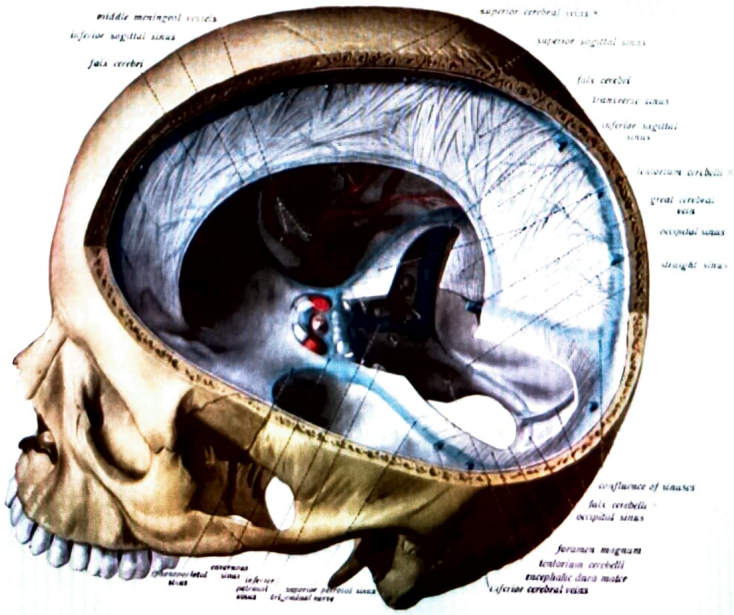


8 : Fraziers point
9 : Dandy's point

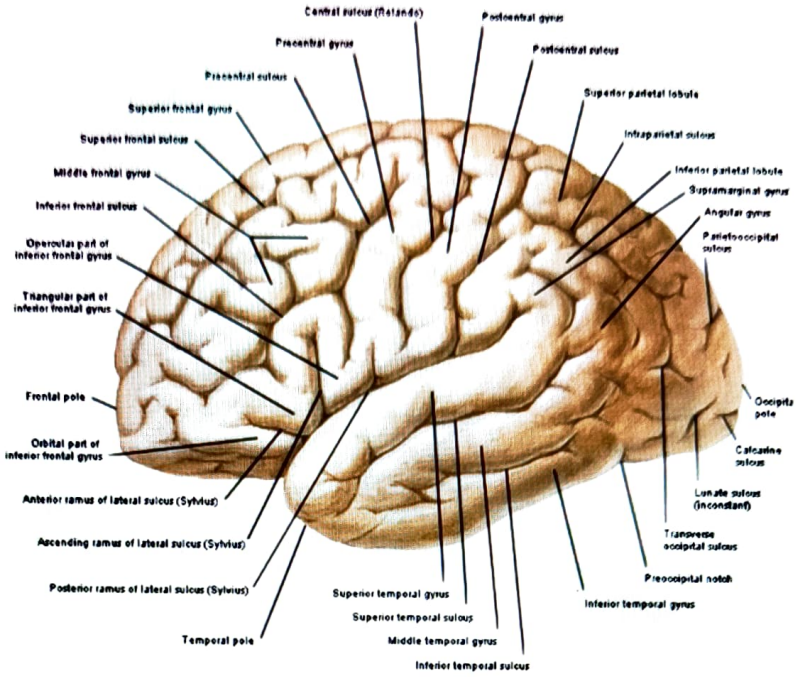


Falx cerebri :
Thick sheat of dural investation.
Divides into a hemisphere.

Tentorium cerebri :
Wing like structure.

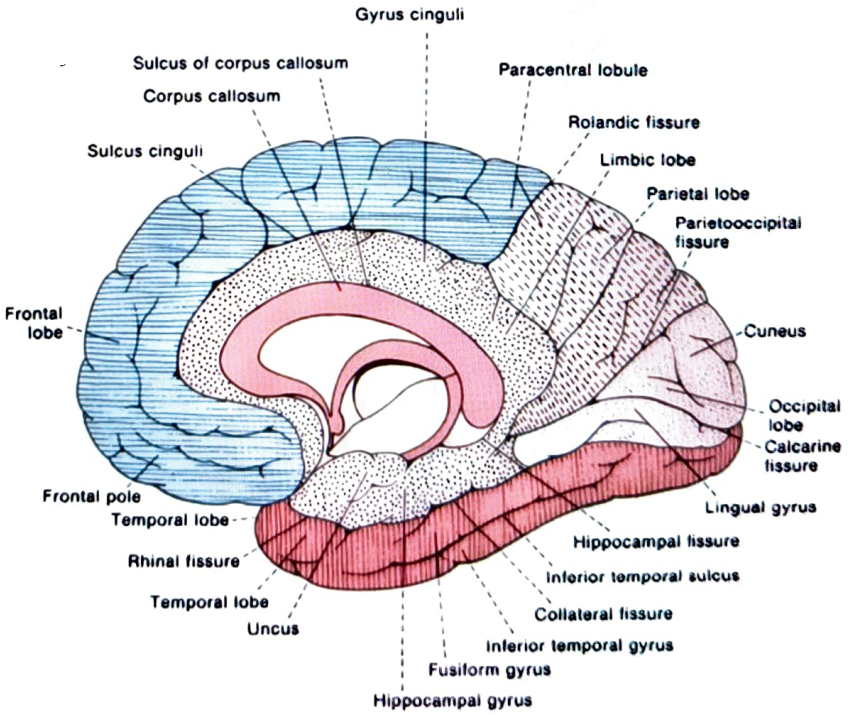


Cerebrum : Lateral view

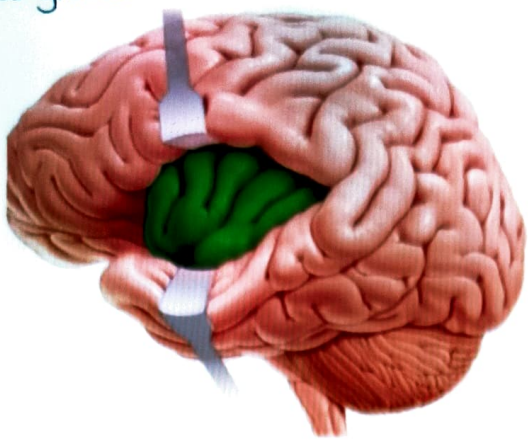


4 lobes/5 lobes including corpus callosum as a lobe.

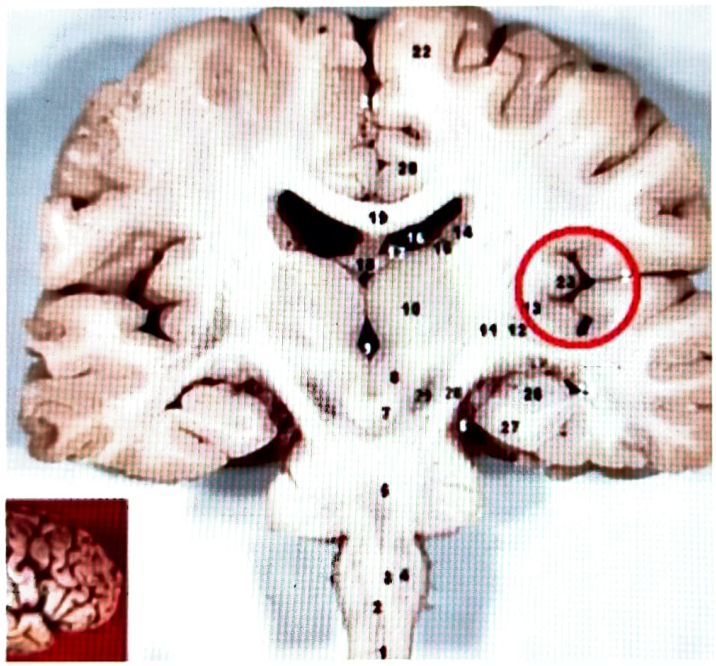
Central sulcus : Divides frontal & parietal lobe.

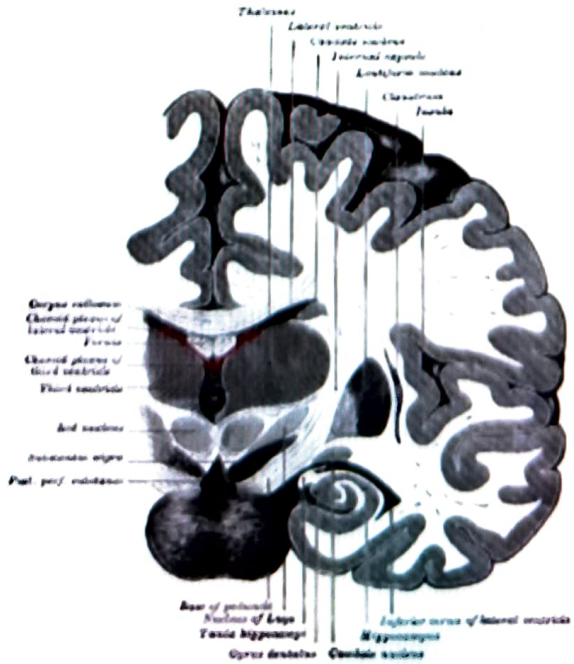


Insular glioma :

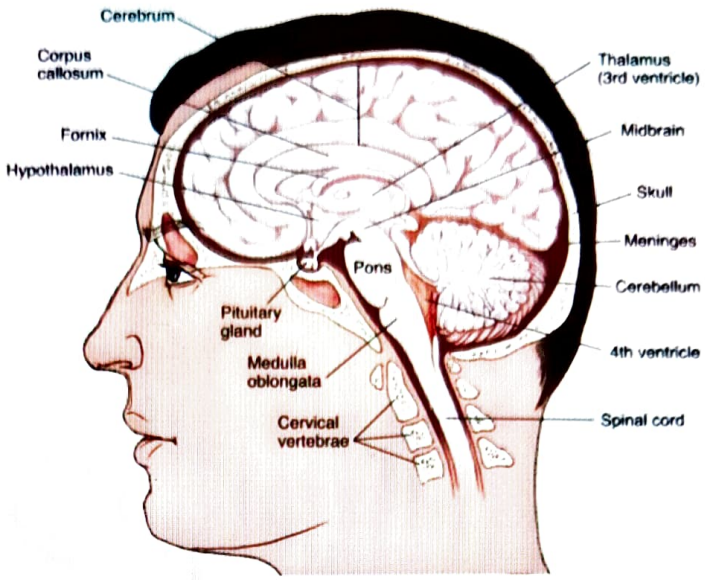


Coronal section :





Deep part of brain :



Cingulate gyrus : Extending from frontal to parietal.

Corpus callosum :

Lies below ciingulate gyrus.

Parts :

Rostrum : Anterior beak like.

Genu : Turn.

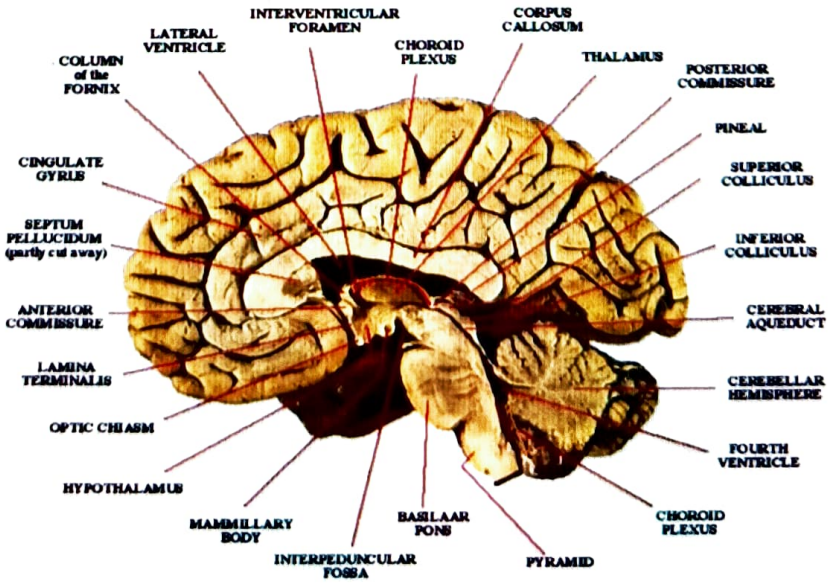
Body.

Splenium : Posterior part.

Thick band of nerve fibres connectings a hemisphere.

If cut off → left & right hemisphere behave seperately.

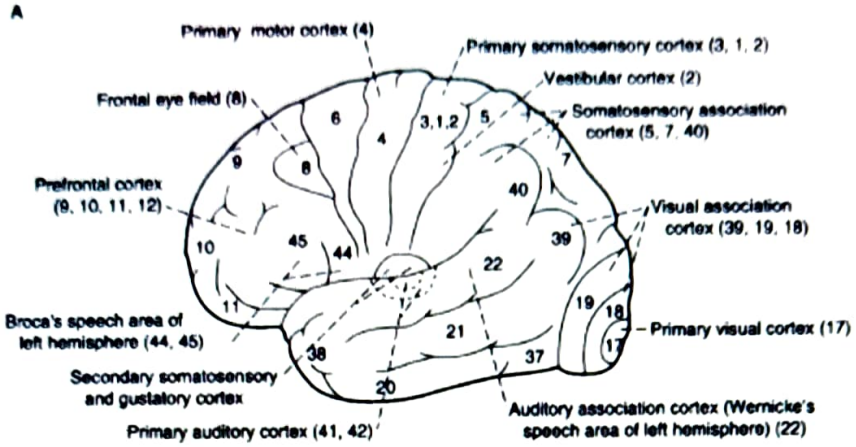
Example : Phantom hand syndrome (hand tries to strangle).

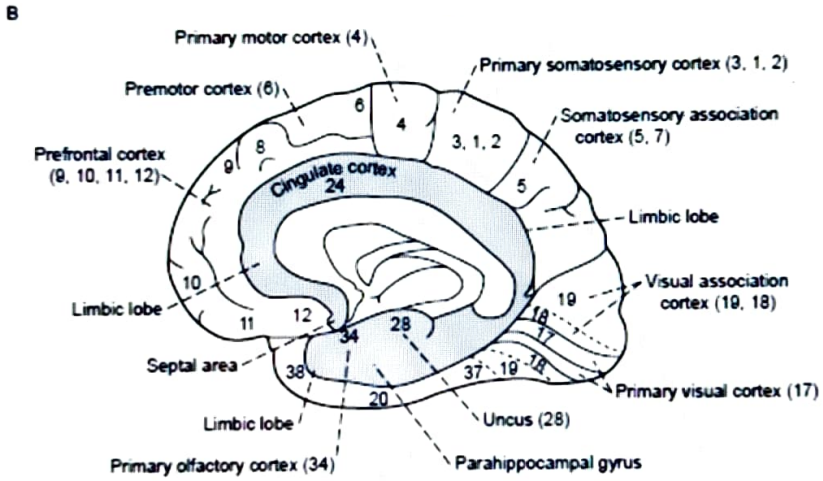


Sulci & gyri :

Frontal lobe gyri : Superior, middle, inferior.

Temporal lobe gyri : Superior, middle, inferior.





Primary motor cortex :

Area 4 : Controls motor function of opposite are.

Area 8 :

Frontal eyefield.

Conjugate movement of eye.

If defective : sees only 1 side & ignores other side.

Speech area : Broca's area 44 & 45.

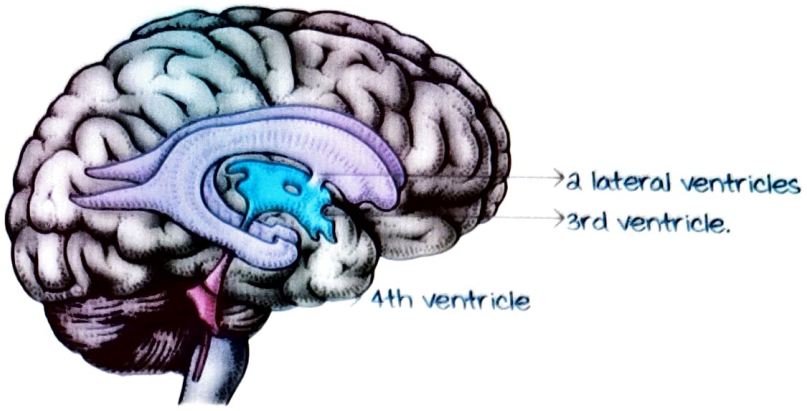
Primary auditory cortex :

Close to insular cortex on temporal lobe.

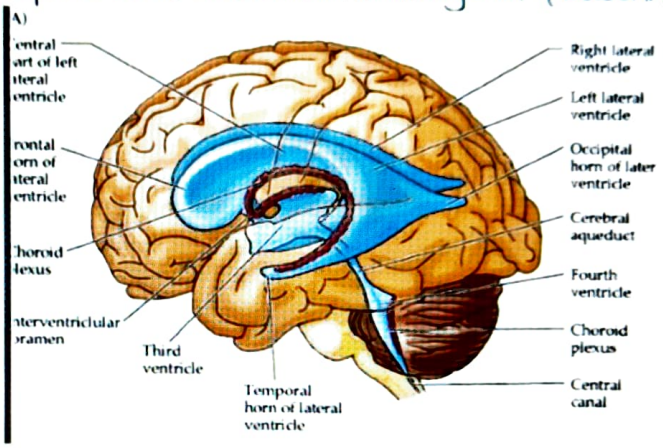
Wernicke's areas.

Primary visual cortex (17).

Ventricles :



Lateral ventricles → Foramen of monroi → 3rd ventricles → Aqueduct of sylvius → 4th ventricles → drains to central canal of spinal cord + Foramen of magendi & Luschka.



Choroid plexus :

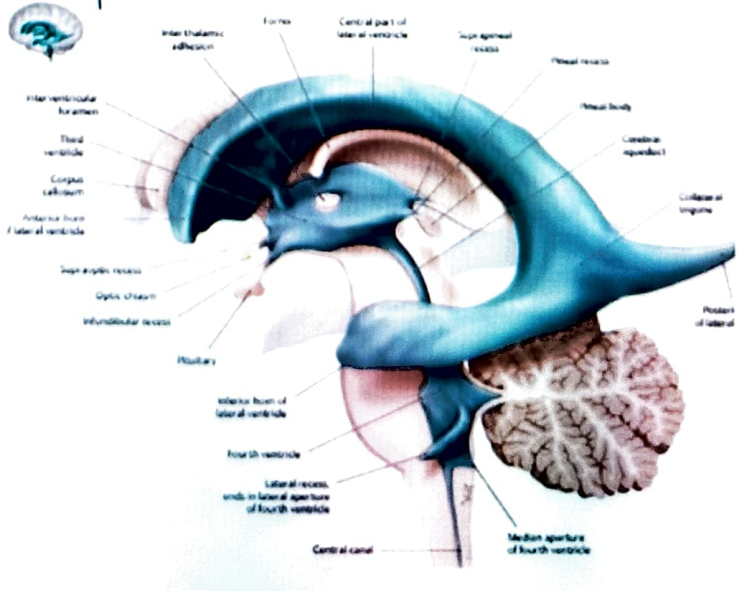
Produces CSF (nutritive).

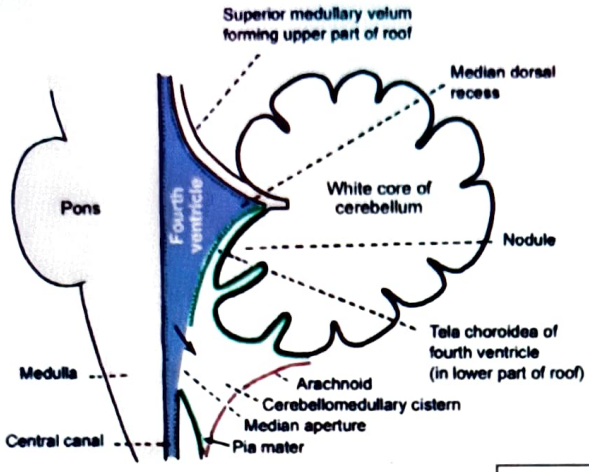
Present in lateral, 3rd & 4th ventricle.

Distance of frontal horn from cortical surface :

Approximately 3.5-4 cm long in normal brain.

useful to determine the length of tube to be inserted for shunt from focus point.





Posterior part of pons : Entry for tumors in brainstem.

Tent shaped structure

Pons : Infront.

Cerebellum : Behind

Superior medullary velum forms upper part of roof.

Inferior medullary velum lies in lower part of floor of 4th ventricle.

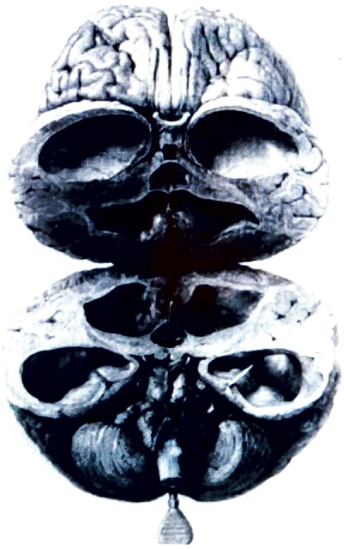
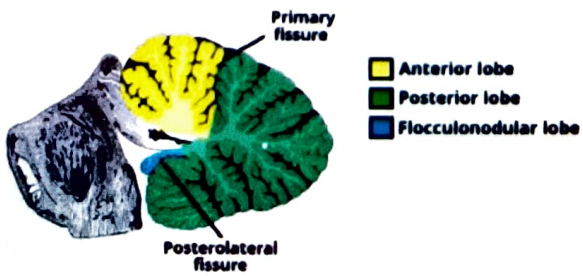


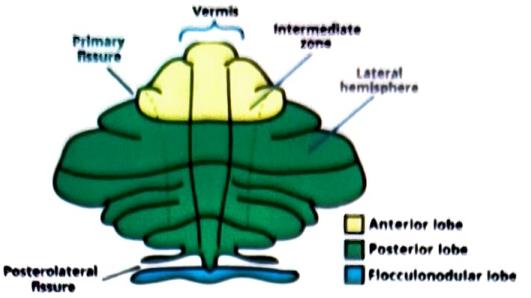
Image by max brodell of brain of child with hydrocephalus showing dilated ventricular system.

Infratentorial structures :

Cerebellum :

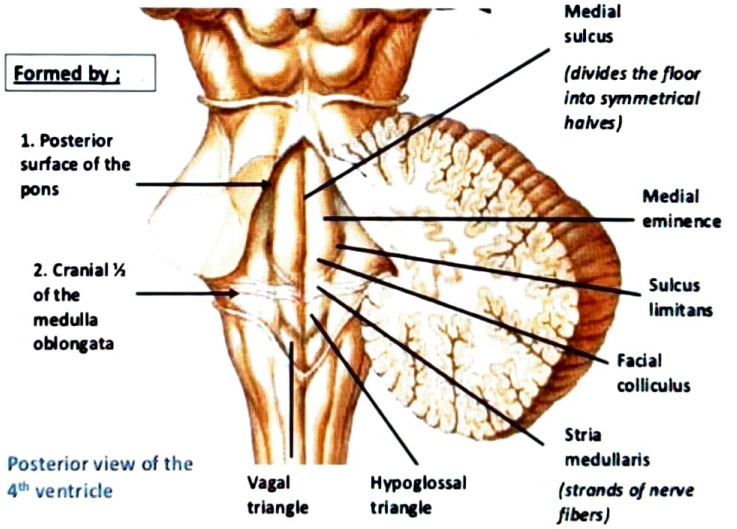


Vermis + appendicular portions.



Arbor vitae (Tree of life) of cerebellum

Floor of rhomboid fossa of 4th ventricle :



Brainstem :

Composed of :

Pons.

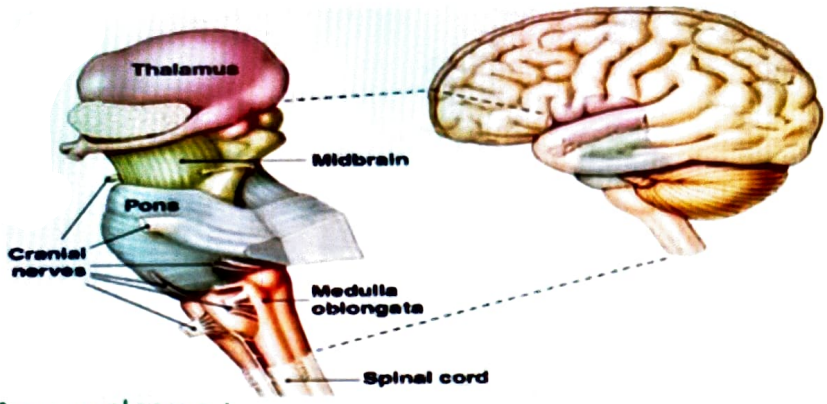
Midbrain.

Medulla oblongata.

Eminences :

Represent location of cranial nerve nucleus & point of entry.

Superior cerebellar, middle cerebellar & inferior cerebellar peduncles connects cerebellum to rest of brain.



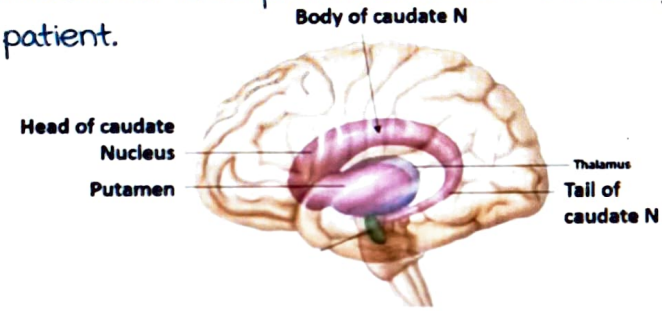
Area postrema :

Is in median.

In floor of 4th ventricle/obex.

This area causes nausea.

Hence, direct stimulation of area prostema/obex → vomitting in stroke/tumor patient.



Basal ganglia

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Thalamus forms part of basal ganglia.

Called as basal ganglia as :

Cortex contains cell bodies.

White matter contains tracts.

Greyish coloured cells are present in the parenchyma ofwhite matter.

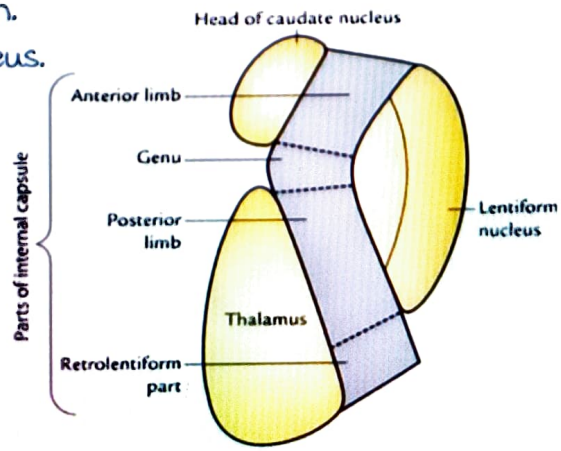
Significant :

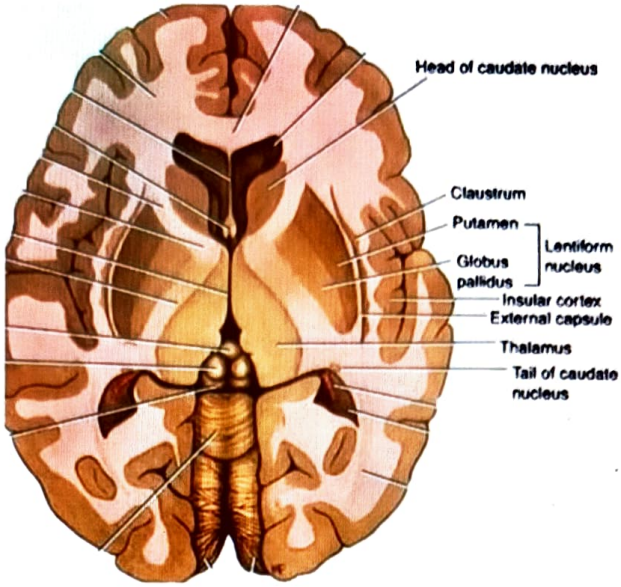
In parkinsonism.

Automatic movement.

In deep wave stimulation.

It contains caudate nucleus.





Internal capsule :

Large tract of white matter.

From premotor cortex & sensory cortex to spinal cord in pyramidal tract.

Parts :

Anterior limb : Fibres for head & hand

Genu : Fibres for trunk & lowerlimb.

Posterior limb : Fibres for lowerlimbs

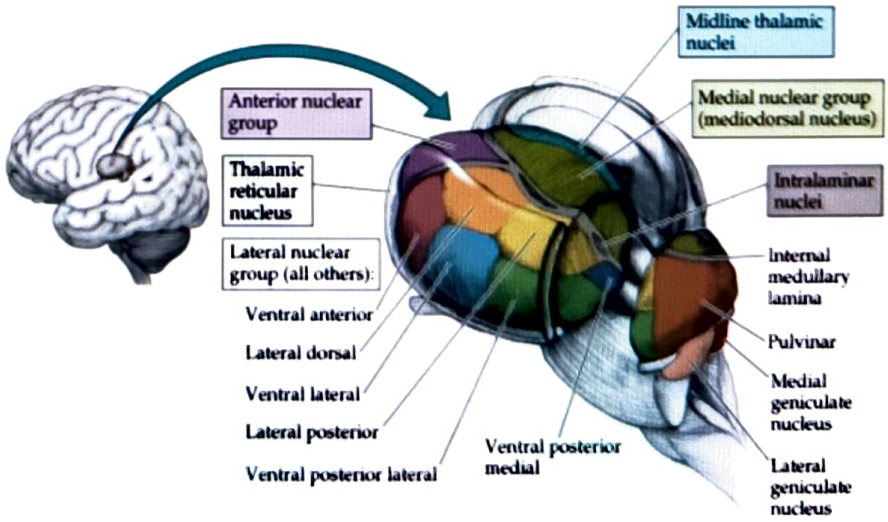
Retrolentiform part.

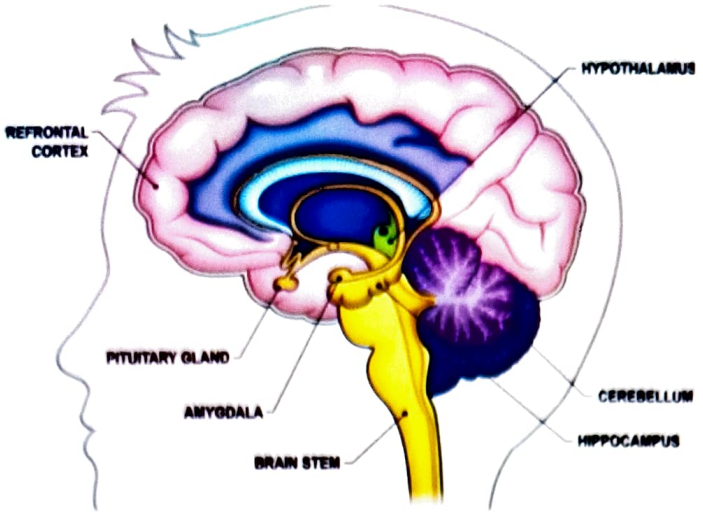
Claustrum :

Thin layer of grey matter .

Seat of consciousness (debatable).

Nuclei :





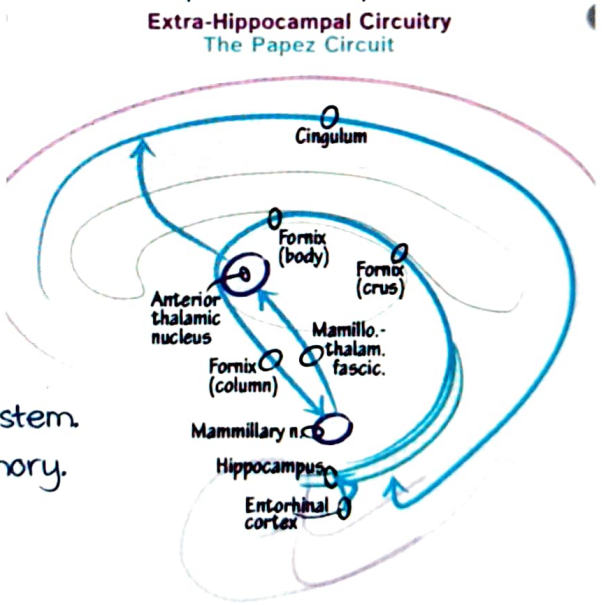
Fornix : deep complex area.

Corpus callosum banded fibres of emotion , memory.

Goes into hippocampus & ends in amygdala (nutmeg).

These structures define smell, memory. Hence part of Papez circuit.

Prosencephon : by evolution, oldest preserved part.

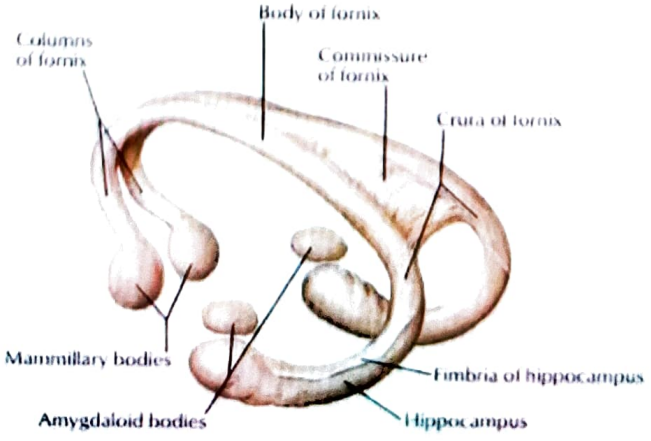


Papez circuit :

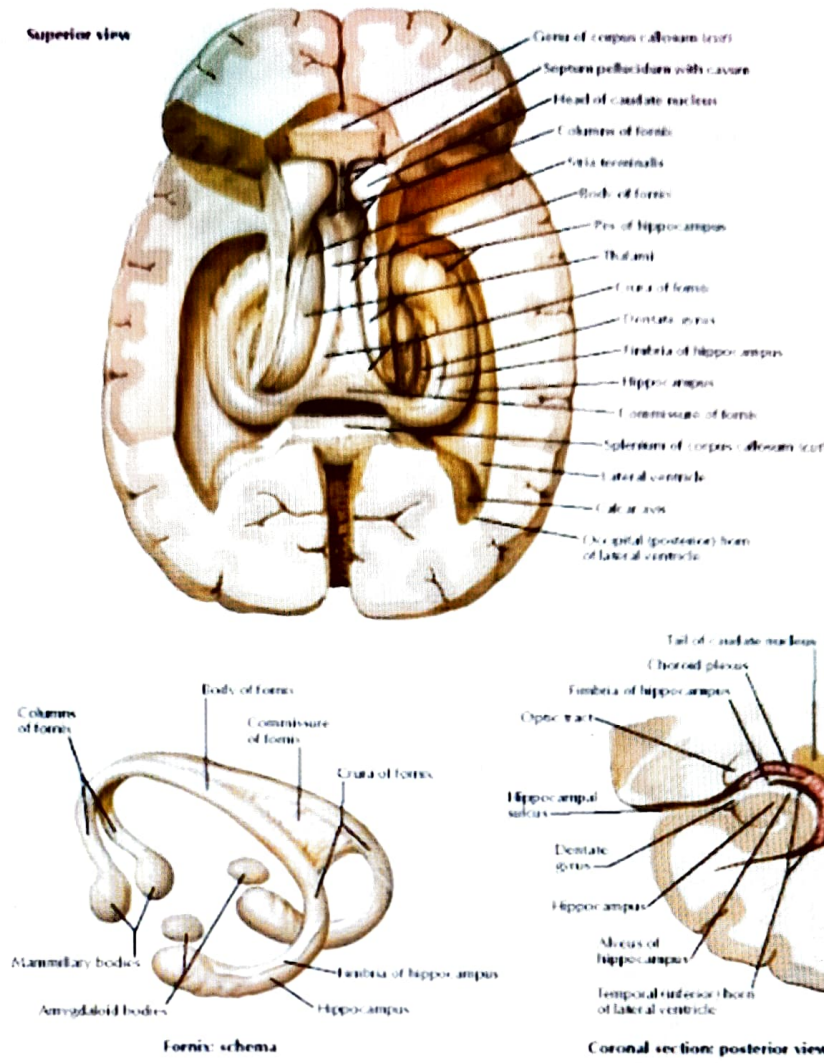
Forms part of limbic system.

Controls emotion & memory.

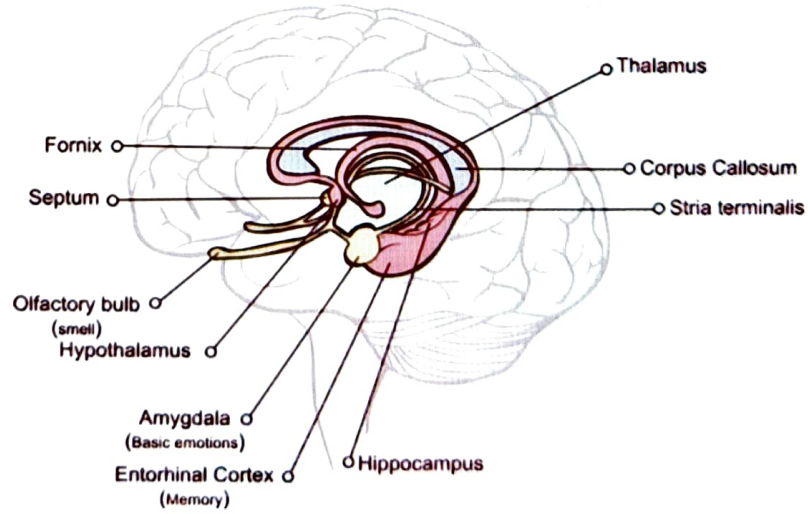
Fornix



Fornix: schema



Limbic system :



Smell : Important part of distant memory.

Vision : Is not a part.

ANATOMY OF CRANIAL NERVES

Overview

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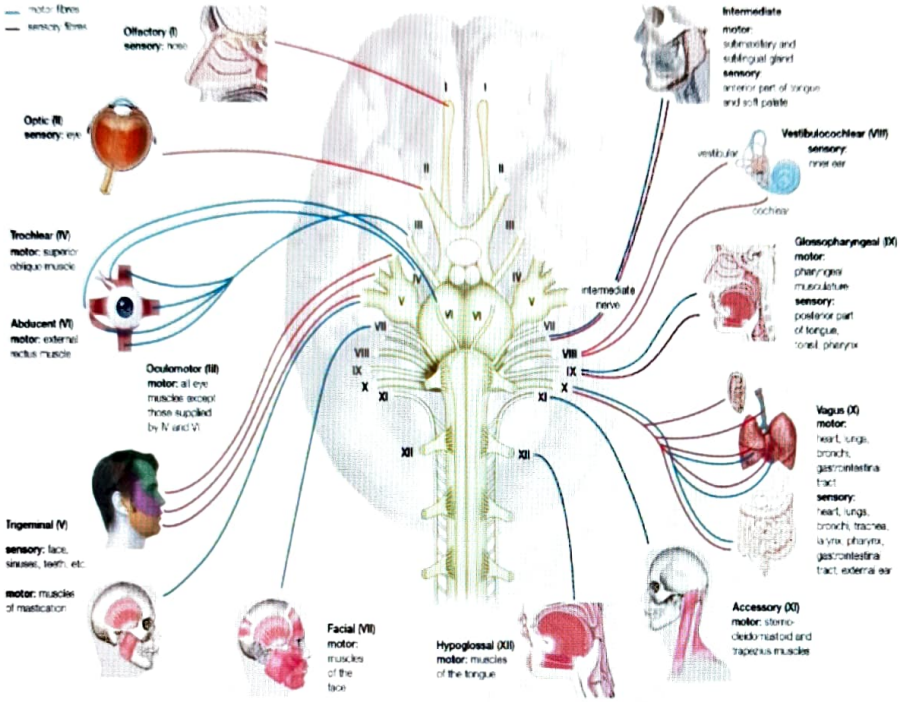
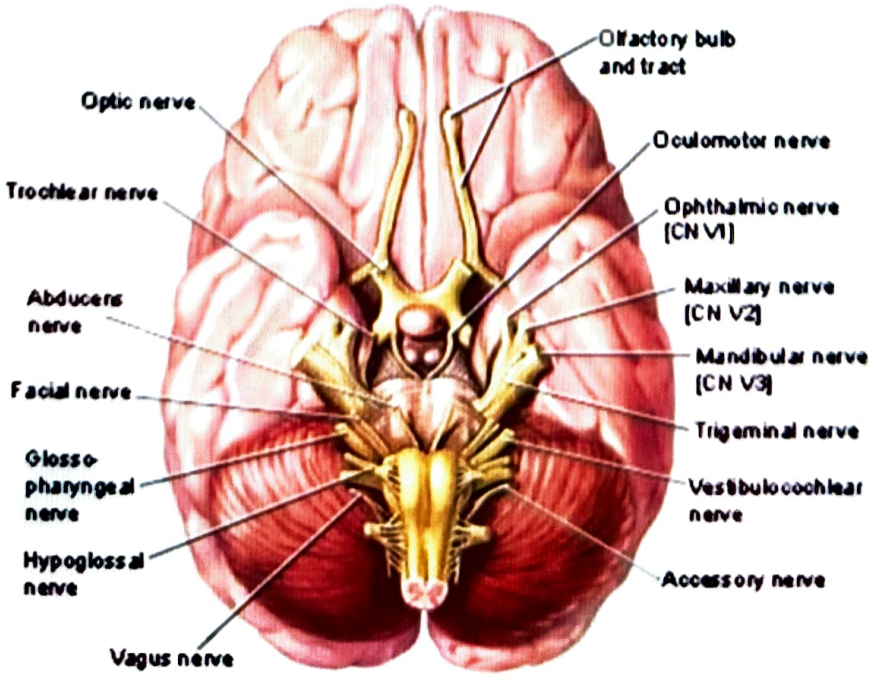


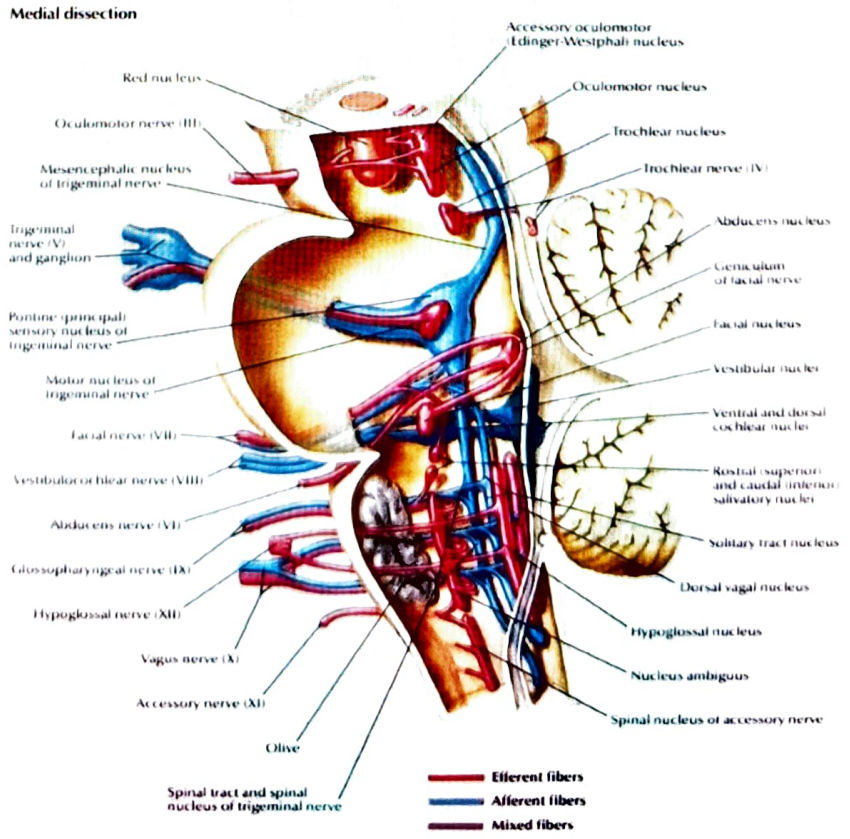
Largest cranial nerve : Vagus nerve.

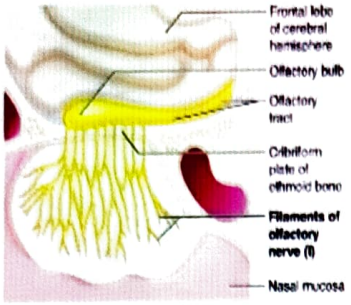
Thickest and largest cranial nerve to innervate the cranium : Trigeminal nerve.

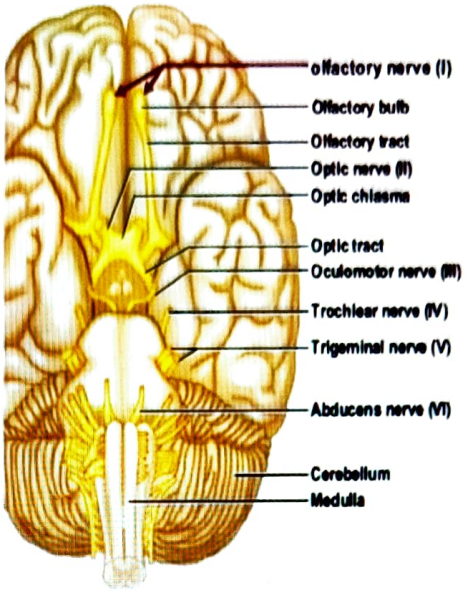


Cranial Nerve	Function	Origin	Destination	Foramina
Olfactory	Olfaction	Olfactory epithelium	Telencephalon	Olfactory F
Optic	Vision	Retina	Optic chiasm and midbrain	Optic F
Oculomotor	EM, P	Ventral midbrain	Muscles: superior, medial, inferior rectus, inferior oblique, levator palpebrae superioris, ciliary	Superior orbital fissure
Trochlear	EM	Dorsal midbrain	Superior oblique muscle	Superior orbital fissure
Trigeminal	S, M	Pons	Masticator muscles Pons (sensory)	Superior orbital fissure, F rotundum, F ovale
Abducens	EM	Pons	Lateral rectus muscle	Superior orbital fissure
Facial	S, M, P, taste (anterior 2/3 of tongue)	Pons	Facial expression muscle, lacrimal and salivary glands Pons (sensory)	IAC, stylomastoid F
Vestibulocochlear	Hearing, balance	Pons	Medulla, pons, cerebellum, thalamus	IAC
Glossopharyngeal	S, M, P, taste (posterior 1/3 of tongue)	Medulla	Muscles of speech and swallowing Parotid gland Medulla (sensory)	Jugular F
Vagus	S, M, P	Medulla	Throat, lung, viscera Medulla (sensory)	Jugular F
Accessory	M	Medulla Spinal cord	Soft palate, throat, neck muscles	Jugular F
Hypoglossal	M	Medulla	Intrinsic tongue muscles	Hypoglossal canal

Cranial nerve nuclei in brainstem :







First cranial nerve.

Purely sensory nerve and conveys the sense of smell.

Olfactory receptors are present in the olfactory mucosa under the roof of the nasal cavity.

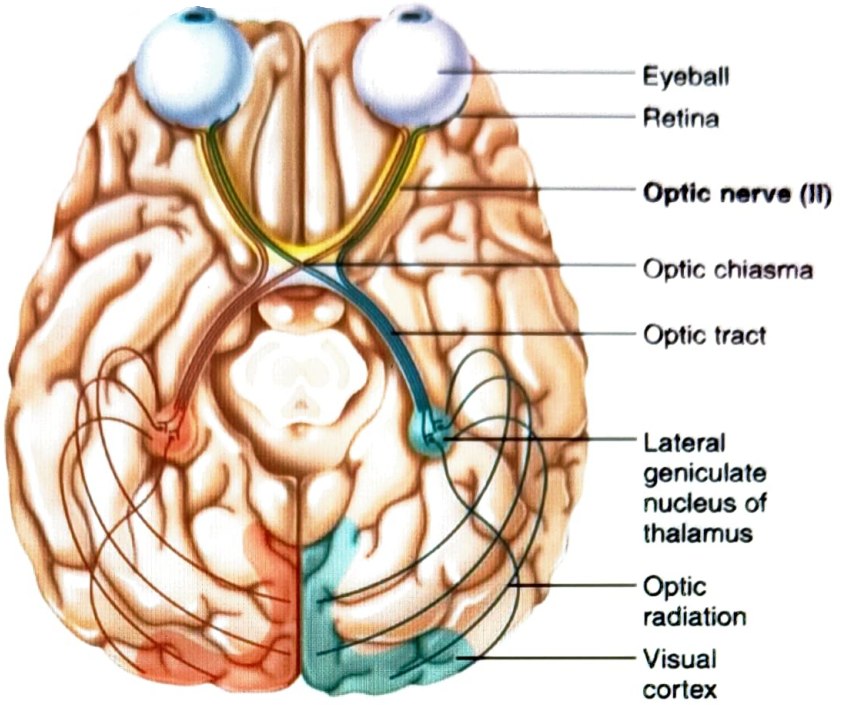
The olfactory fibers cross the skull base through the olfactory foramina of the cribriform plate and enter the olfactory bulb.

The olfactory bulb proceeds to the olfactory tract.

The olfactory tract enters the brainand projects to the olfactory cortex.

1. Primary olfactory cortex :
   - Anterior olfactory cortex.
   - Pyriform cortex.
   - Entorhinal area.
   - Amygdala.
   - Periamygdaloid complex.
2. Secondary olfactory cortex :
   - Orbitofrontal cortex.

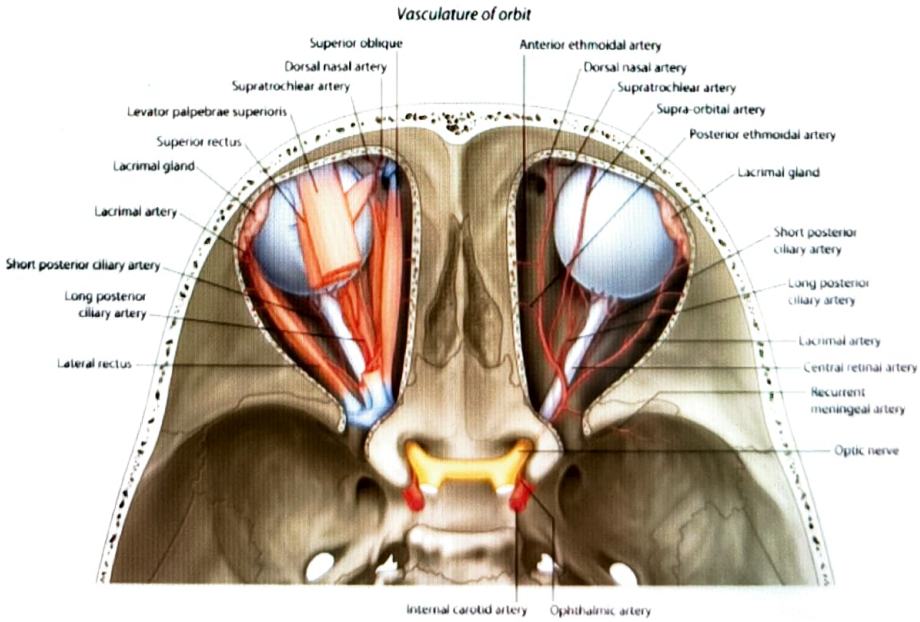
Nerve passing through cribriform plate : Olfactory nerve.



Second cranial nerve (CN II) responsible for transmitting visual information.

Pathway:

Optic nerve → optic tract → lateral geniculate body → optic radiation → visual cortex (Brodmann area 17).



Optic nerve is angulated.

Temporal vision is associated with the nasal part of retina.

Nasal vision is associated with temporal part of retina.