

**Gross anatomy of the brainstem
and the cerebellum.
The IV. ventricle.**

János Hanics M.D.



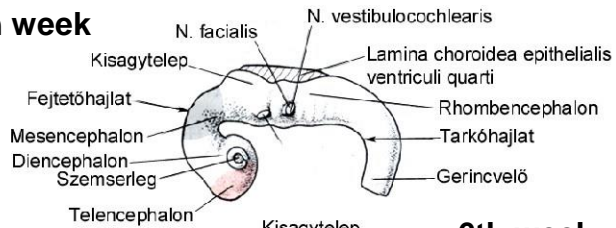
Academic Year 2017/2018 2nd Semester
Faculty of Dentistry, ED II. 1 – 4



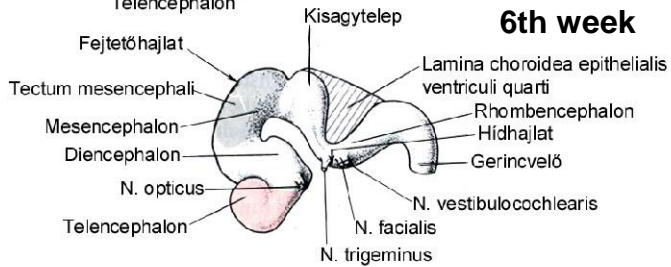
Week	LECTURE <i>Tuesday 8.00-9.40</i> <i>Wednesday 10.45-11.30</i>	DISSECTION <i>ED II 1,2,4 Mondays 10.00-11.30</i> <i>ED II 3 Mondays 15.00 – 16.30</i> <i>Thursdays 13.10-14.40</i>	HISTOLOGY <i>5 Mondays only</i> <i>15.45 – 17.15</i>
Week 1 Sept 11 - 17	1. Introduction to the study of the nervous system Meninges, hemispheres, the lateral ventricles 2. Gross anatomy of the diencephalon, the III. ventricle 3. Gross anatomy of the brainstem and the cerebellum The IV. ventricle	Divisions of the brain, meninges, arteries and veins of the brain, surface structures of the hemispheres, basis <i>cerebri</i> Specimen demonstration: dura mater, sinuses	
Week 2 Sept 18 - 24	4. Blood supply to the brain, CSF circulation 5. Differentiation of the neural tube, development of the <i>spinal cord</i> . Neural crest 6. Differentiation of the brain vesicles	Lateral ventricles, third ventricle Brain stem, fourth ventricle, cerebellum	
Week 3 Sept 25 - Oct 1	7. Gross anatomy of the spinal cord, spinal segment Dermatomes 8. Neuronal architecture of the spinal cord: proprioceptive and <i>nociceptive</i> (withdrawal) reflex arcs. 9. Neuronal architecture of the spinal cord: autonomic reflex arc. Spinal pathways	Cross sections of the brain. Specimen demonstration: spinal cord together with the membranes	
Week 4 Oct 2 - 8	10. Introduction to cranial nerves. Classification of sensory, motor and autonomic nuclei 11. Microscopy of the brainstem: tracts and nuclei of the medulla oblongata 12. Microscopy of the brainstem: tracts and nuclei of the pons and midbrain. Reflex arc of mastication	Fine structure of spinal cord. Revision 1st midterm test: Anatomy and development of the brain and the spinal cord	
Week 5 Oct 9-15	13. Cells of the CNS: <i>neurons</i> (axon, dendrite, synapses) 14. Cells of the CNS: glia cells 15. Microscopy of the diencephalon	- Dissection of limbs. Microscopy of the CNS	Nervous system I.
Week 6 Oct 16- 22	16. Microscopy of the cerebral cortex 17. Sensory systems, neuroanatomy of pain 18. Microscopy of the cerebellum, pathways	- Dissection of limbs. Microscopy of the CNS	Nervous system II.
Week 7 Oct 23 – 29 <i>Oct 23 is national holiday</i>	19. Structure and connections of the basal ganglia Motor pathways 20. Trigeminal nerve, ophthalmic division 21. Trigeminal nerve maxillary division	No class on Monday Dissection of limbs. Microscopy of the CNS	No class on Monday



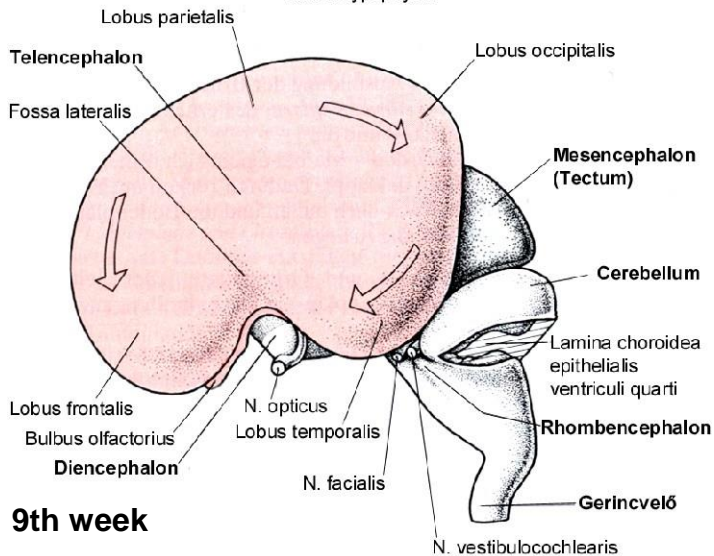
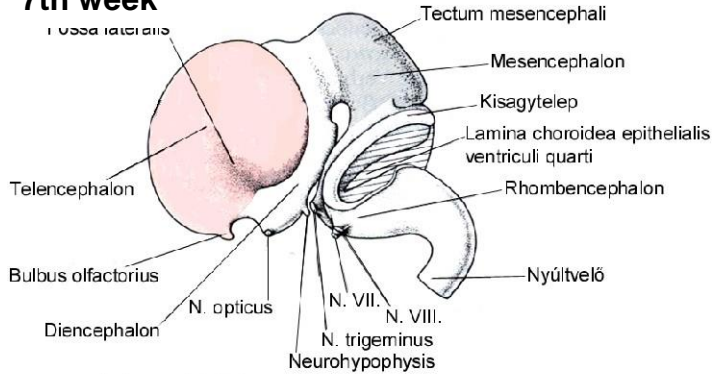
5th week



6th week

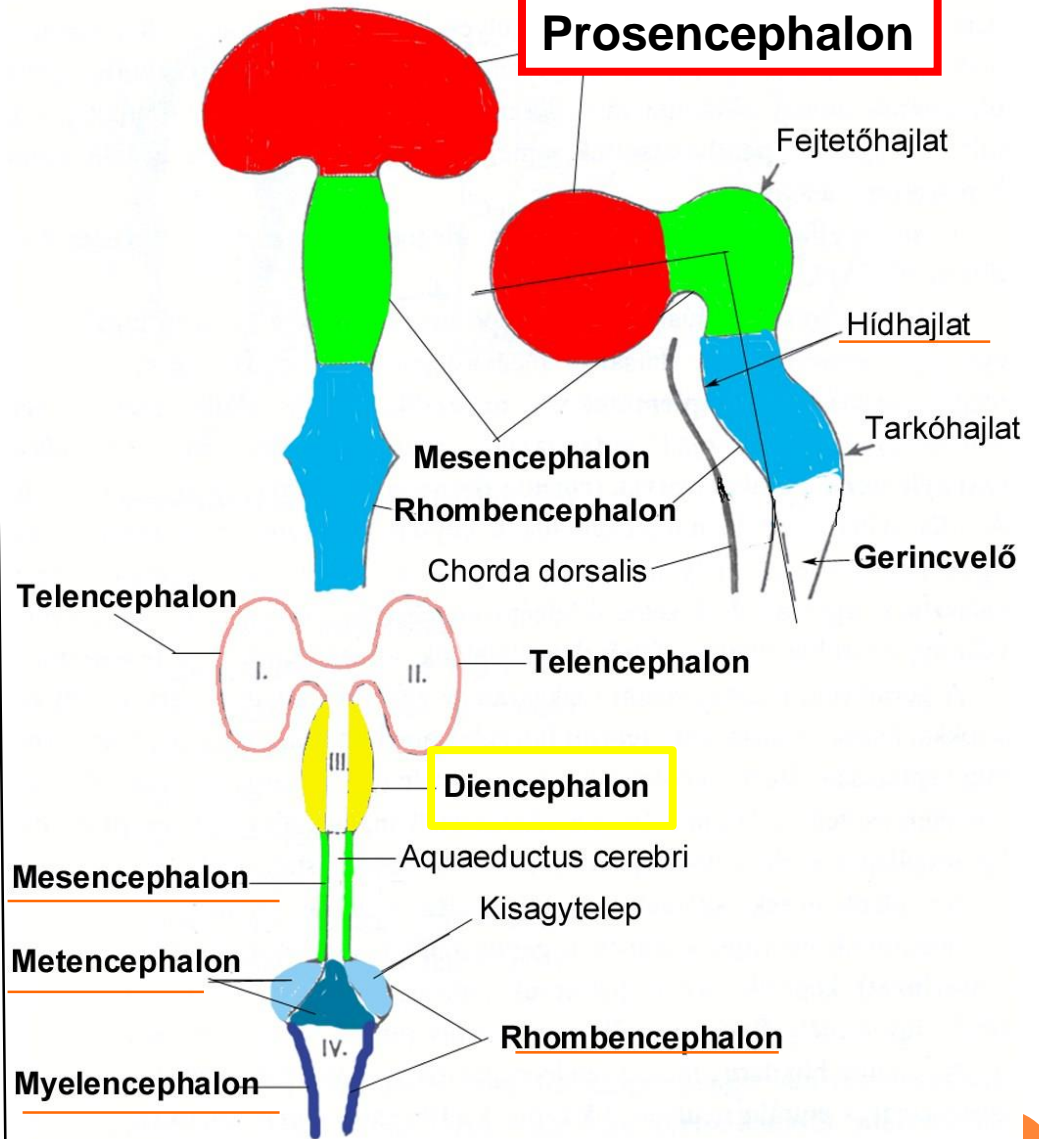


7th week



9th week

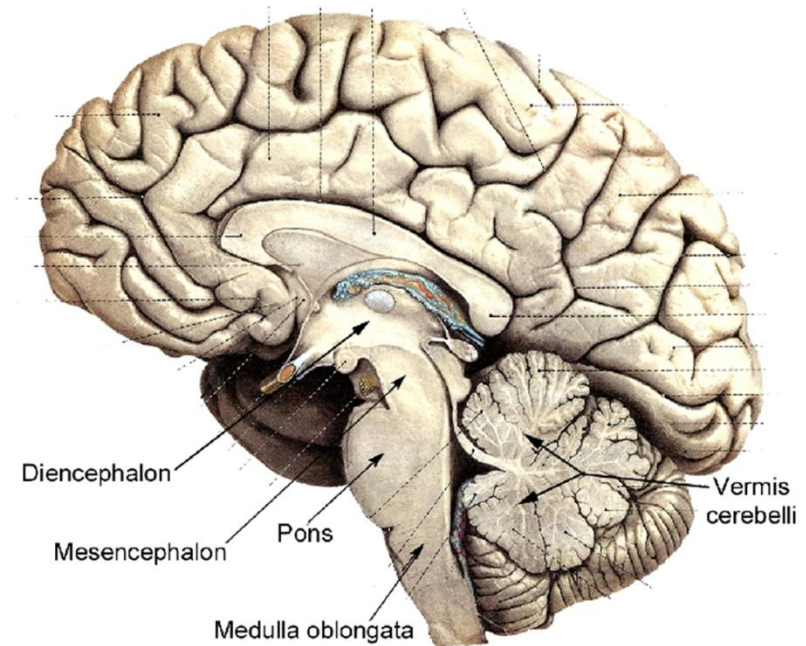
Prosencephalon



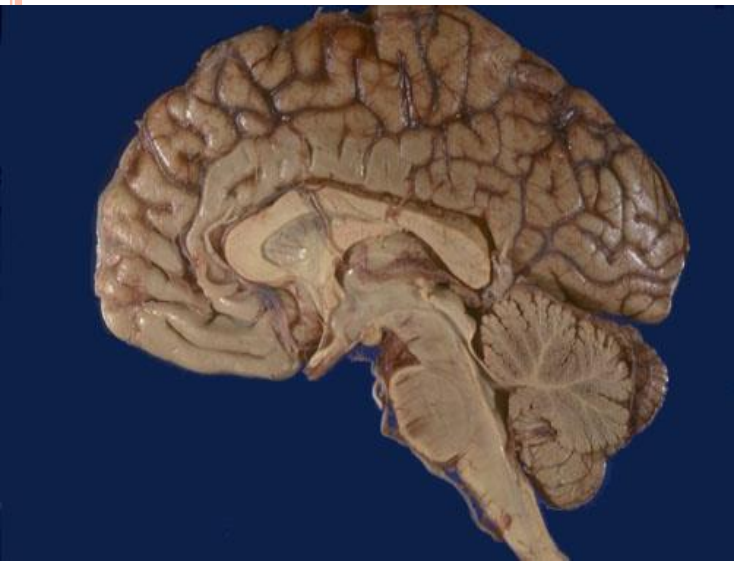
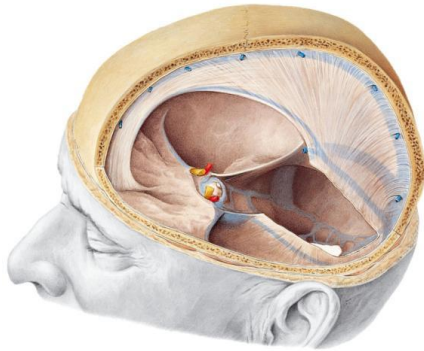
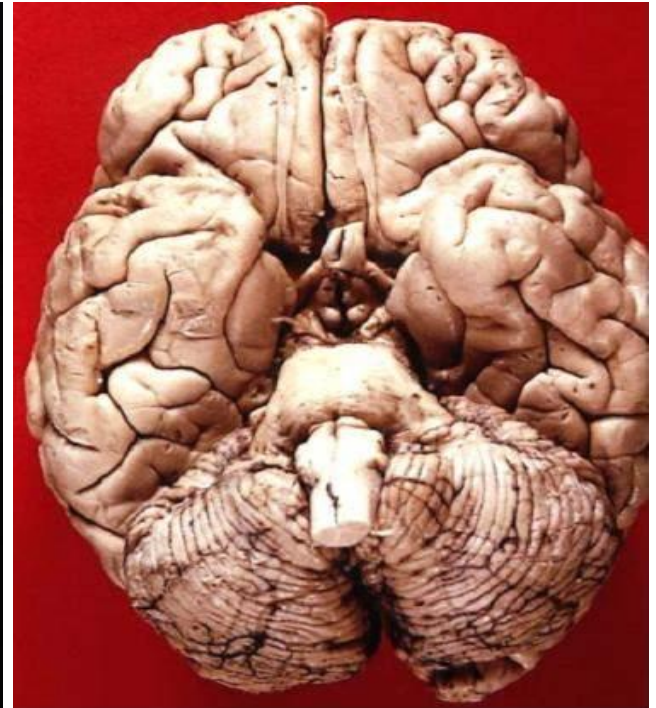
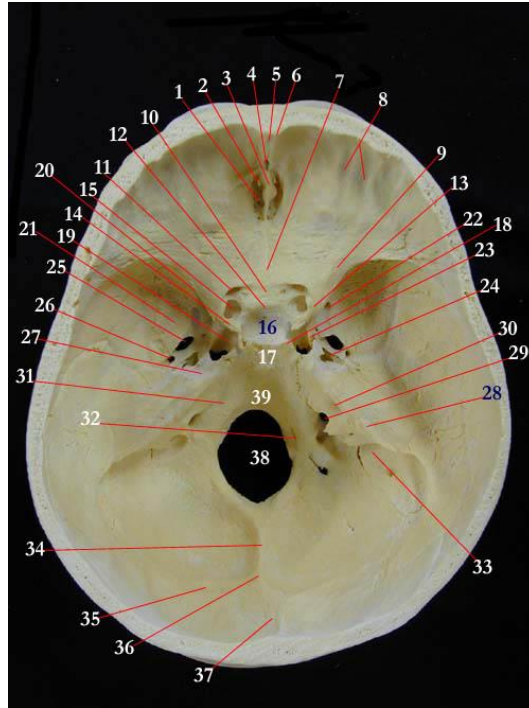
Parts of the brainstem

- Mesencephalon (Midbrain)
- Pons
- Oblongate medulla

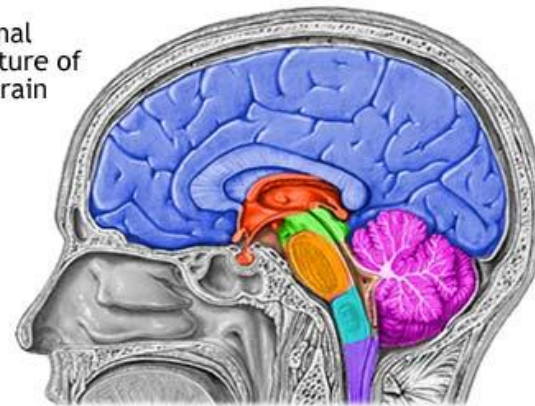
- Incorporated cavities:
cerebral aquaeduct
and IV. ventricle



Position within the skull



Internal structure of the brain



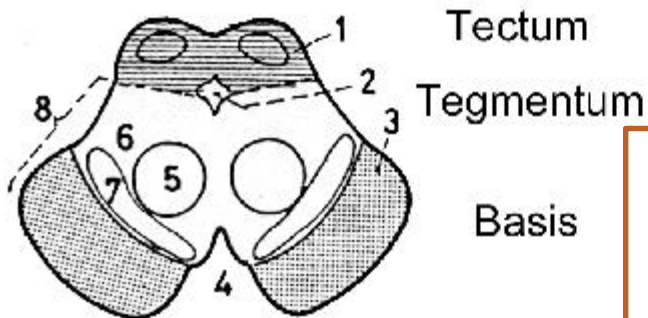
- Spinal cord
- Cerebellum
- Diencephalon
- Pons
- Medulla Oblongata
- Midbrain
- Cerebral hemisphere



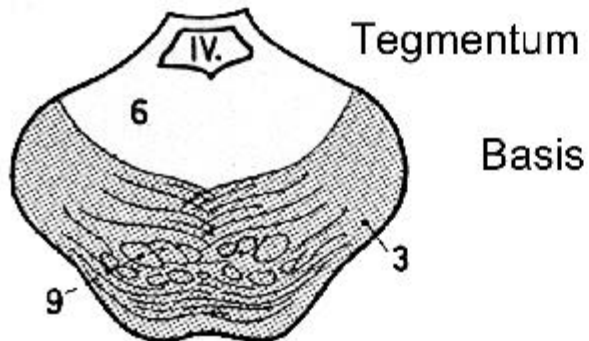
Cross sections of the brainstem

3 level arranged in the longitudinal axis:

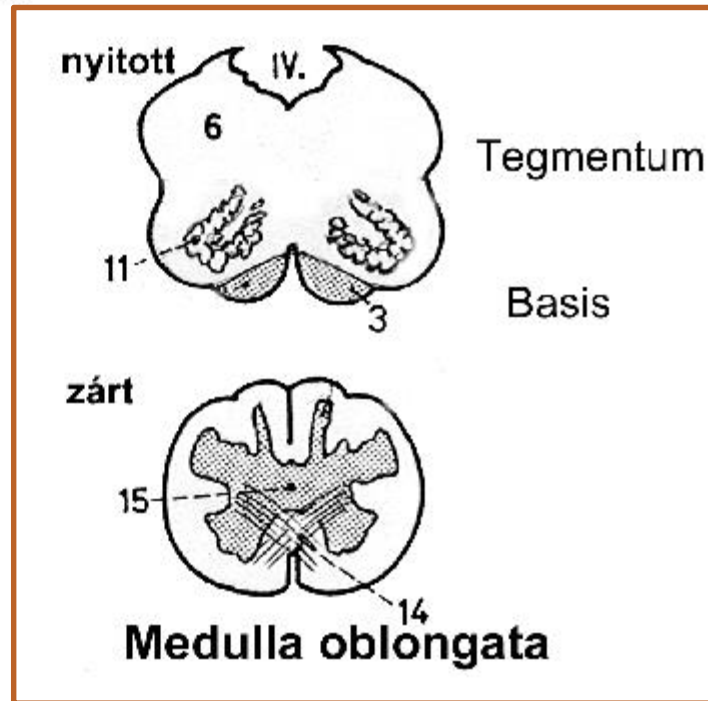
- 1) Tectum + tegmen ventriculi quarti (dorsal)
- 2) Tegmentum (middle)
- 3) Basis (ventral)



Mesencephalon



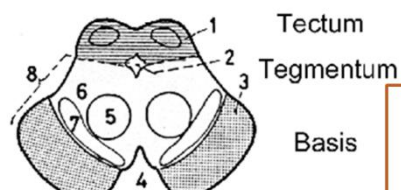
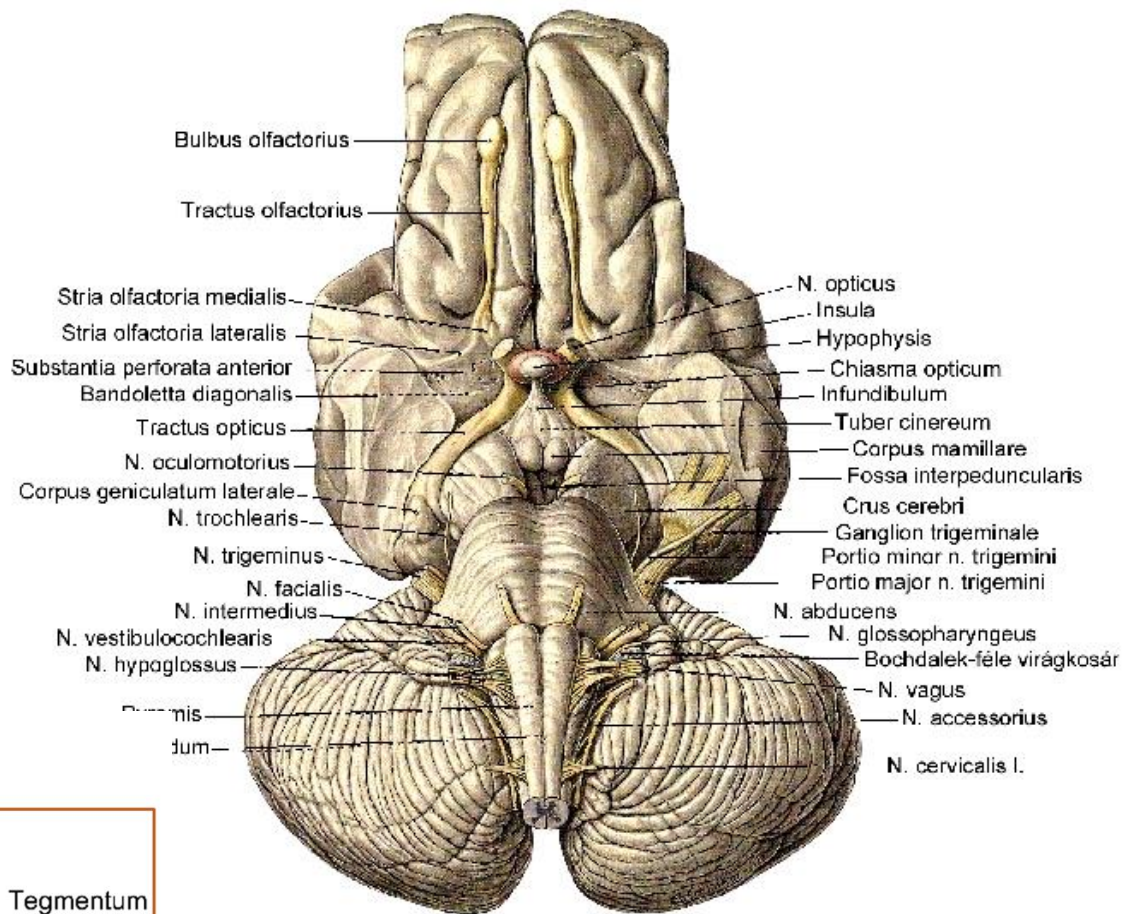
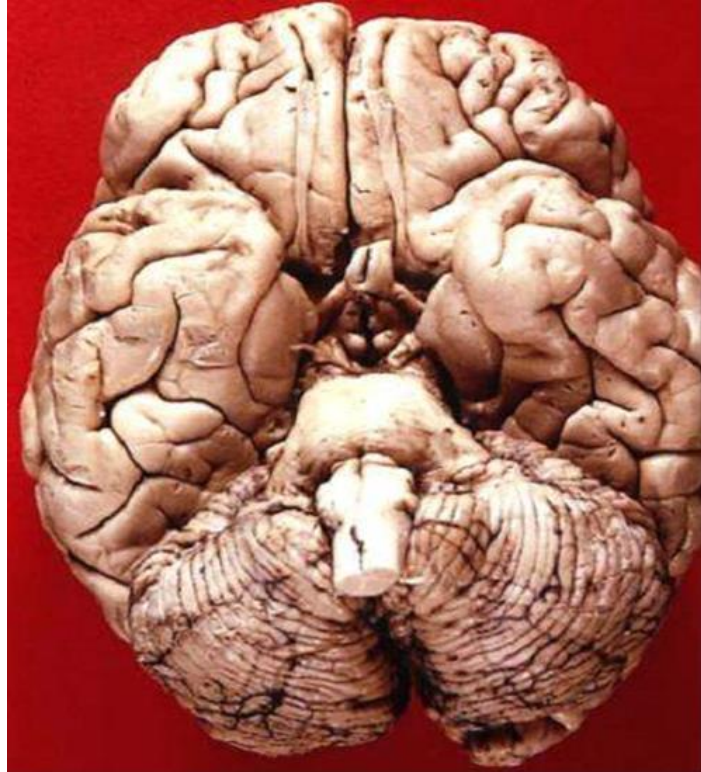
Pons



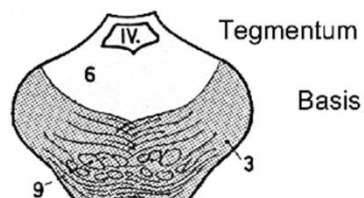
Medulla oblongata



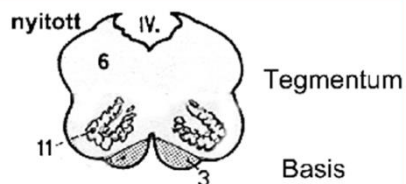
Ventral aspect of the brainstem



Mesencephalon



Pons



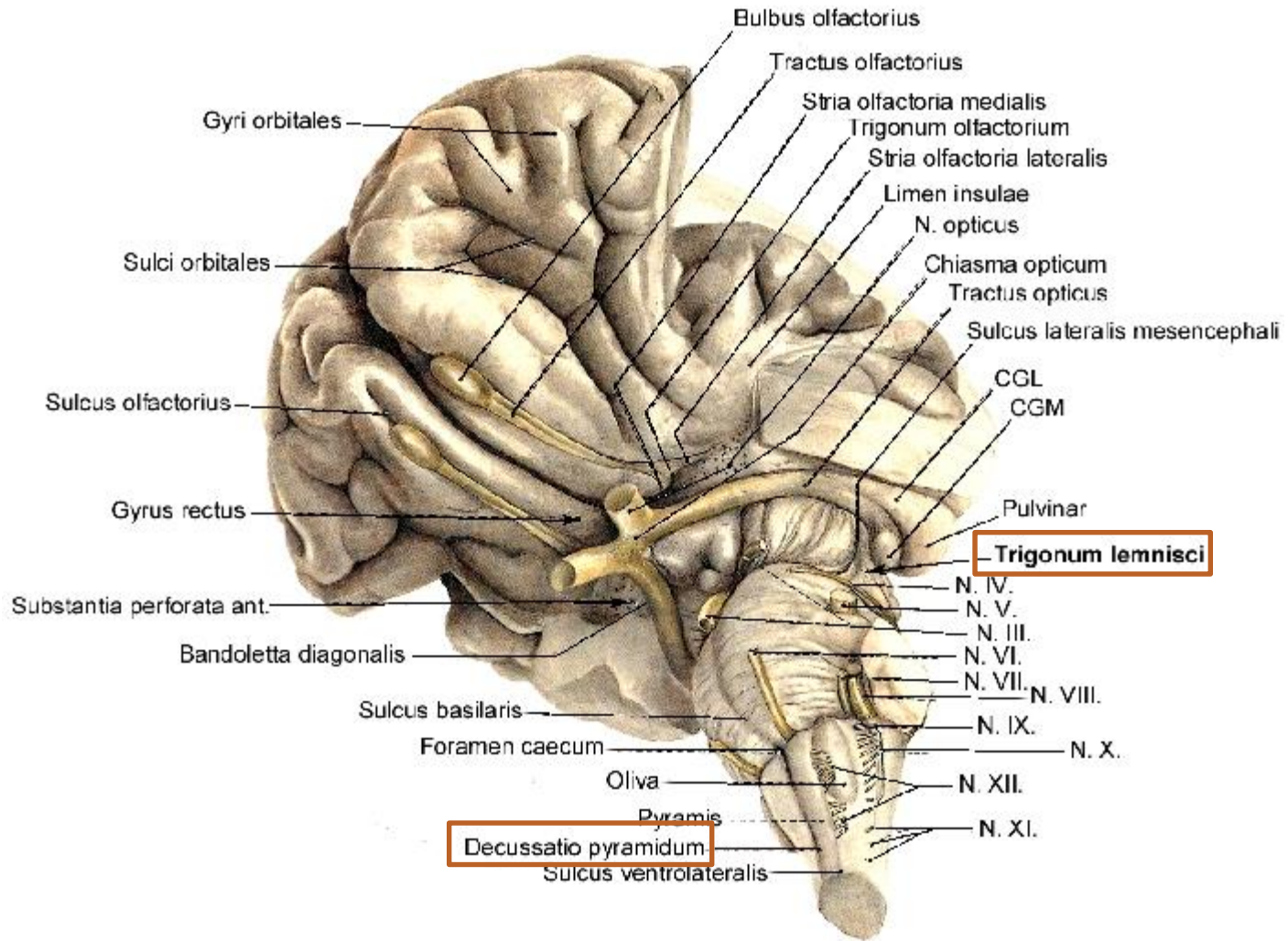
The exits of cranial nerves (from brain, dura and skull)

The *real cranial nerves* (CN III-XII.) originate from the brainstem (=midbrain, pons, medulla). 1st and 12nd cranial nerves are not real cranial nerves because they are extensions of the brain (CNS!).

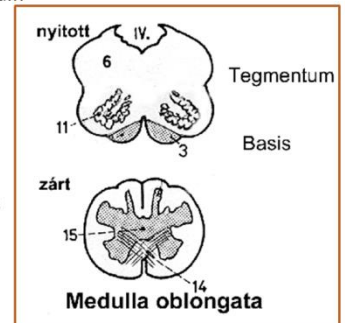
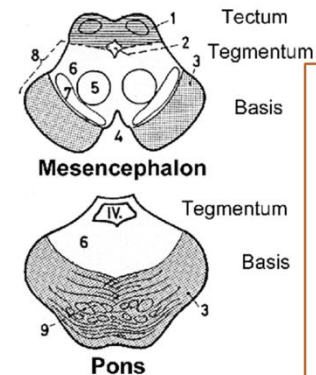
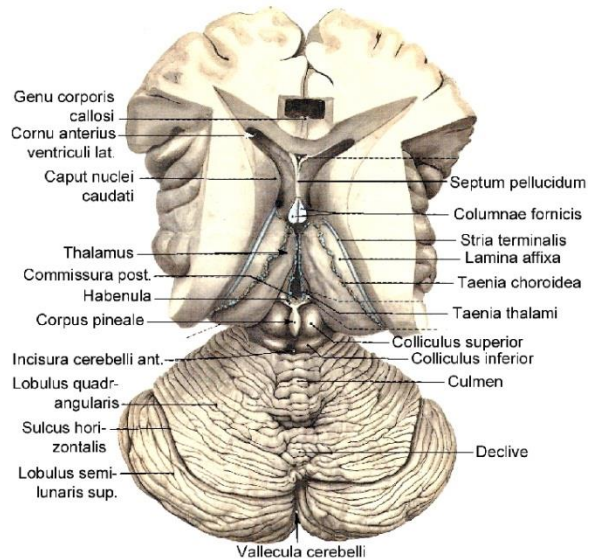
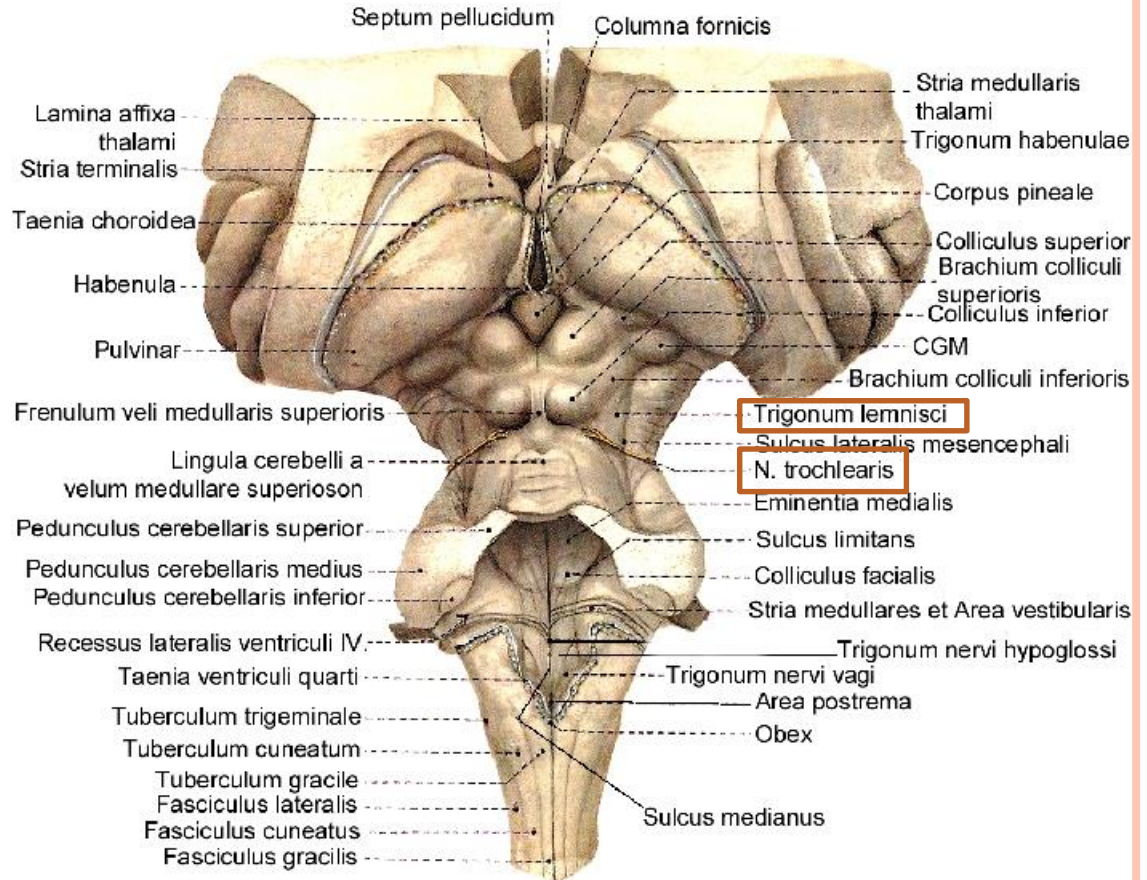
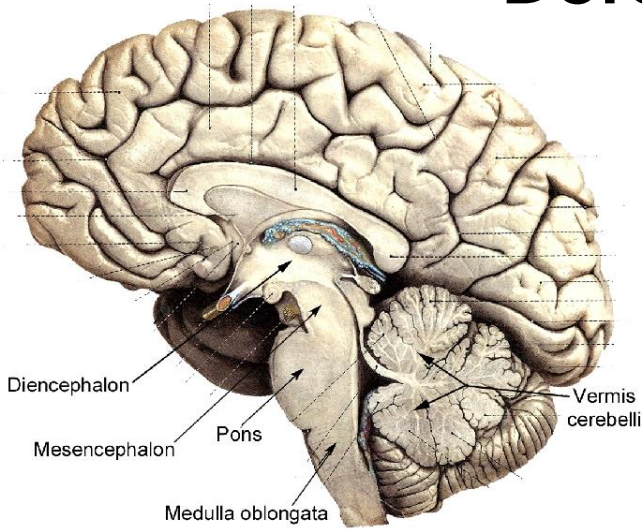
	Brain exit	Dural exit	Skull (cranial) exit
I. Olfactory nerve	Olfactory bulb	Cribriform plate	Cribriform plate
II. Optic nerve	Optic chiasma	At the posterior pole of the eyeball (!)	Optic canal
III. Oculomotor nerve	Oculomotor sulcus (=medial sulcus of crus cerebri) in the interpeduncular fossa ; between post. cerebral a. and sup. cerebellar a.	Cavernous sinus (lateral wall) Enters btw. the ant. and post. petroclinoidal folds	Sup. orbital fissure
IV. Trochlear nerve	Below inferior colliculi; both sides of the frenulum of sup. medullary velum Note: n. IV. is the only cranial nerve which exits out the DORSAL aspect of the brain!!	Cavernous sinus (lateral wall) Enters within the ant. petroclinoidal fold	Sup. orbital fissure
V. Trigeminal nerve	Btw. pons and brachium pontis, anteriorly - larger, sensory root inferiorly, motor root superiorly	Trigeminal (Meckel's) cave V/1.: cavernous sinus (lateral wall) V/2.: cavernous sinus (lateral wall) V/3.: For. ovale	V/1.: Sup. orbital fissure V/2.: For. rotundum V/3.: For. ovale
VI. Abducent nerve	At the ponto-medullary junction, on both sides of foramen cecum	Cavernous sinus (freely!) Ascends in the clivus in the <i>Dorello's canal</i> ; enters the cavernous sinus far below the post. petroclinoidal fold	Sup. orbital fissure
VII. Facial nerve*	Btw. pons and brachium pontis, posteriorly - in the cerebello-pontine angle	The fundus of the internal acoustic meatus	
VIII. Vestibulocochlear nerve	Btw. pons and brachium pontis, posteriorly - in the cerebello-pontine angle; laterally from n. VII.		
IX. Glossopharyngeal nerve	In the lateral parolivary sulcus (superiorly)	Jugular foramen (anterior part: pars nervosa)	
X. Vagus nerve	In the lateral parolivary sulcus (below n. IX.)		
XI. Accessory nerve	In the lateral parolivary sulcus (inferiorly) - the <i>cranial roots</i> of n. XI. From spinal segments C1-6 the <i>cervical or spinal roots</i> of n. XI.		
XII. Hypoglossal nerve	In the medial parolivary sulcus	Hypoglossal canal	

* nervus intermedius exits between n. VII. and n. VIII. but belongs to n. VII. (parasympathetic and taste fibres)

Lateral view

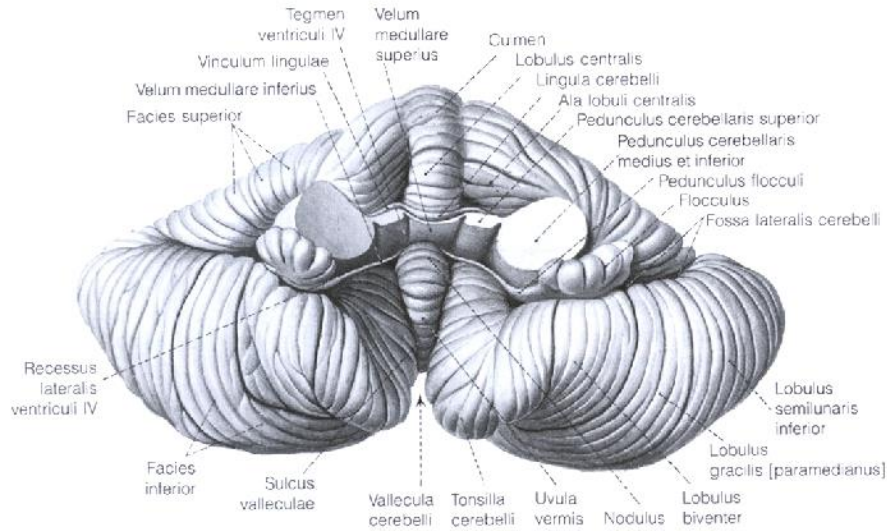


Dorsal aspect of the brainstem

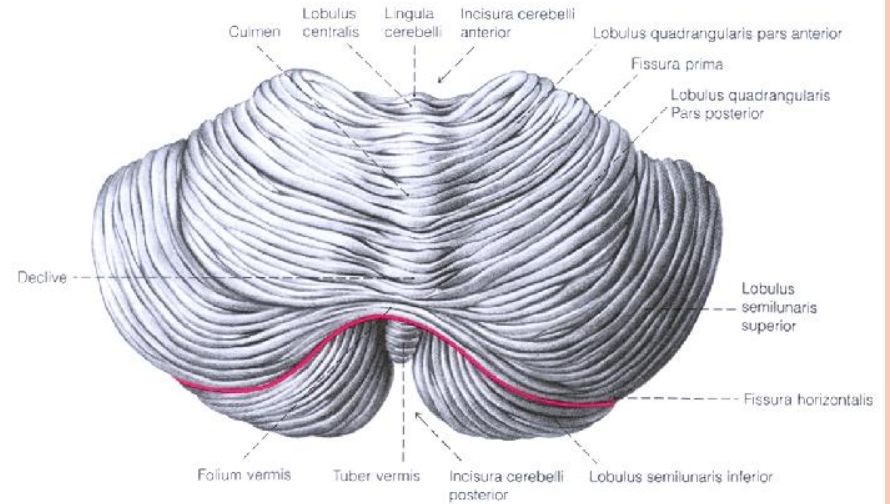


Cerebellum

Folia cerebelli – thin „gyri”



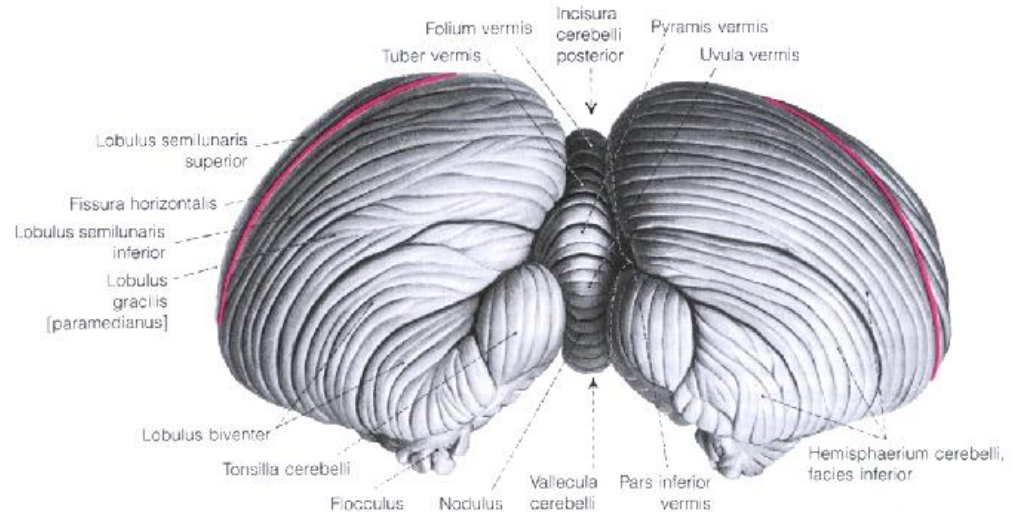
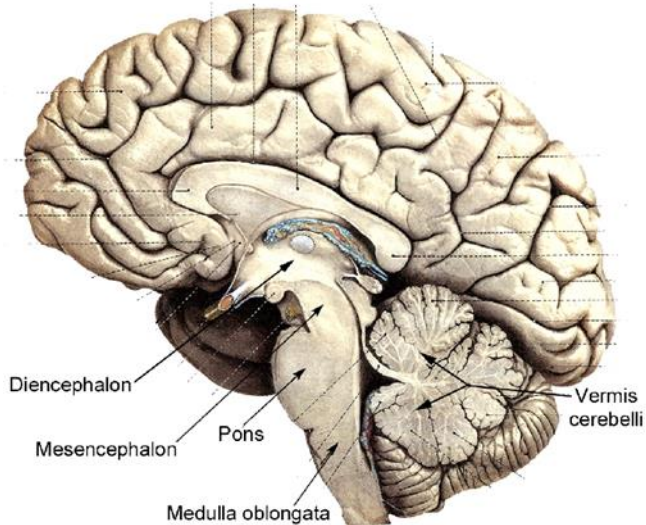
Fissura cerebelli – Between fissures



Vermis

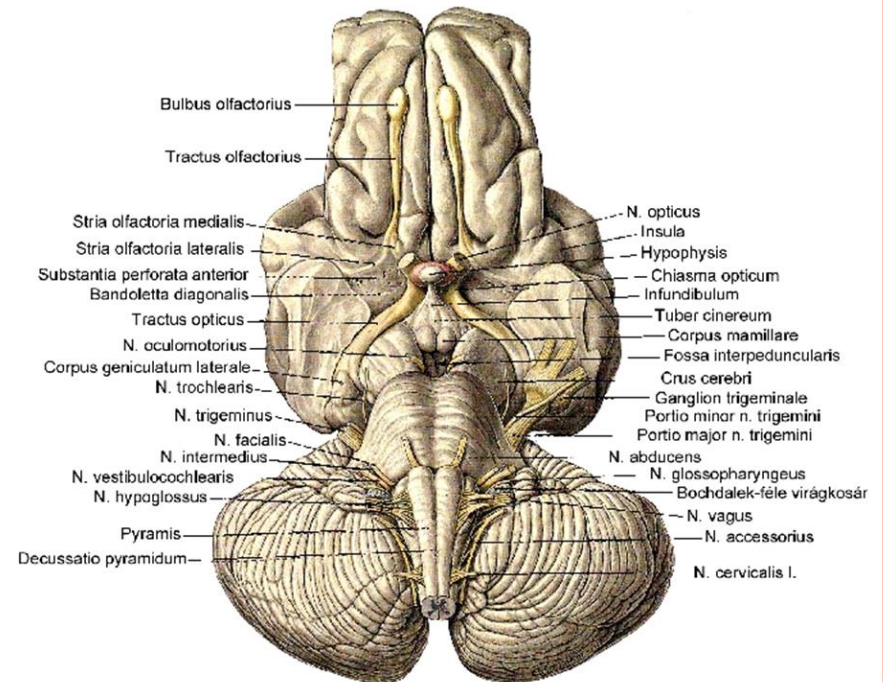
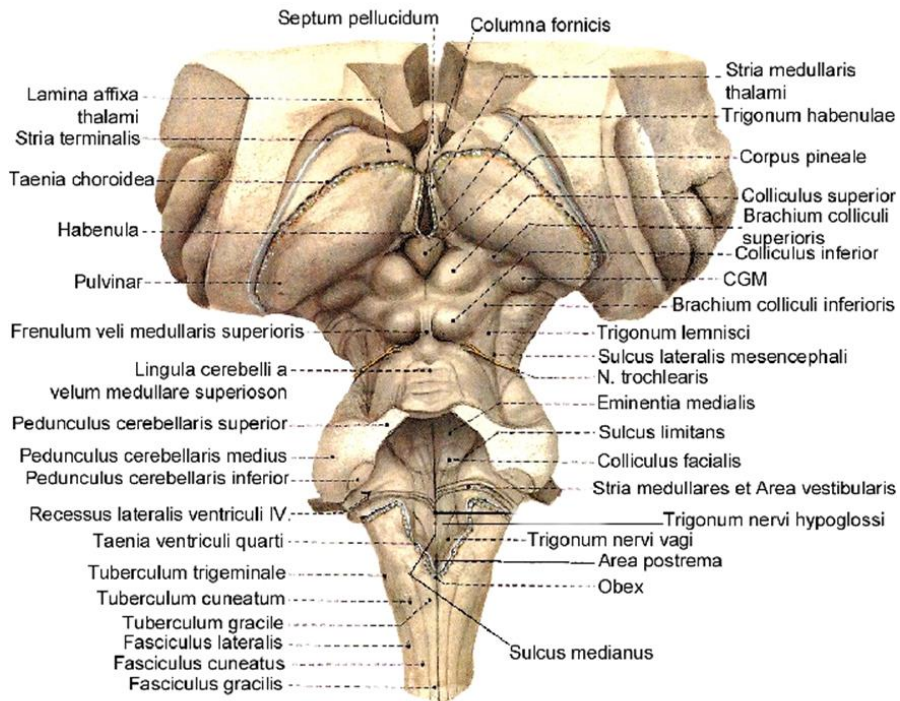
Arbor vitae

Hemisphaeria cerebelli

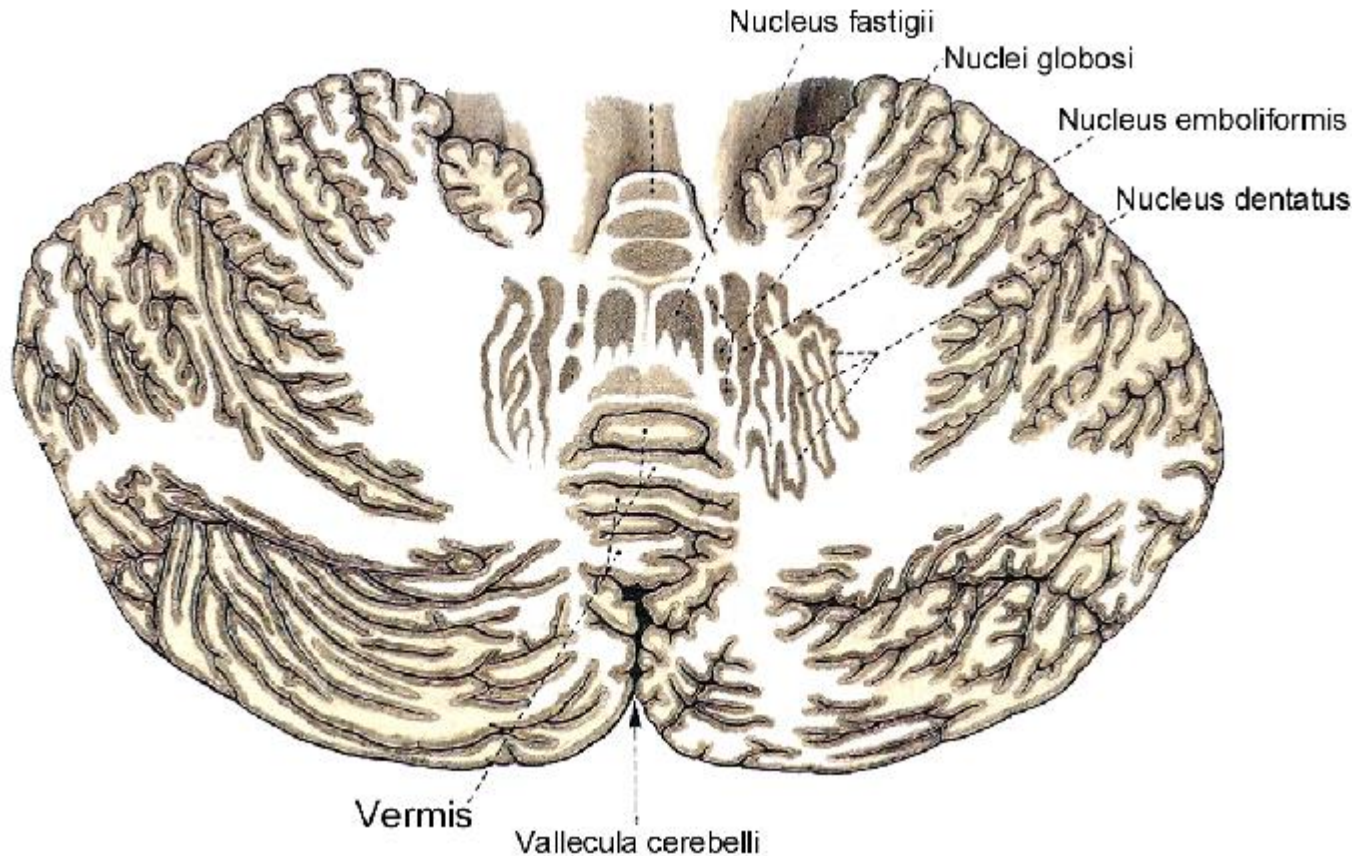


Cerebellar peduncles (3 pair)

- Connect cerebellum with 3 part of brainstem:
 - midbrain: superior cerebellar peduncle is (brachium conjunctivum)
 - pons: medial cerebellar peduncle (brachium pontis) -ventral!!!
 - oblongate medulla: inferior cerebellar peduncle (corpus restiforme)



Cerebellar nuclei (4 pair)



Cortex cerebelli – cortical zone

Laminae albae – inner white matter

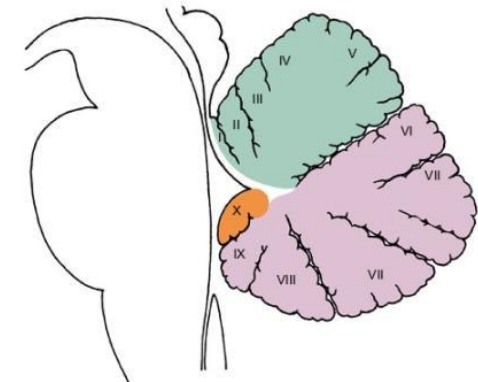
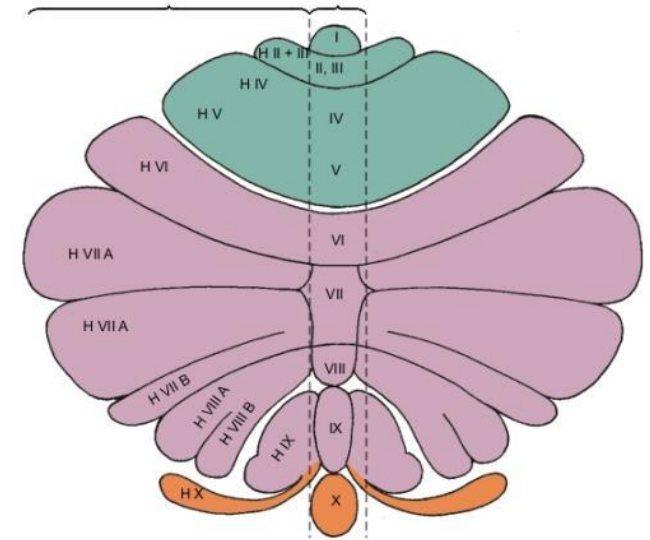
Corpus medullare – the central continuous white matter

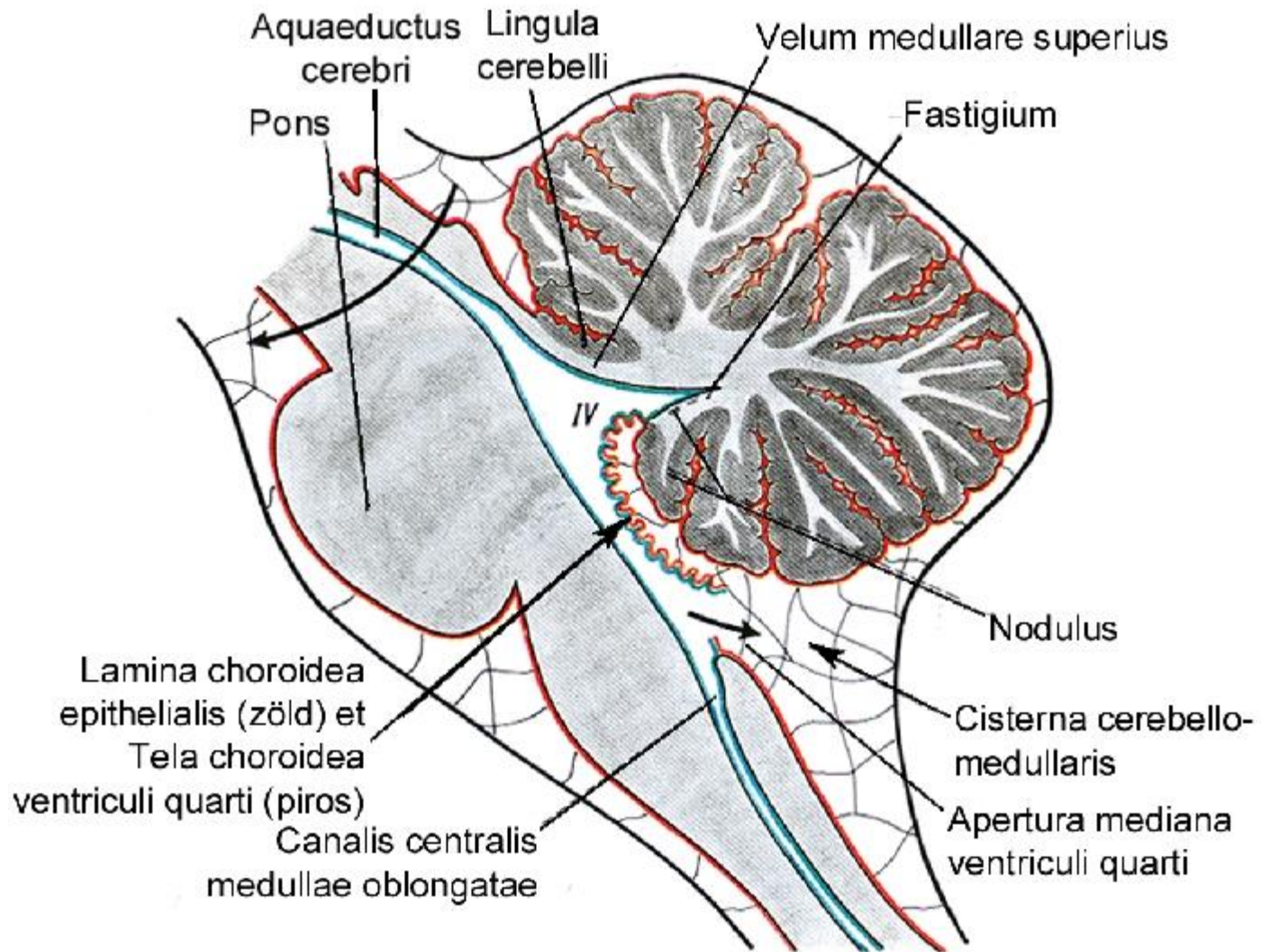


Divisions of cerebellum

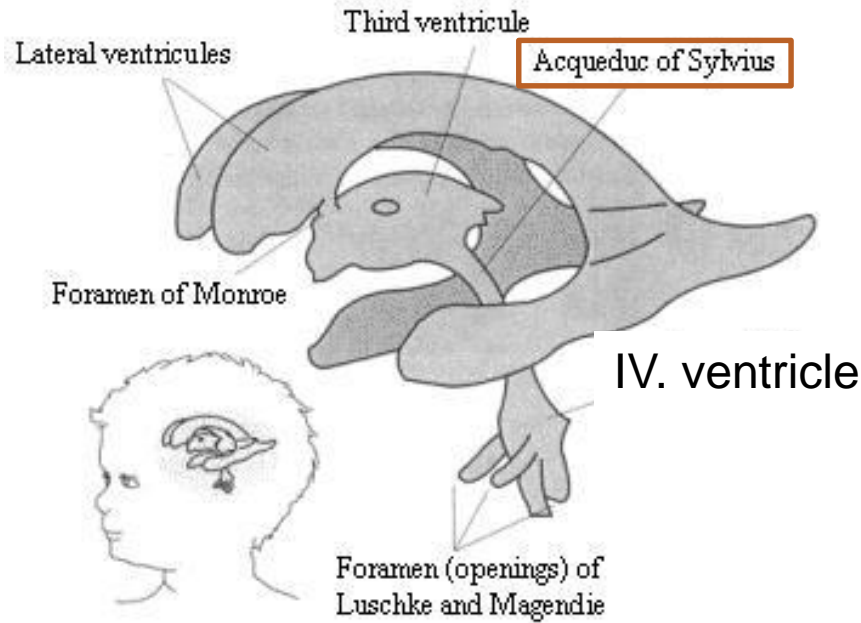
Larsell's division
(with roman numerals from I to X)

Lobuli of vermis	Hemispherical lobuli	Genetical division
lingula cerebelli <i>(archicerebellum)</i>	vinculum lingulae	corpus cerebelli
lobulus centralis	ala lobuli centralis	lobus anteriorja
culmen	lobulus quadrangularis	palaeocerebellum
fissura prima		
declive	lobulus simplex	corpus cerebelli
folium vermis	lobulus semilunaris superior	lobus posteriorja
fissura horizontalis cerebelli		
tuber vermis	lobulus semilunaris inferior	neocerebellum
	lobulus gracilis	
pyramis vermis	lobulus biventer	
uvula cerebelli	tonsilla cerebelli	palaeocerebellum
fissura dorsolateralis		
nodus	flocculus	lobus flocculonodularis
		archicerebellum

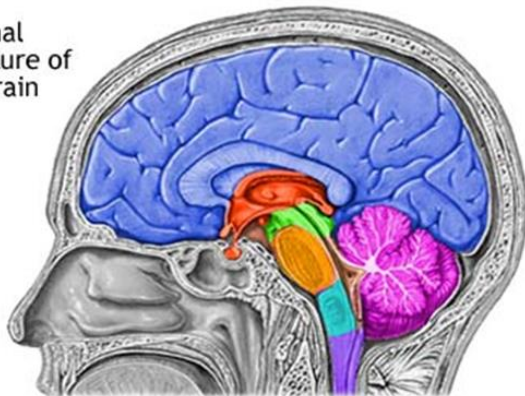




IV. ventricle

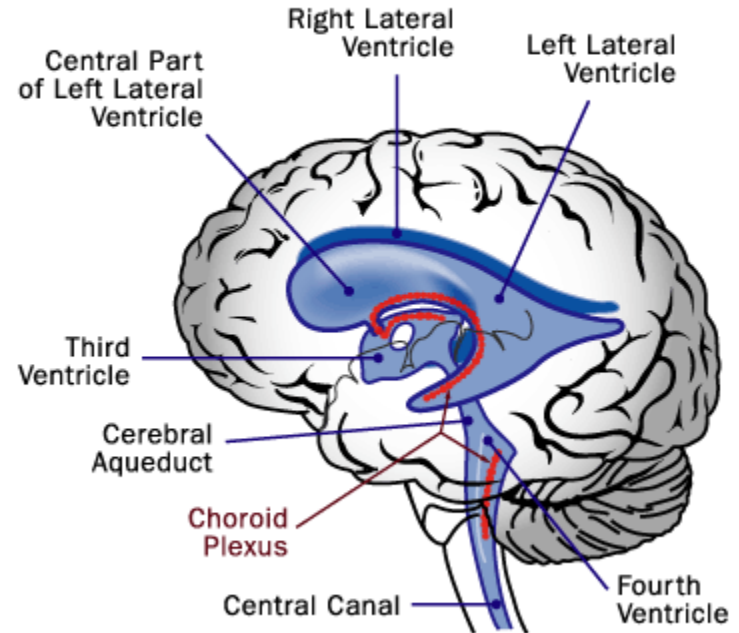


Internal structure of the brain



- Spinal cord
- Cerebellum
- Diencephalon
- Pons
- Medulla Oblongata
- Midbrain
- Cerebral hemisphere

The Ventricular System of the Human Brain



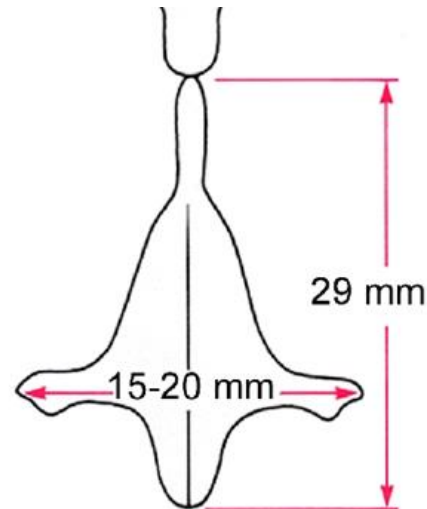
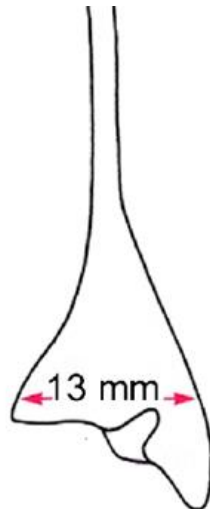
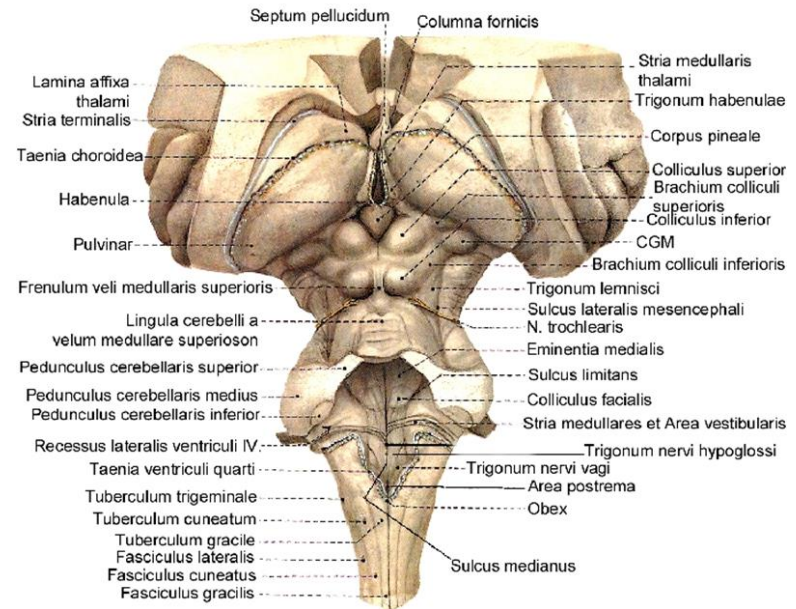
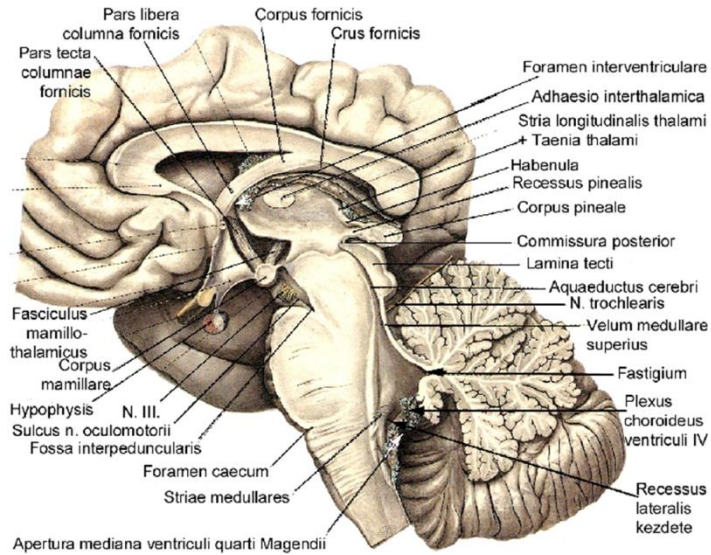
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Connections of IV. ventricle:

- 1) Cerebral aquaeduct (Sylvius)
- 2) (Level of calamus scriptorius) – central canal (spinal cord)
- 3) 3 opening to subarachnoideal space: 2 lateral aperture (Luschka's), 1 median aperture (Magandi's)

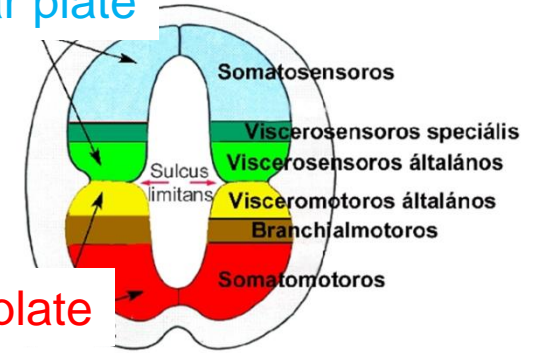


Parameters of the IV. ventricle

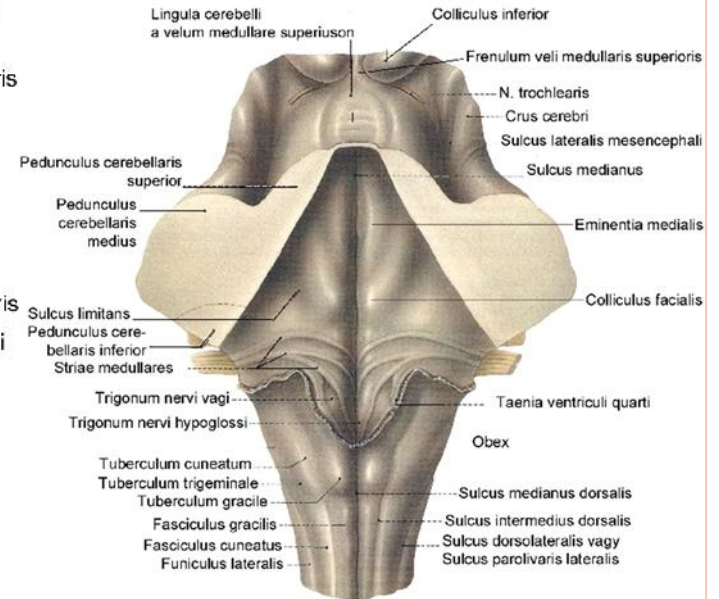
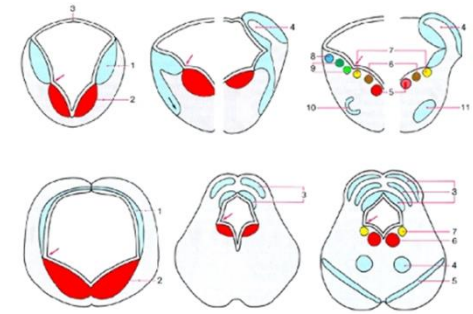
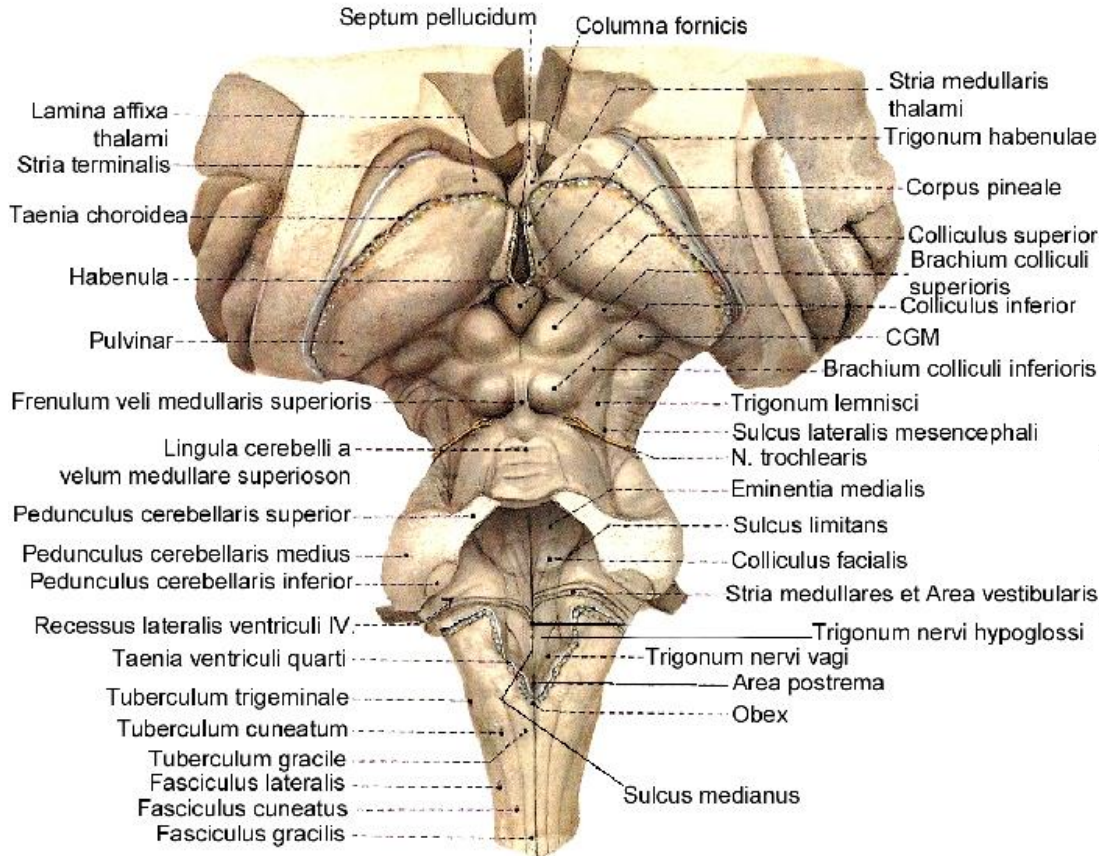


Floor of the IV. ventricle = rhomboid fossa

Alar plate

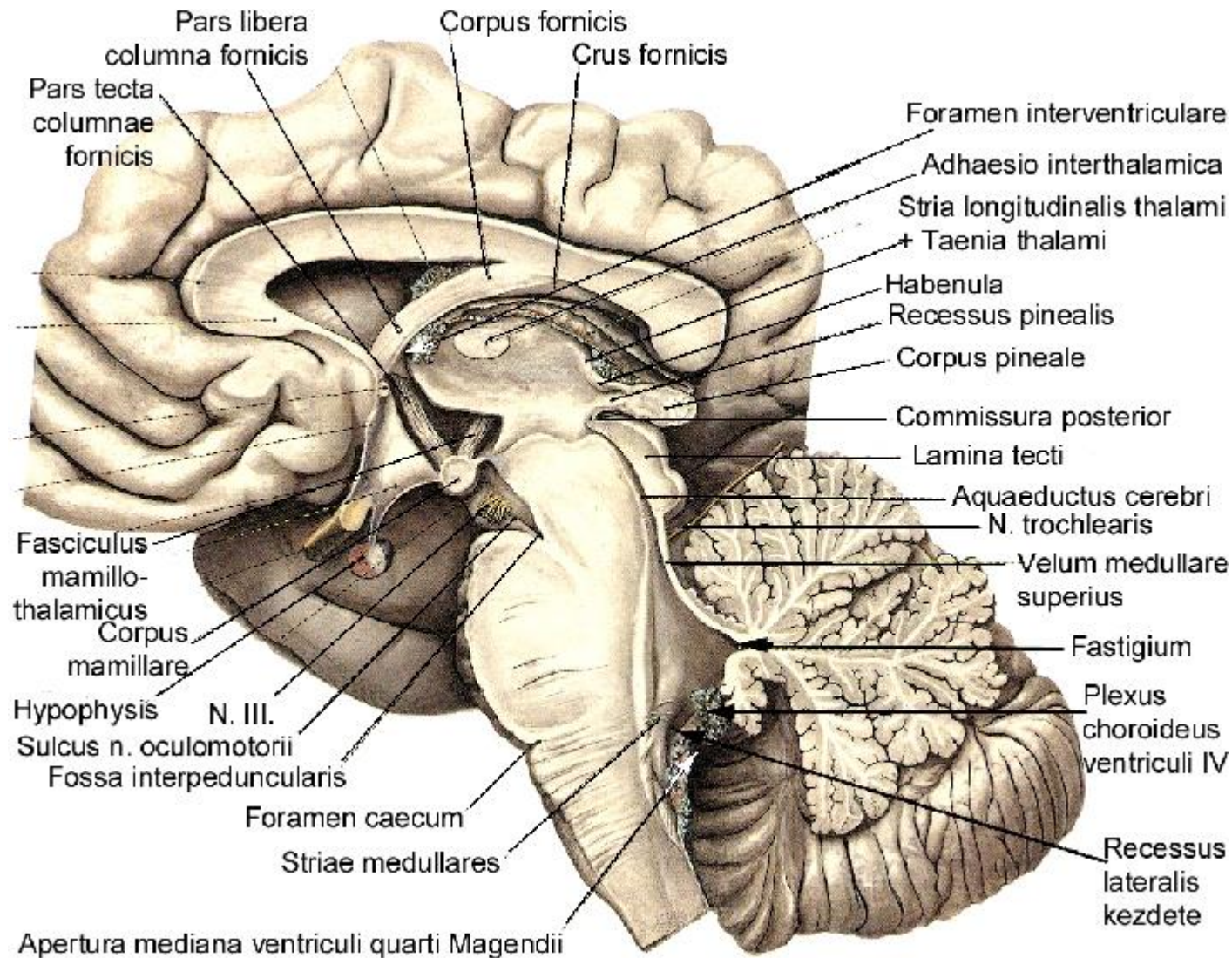


Basal plate



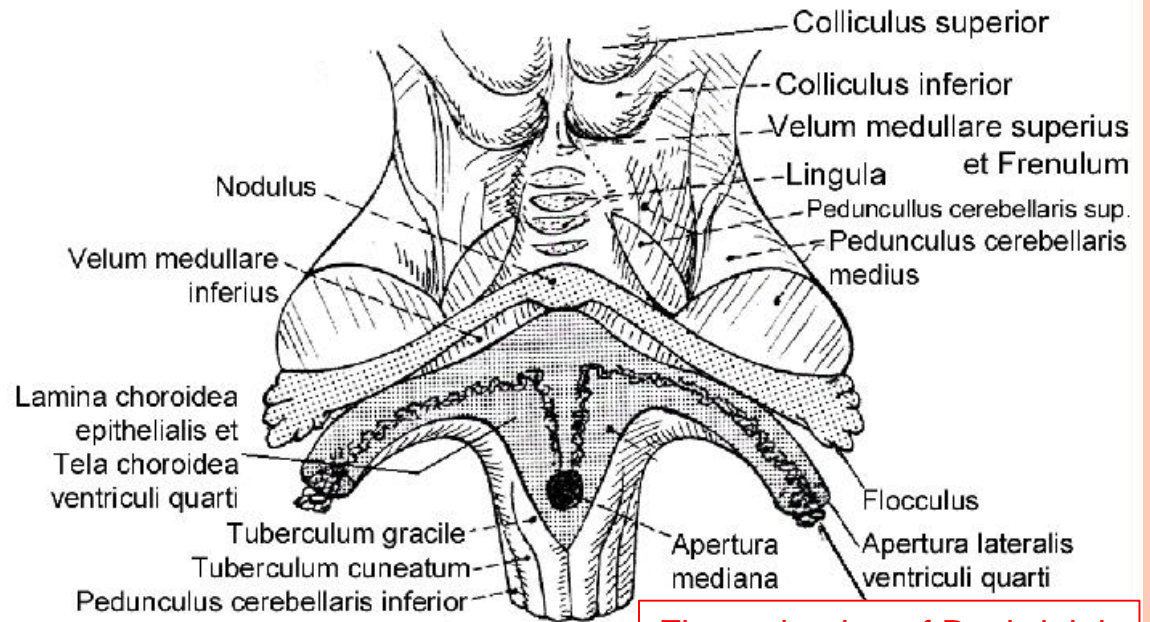
Roof of the IV. ventricle – tegmen ventriculi quarti

1 superior medullary velum + fastigium + nodulus + 2 inferior medullary velum + choroid lamina epithelialis of the IV. ventricle

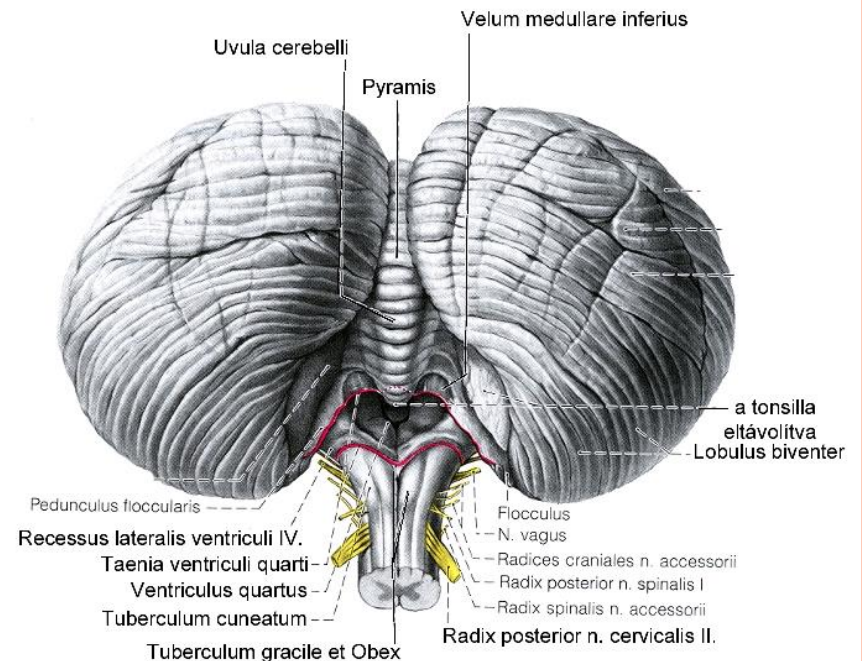
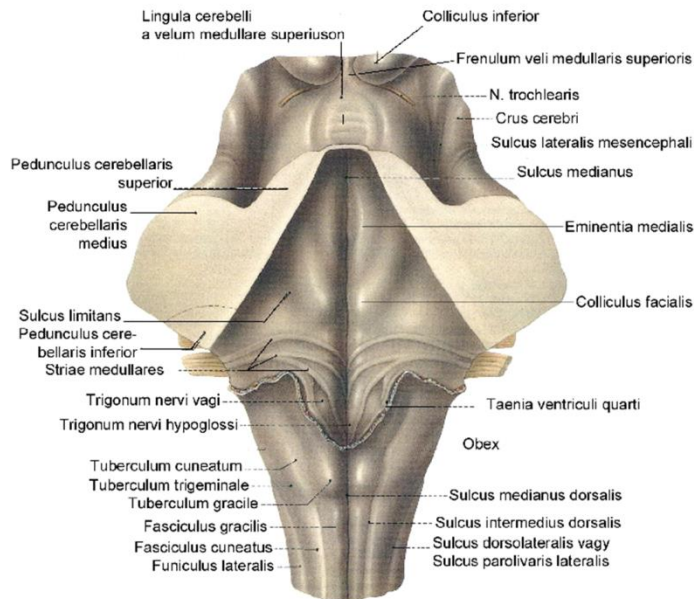


Choroidea lamina epithelialis ventriculi quarti – adhesion line: taenia ventriculi quarti

Lamina?
Tela?
Plexus?



Flower basket of Bochkalek



**Thank You for your
attention!!!**

