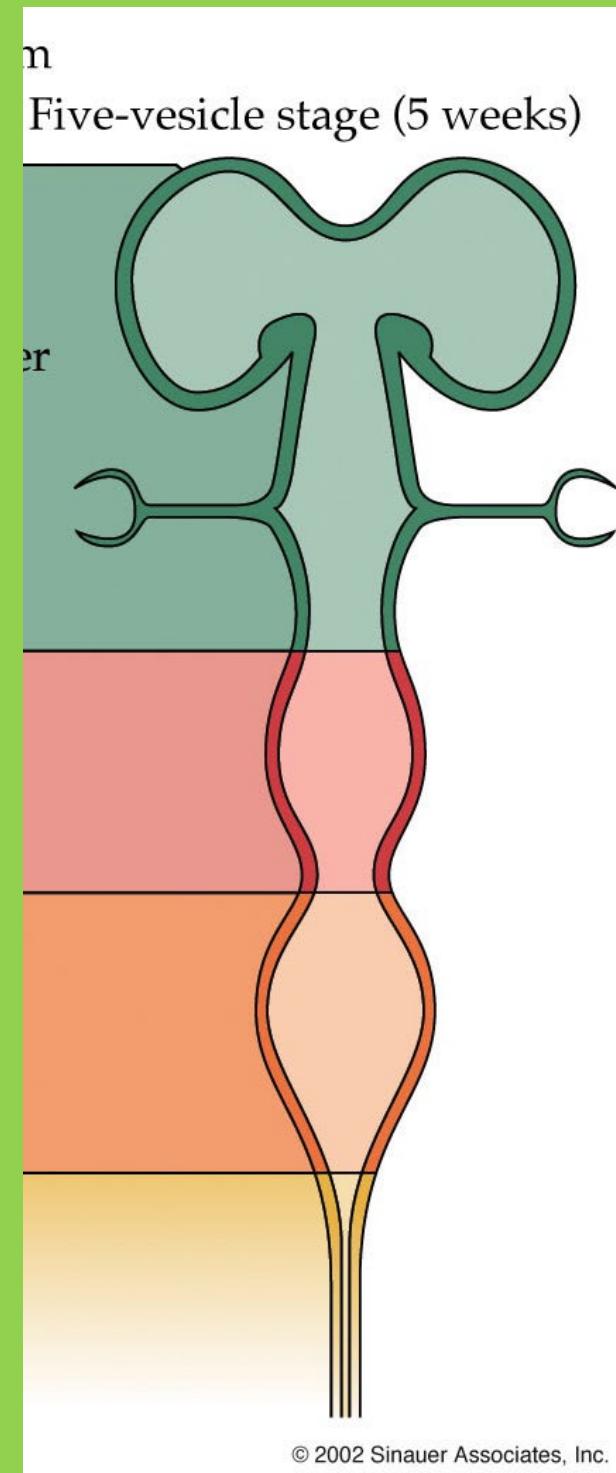
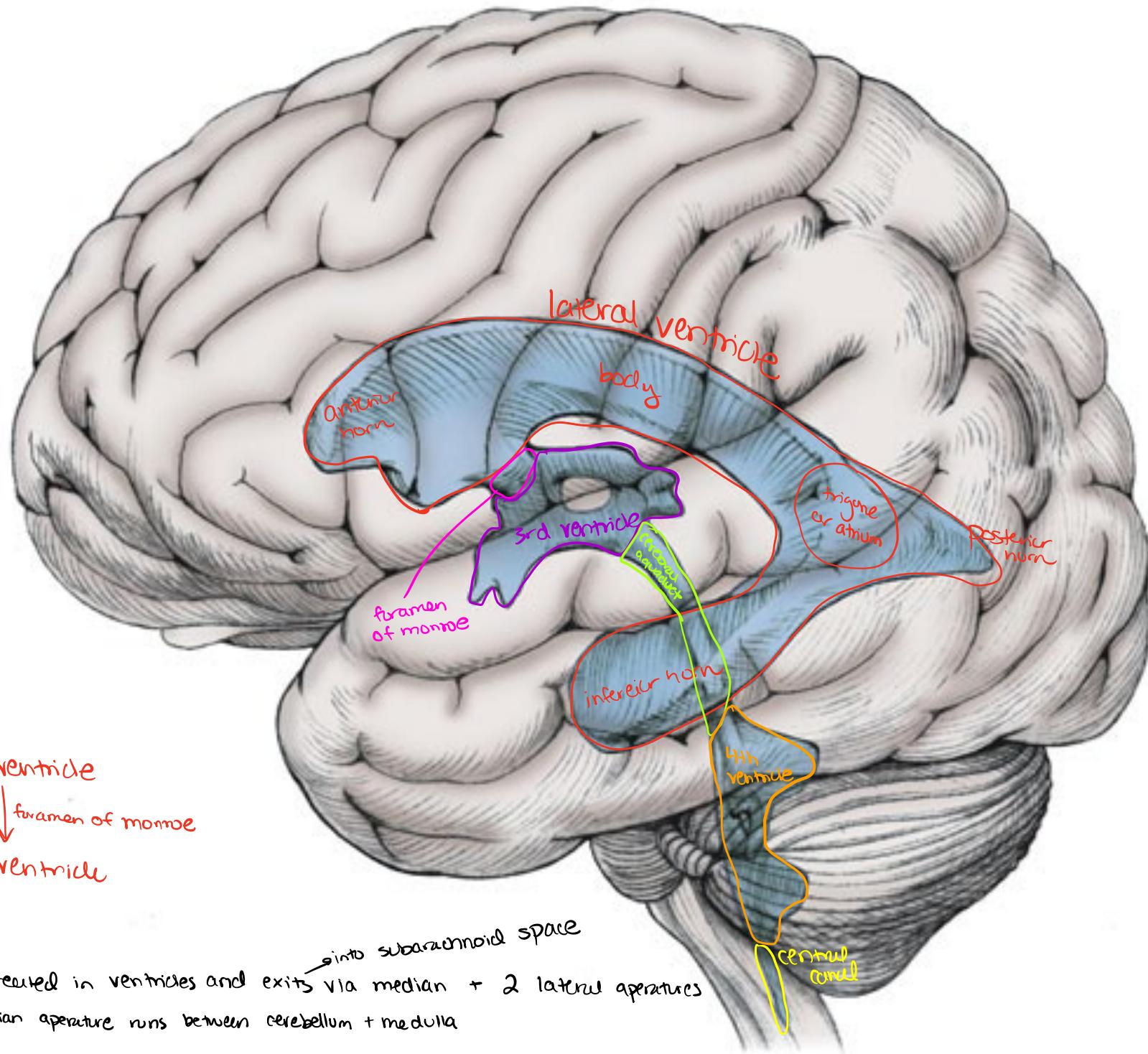


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The Ventricles and Brain Slices

Describe the ventricular system. Be sure to indicate how CSF is produced, how it circulates through these lumens and how it is removed.

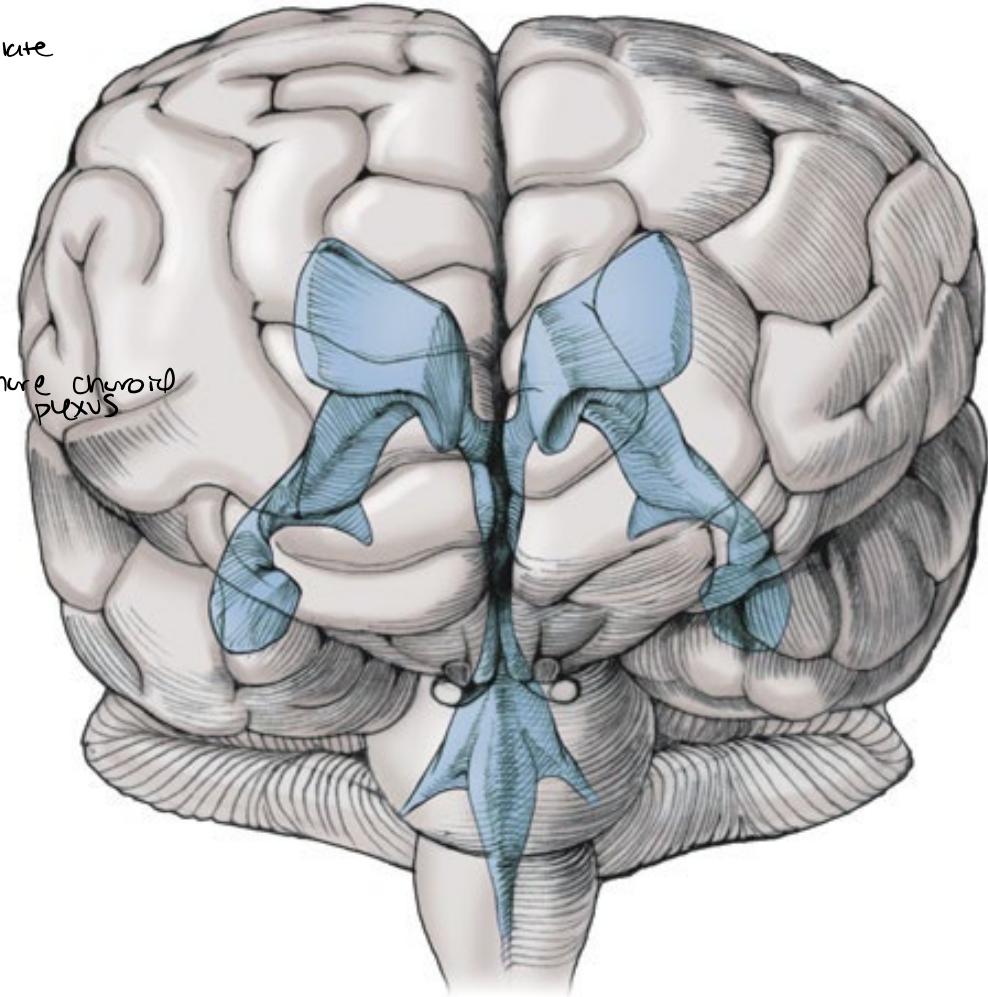




- CSF is created in ventricles and exits via median + 2 lateral apertures
- median aperture runs between cerebellum + medulla

The Ventricles and Cerebrospinal Fluid (CSF)

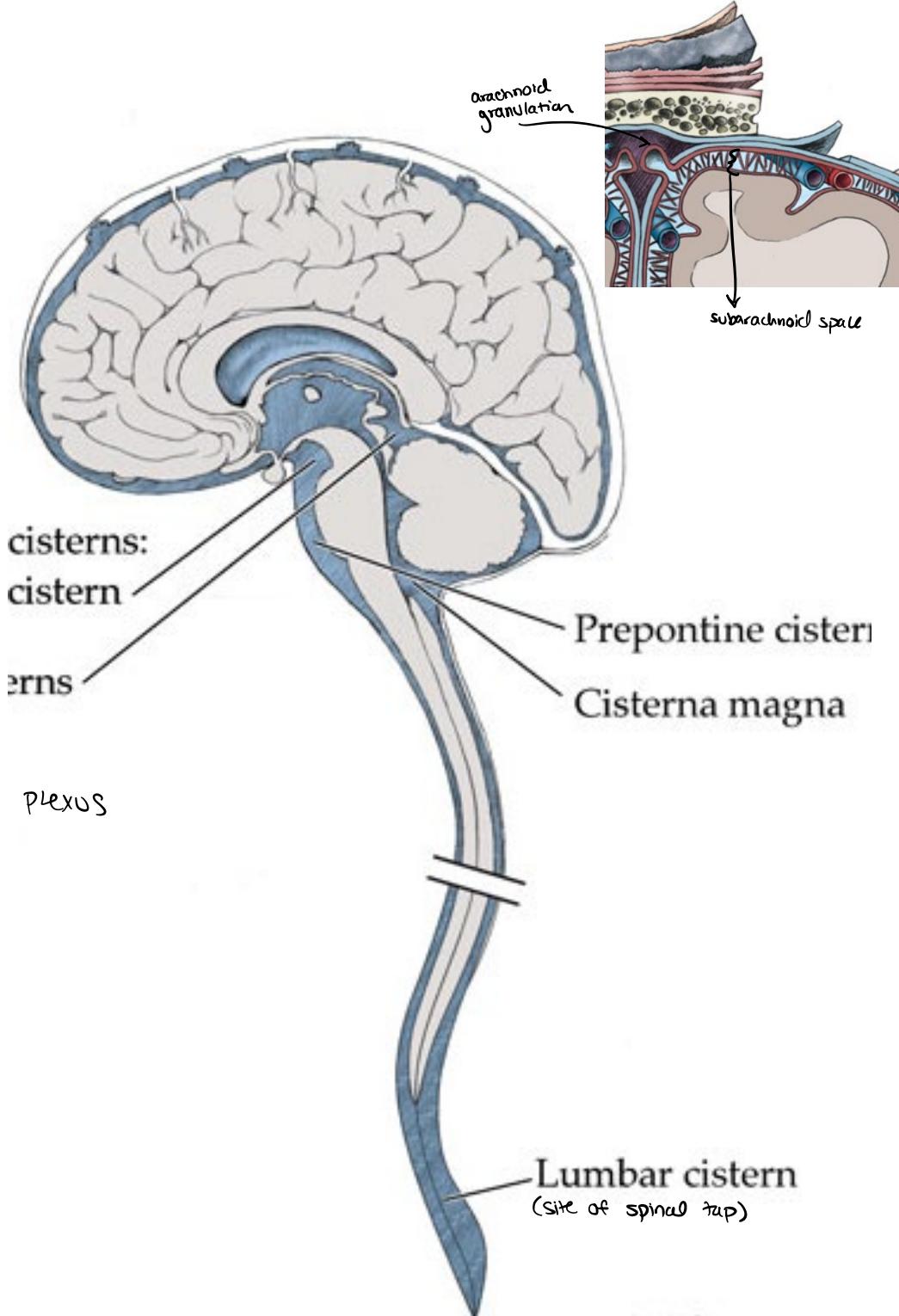
- The Ventricles
 - The Brain's Sewer
 - Functionally like the lymphatic system, but with no leucocytes (white blood cells)
 - Lined with Ependyma – lining of epithelial cells which also can have stem cells
- CSF
 - most CSF is produced in lateral ventricles b/c they have more choroid plexus
 - Produced in the Ventricles by Choroid Plexus
 - An organ made of capillaries and ependyma
 - Travels through the ventricles to the fourth ventricle
 - Exits Medial and Lateral Apertures
 - Travels through the Subarachnoid Space
 - Exits Arachnoid Granulations into the Sinuses



The Subarachnoid Space

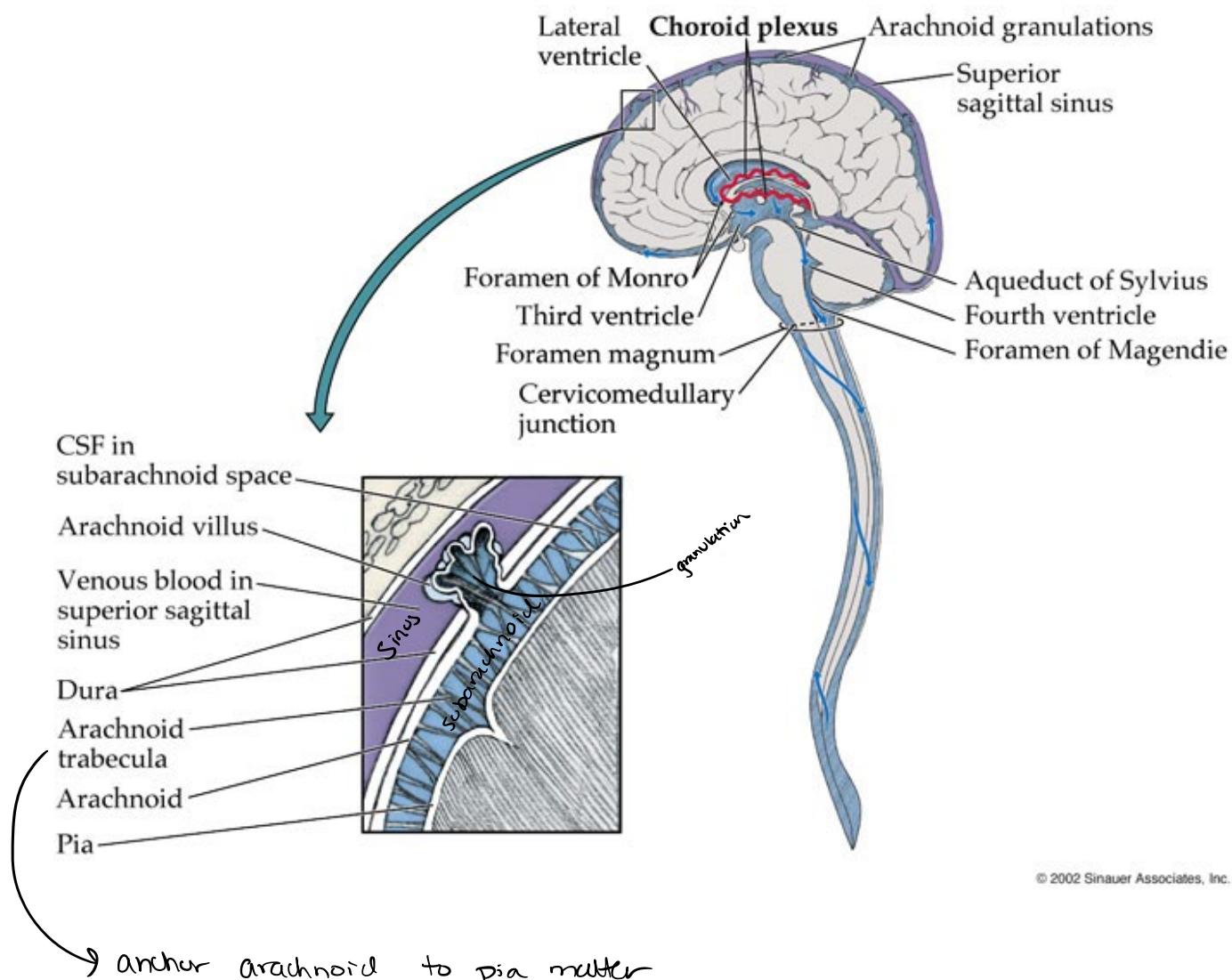
- Below the arachnoid layer (within?)
 - Arachnoid surface to Pia
 - Contains blood vessels
- Filled with pressurized fluid – CSF
 - Volume of ventricles and subarachnoid space, 150ml
 - Ventricle volume only 30 ml
 - CSF produced per day, 600ml by choroid plexus
- Thin space (mm's) except for Cisterns
 - Lumbar Cistern (below L2) and Cistern Magna
 - Site of Spinal Taps → lumbar cistern
 - Monitor for blood and metabolites

medial aperture
cistern magna



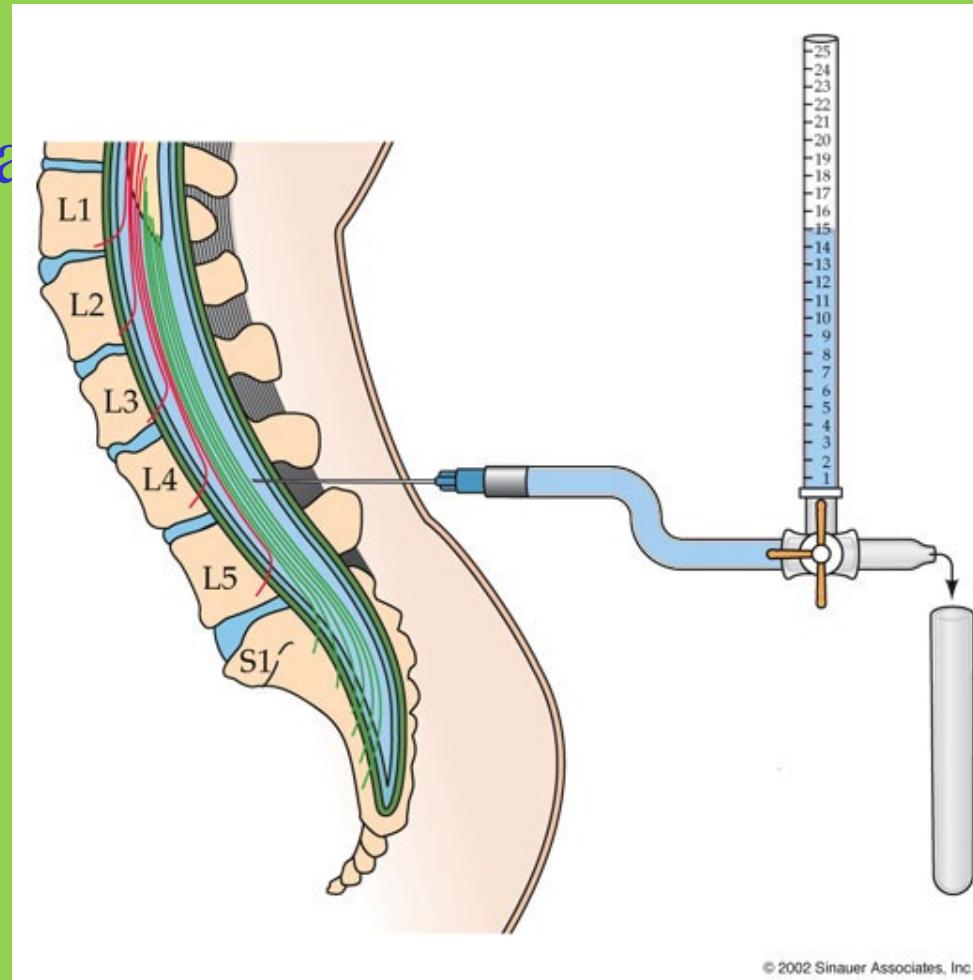
Arachnoid Granulations

- Protrusions of arachnoid into the sinuses
- Releases CSF into sinuses
 - Drain into sewer
 - Sinuses carry blood and CSF to jugular vein



CSF and Hydrocephalus

- What is hydrocephalus and what are some common causes
- At what location in the subarachnoid space could blockage of CSF flow produce **Communicating Hydrocephalus?**
- How about **Non-communicating hydrocephalus?**



Hydrocephalus

- Symptoms

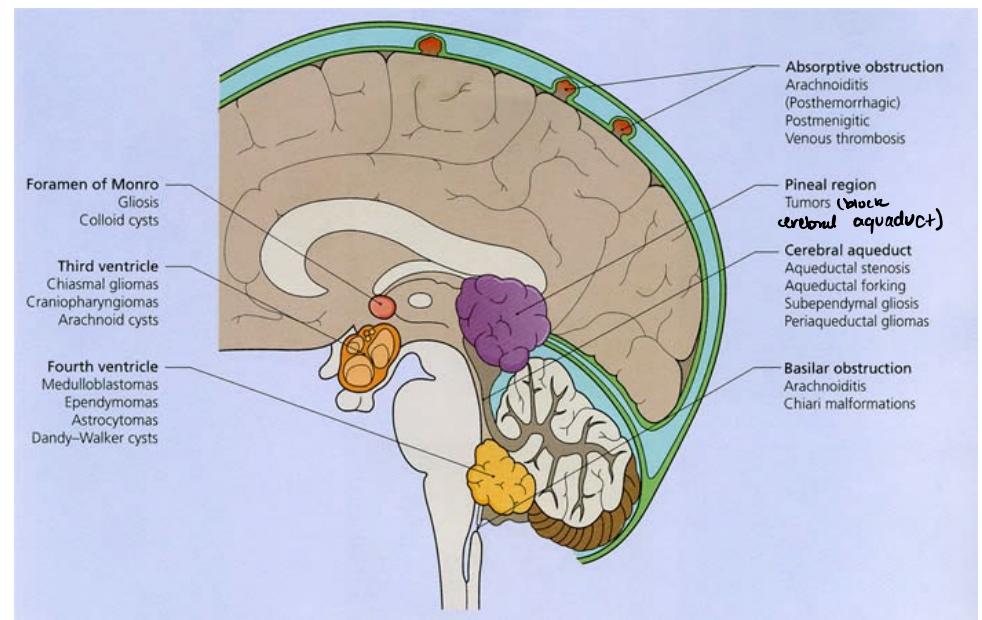
- Increased CSF pressure
- Infant
 - Enlarged Head
b/c skull has not fully fused where cartilage hasn't turned to bone
 - Anterior and Posterior Fontanelles have not fused
 - Brain Compression

- Adult

- Normal Skull size *which can't expand*
- Severe Brain Compression 

- Blockage of CSF flow

- Blockage of ventricular paths
 - Developmental, tumors, cysts or infections
- Blockage within subarachnoid
 - Infections, Tumors

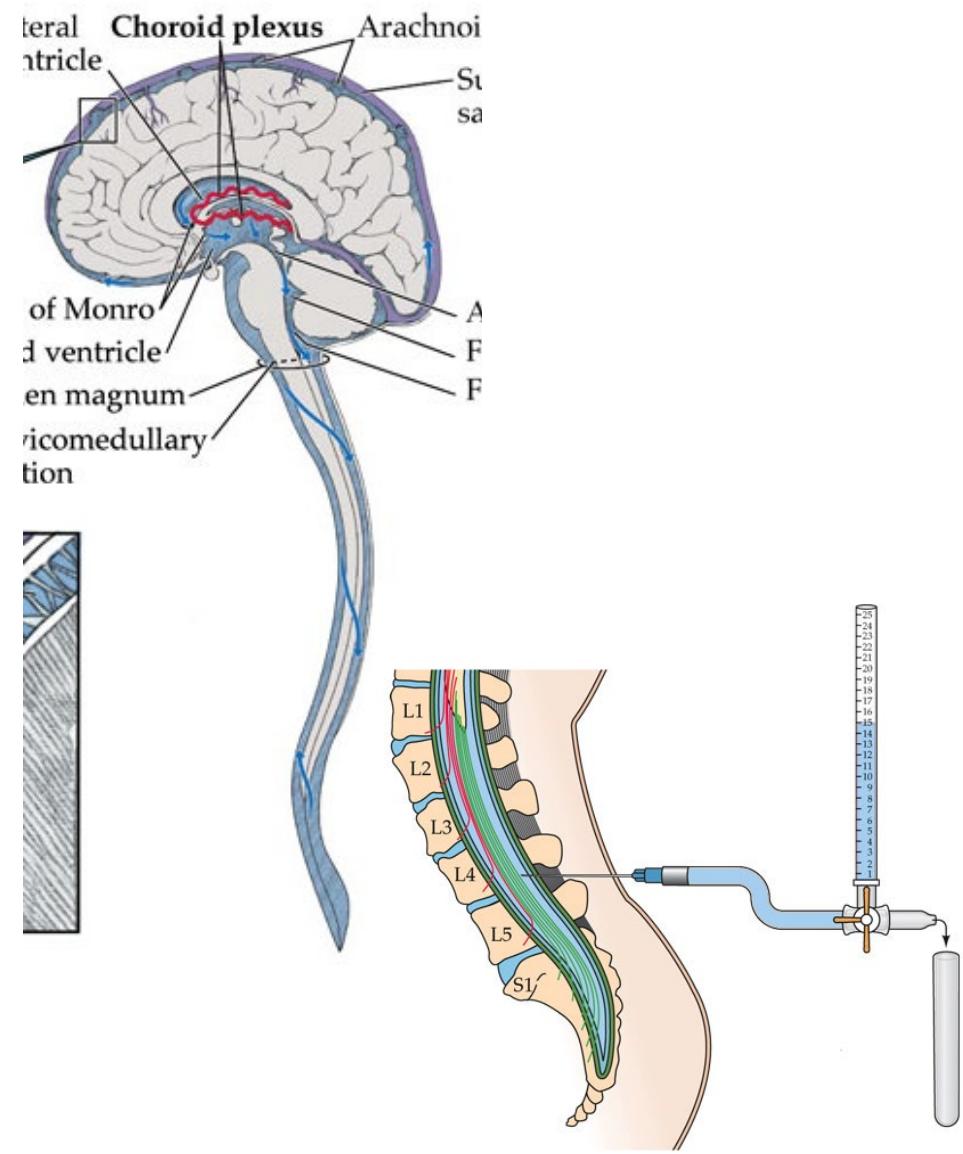


Original Diagnosis of Hydrocephalus

- Non-Communicating
 - Dye injected into lateral ventrals
 - No dye exits lumbar tap
 - Blockage of Ventricle to Subarachnoid connection
- Communicating

 - Dye injected into lateral ventrals
 - Dye exits lumbar tap
 - But still hydrocephalus
 - Blockage of Subarachnoid to Sinus connection

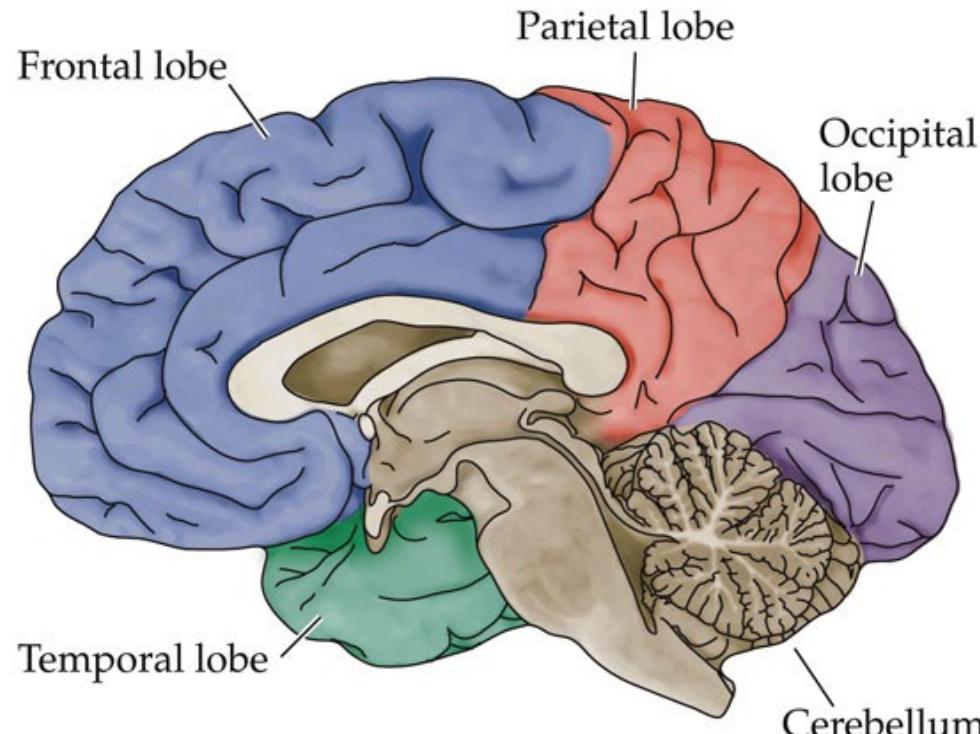
- MRI can make the distinction now
 - For Example ...



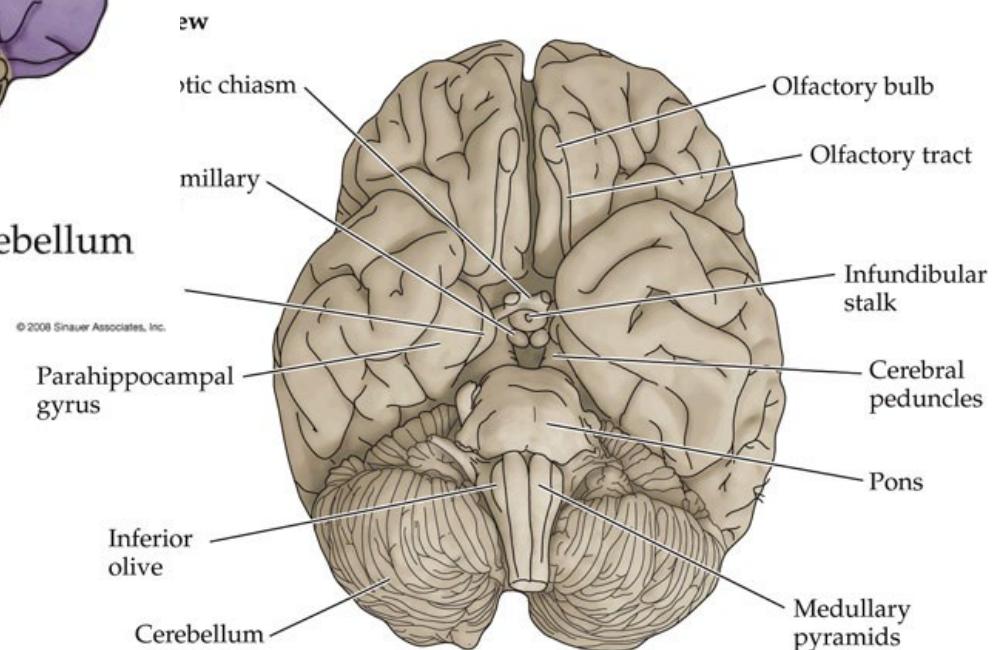
What are the section planes commonly used to slice the forebrain?

Planes of Section

(B)



NEUROSCIENCE, Fourth Edition, Appendix, Figure A12 (Part 2)

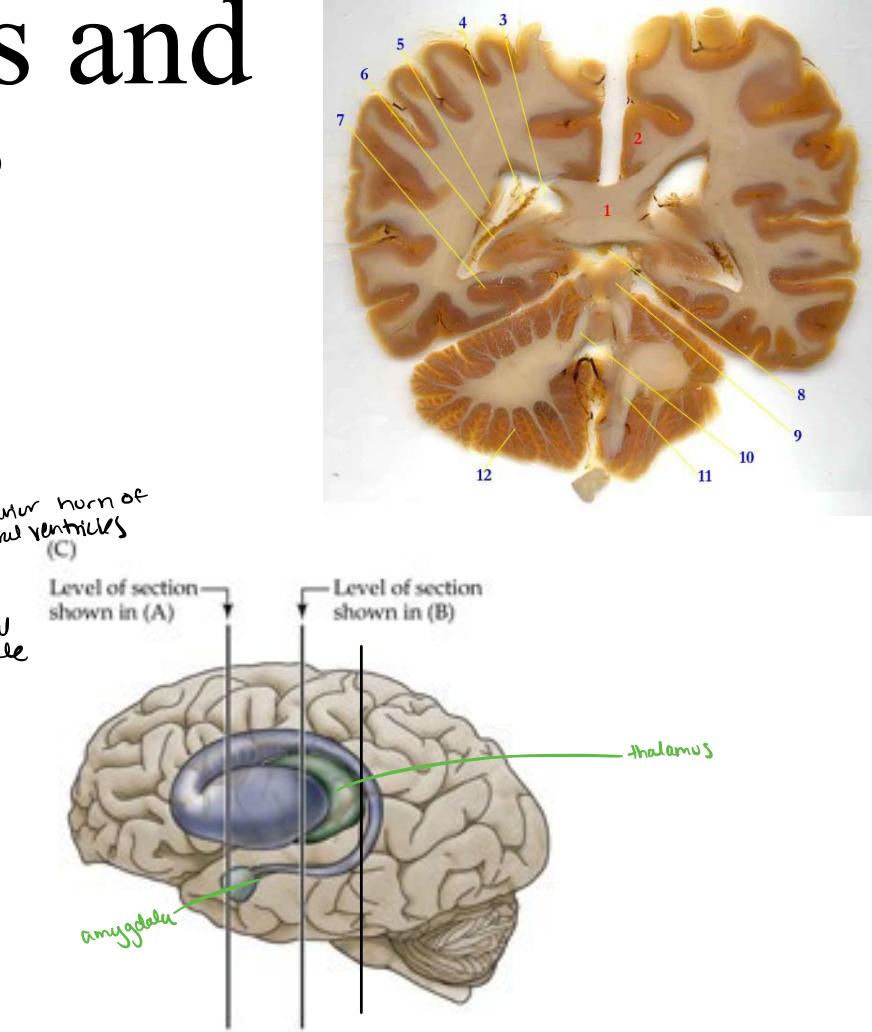
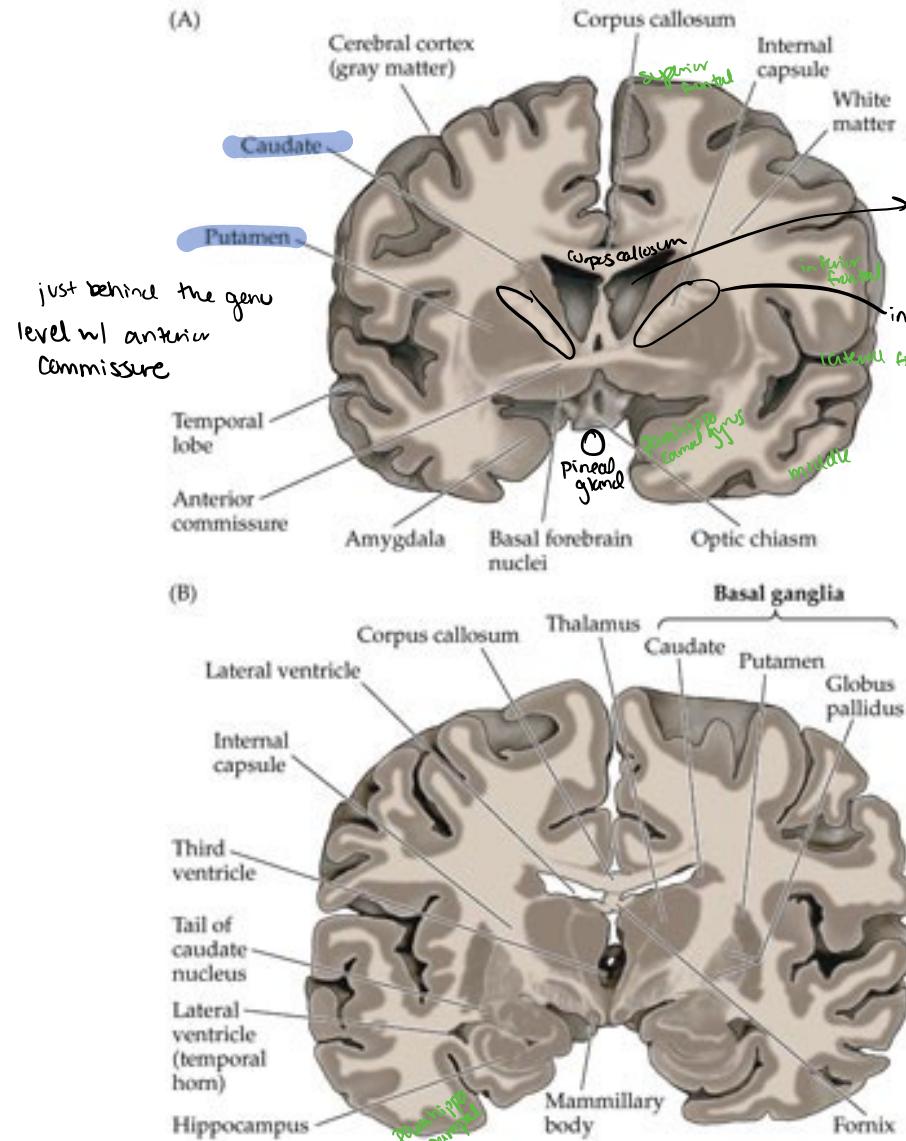


NEUROSCIENCE, Fourth Edition, Appendix Figure A11 (Part 2)

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In three key coronal sections, describe the location of major frontal and temporal lobe gyri, corpus callosum, the lateral and third ventricles, main deep cerebral nuclei and regions of the diencephalon

Slicing the Ventricles and Basal “Ganglia”



Deep Cerebral Nuclei

Caudate

Putamen

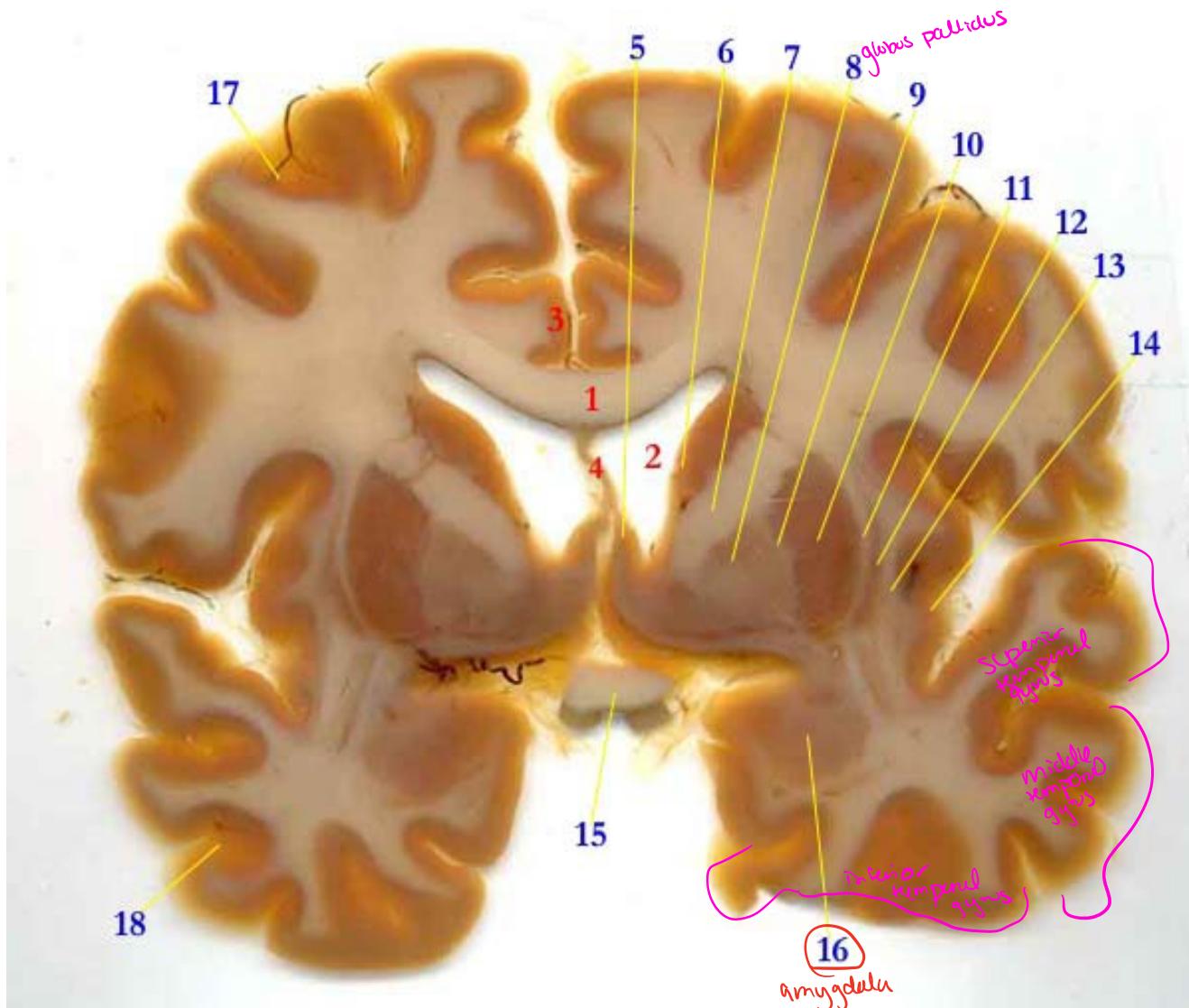
Globus Pallidus

Amygdala

body of corpus callosum, you will see thalamus

Slicing the Loaf

2. anterior horn of lateral ventricle

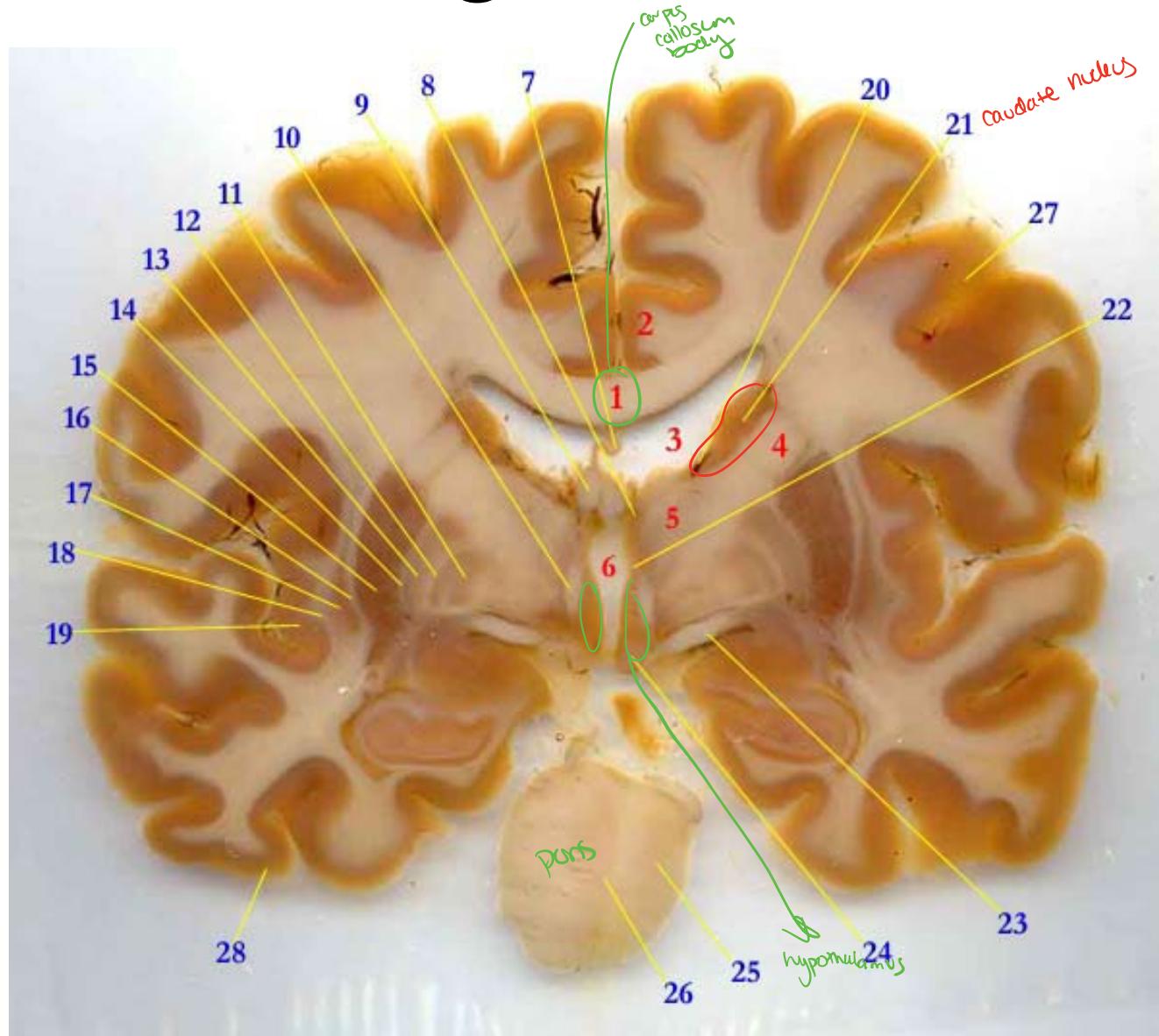


From Institut für Anatomie

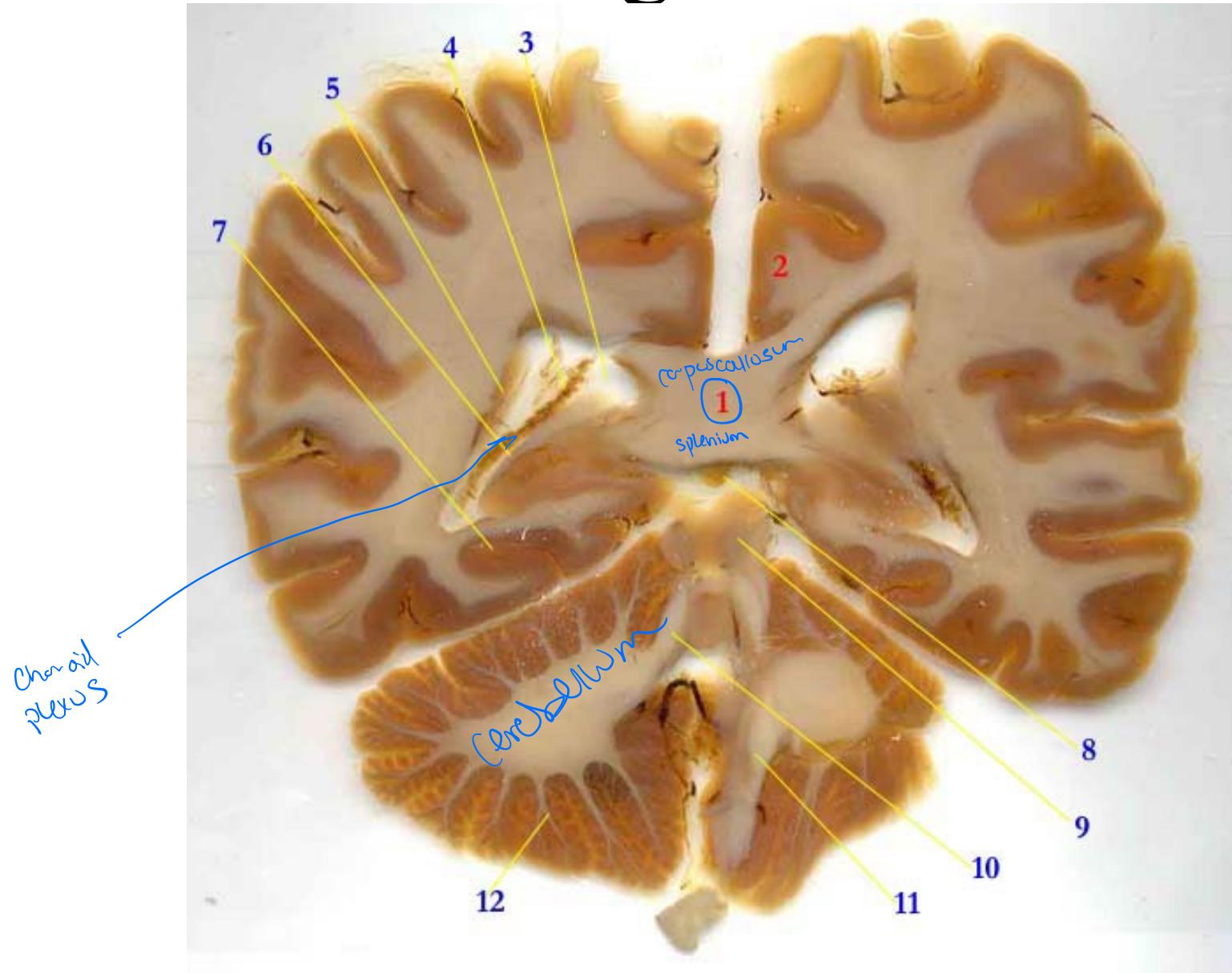
<http://www.meduniwien.ac.at/sysanat/plastinatedbrain/main.html>

Slicing the Loaf

a thalamic level



Slicing the Loaf



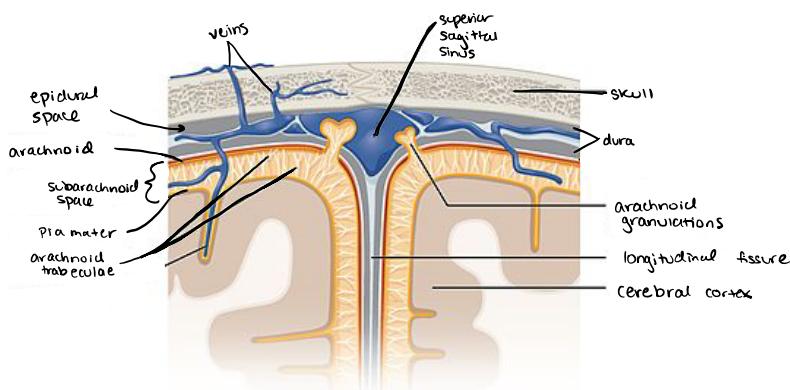
Ventricles + Cerebrospinal Fluid

Ventricles

- brain sewer system → metabolites of all cells in the brain circulate through blood and are pushed into ventricular system
- functions like lymphatic system, but no white blood cells (leucocytes)
- lined w/ ependyma (epithelial lining) that may contain stem cells

Path of CSF

- made up of capillaries + ependyma
 - produced by choroid plexus in the ventricles
 - travels through ventricles to 4th ventricle
 - exits 4th ventricle via medial + lateral apertures which
 - lead to cisterns (part of subarachnoid space)
 - exits subarachnoid space into the sinuses via arachnoid granulations



Subarachnoid Space

- subarachnoid space is below arachnoid and above pia mater
- contains pressurized CSF
 - volume of ventricles + subarachnoid space $\approx 150 \text{ mL}$
 - 600 mL of CSF produced daily
- normally a very thin space (mm) except in cisterns (lumbar + cisterna magna)
 - lumbar cistern + cisterna magna are the site of spinal taps to monitor for blood and metabolites in CSF

Arachnoid Granulations - protrusions of arachnoid into the sinuses, which then drain into jugular vein

Hydrocephalus - increased pressure in the ventricular system

Symptoms in Babies → get enlarged head b/c bones have not fused

Symptoms in Adults → skull can't expand, so severe brain compression

- Hydrocephalus occurs due to blockage of ventricular paths + blockage of subarachnoid granulations
 - tumors (ex. tumor of pineal gland blocks cerebral aqueduct / cerebellum tumor blocks lateral apertures)
 - cysts (ex. blockage of foramen of monro)
 - infections → pus can block foramina

2 types of Hydrocephalus

- ① Non-communicating Hydrocephalus → blockage of ventricle to subarachnoid connection
- ② Communicating Hydrocephalus → blockage of subarachnoid space to sinus connection (arachnoid granulations)

Original Hydrocephalus Diagnosis

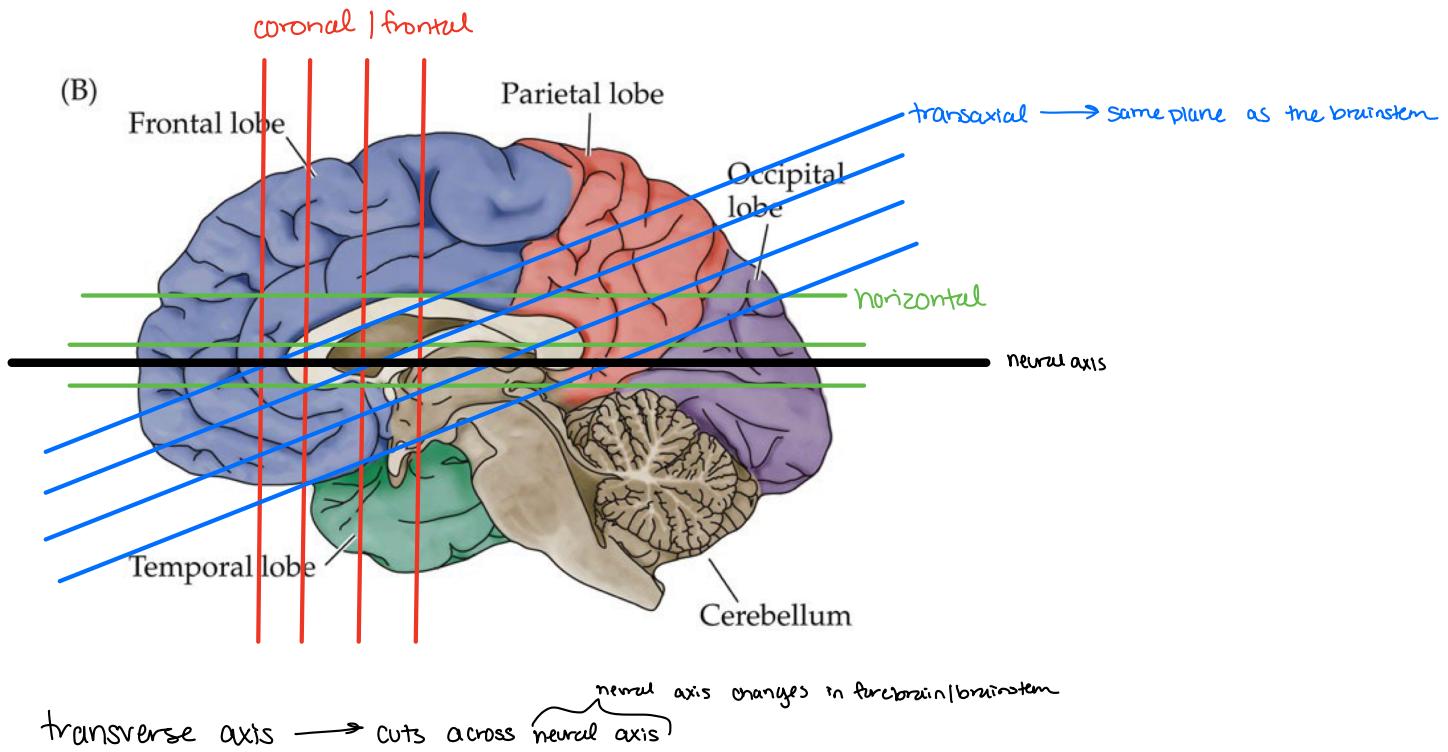
- dye injected into lateral ventricle
- spinal tap taken in lumbar cistern

• no dye in lumbar tap → non-communicating (severe ventricle dilation)

• dye in lumbar tap → communicating hydrocephalus

→ now an MRI can be used to make this distinction

Brain Slices | Planes



• in forebrain coronal slices are transverse slices

• in brainstem transaxial slices are transverse slices

