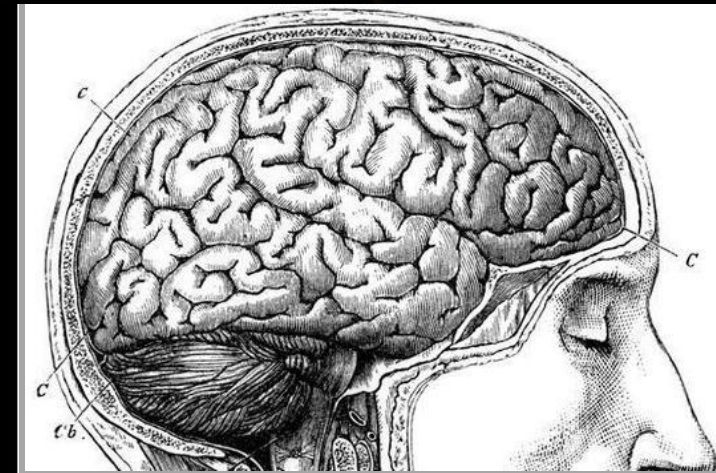
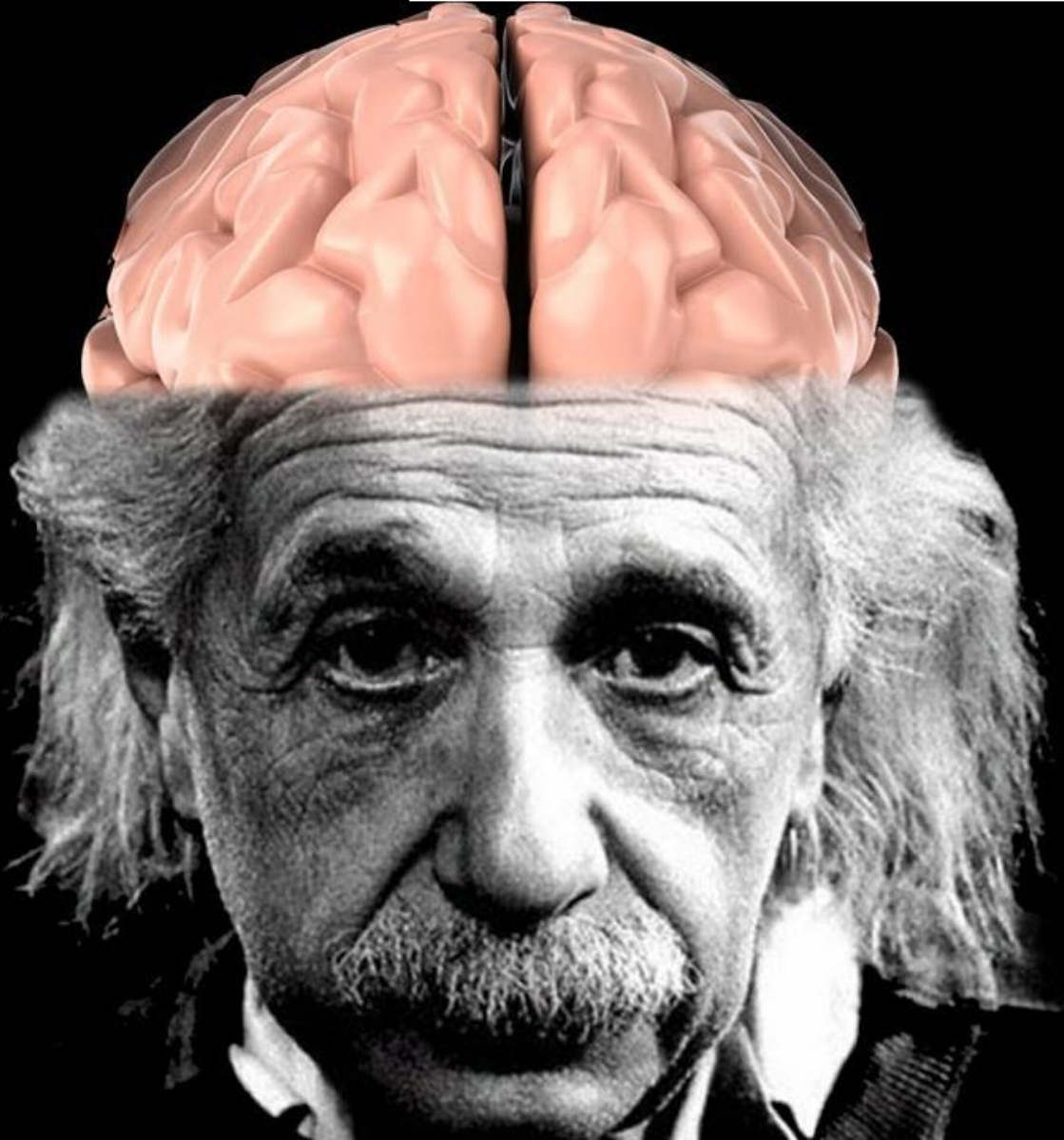
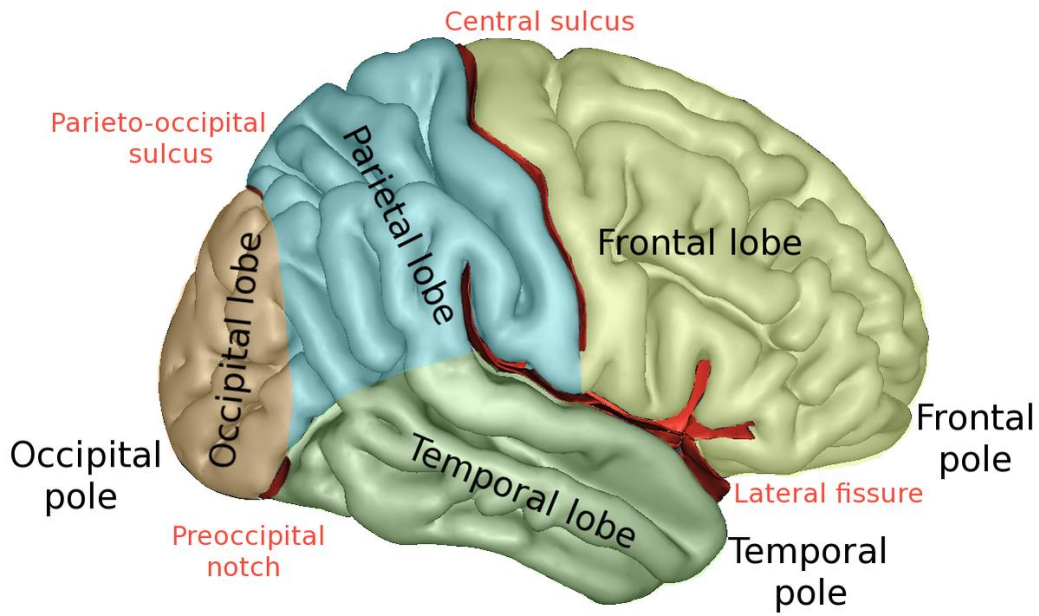
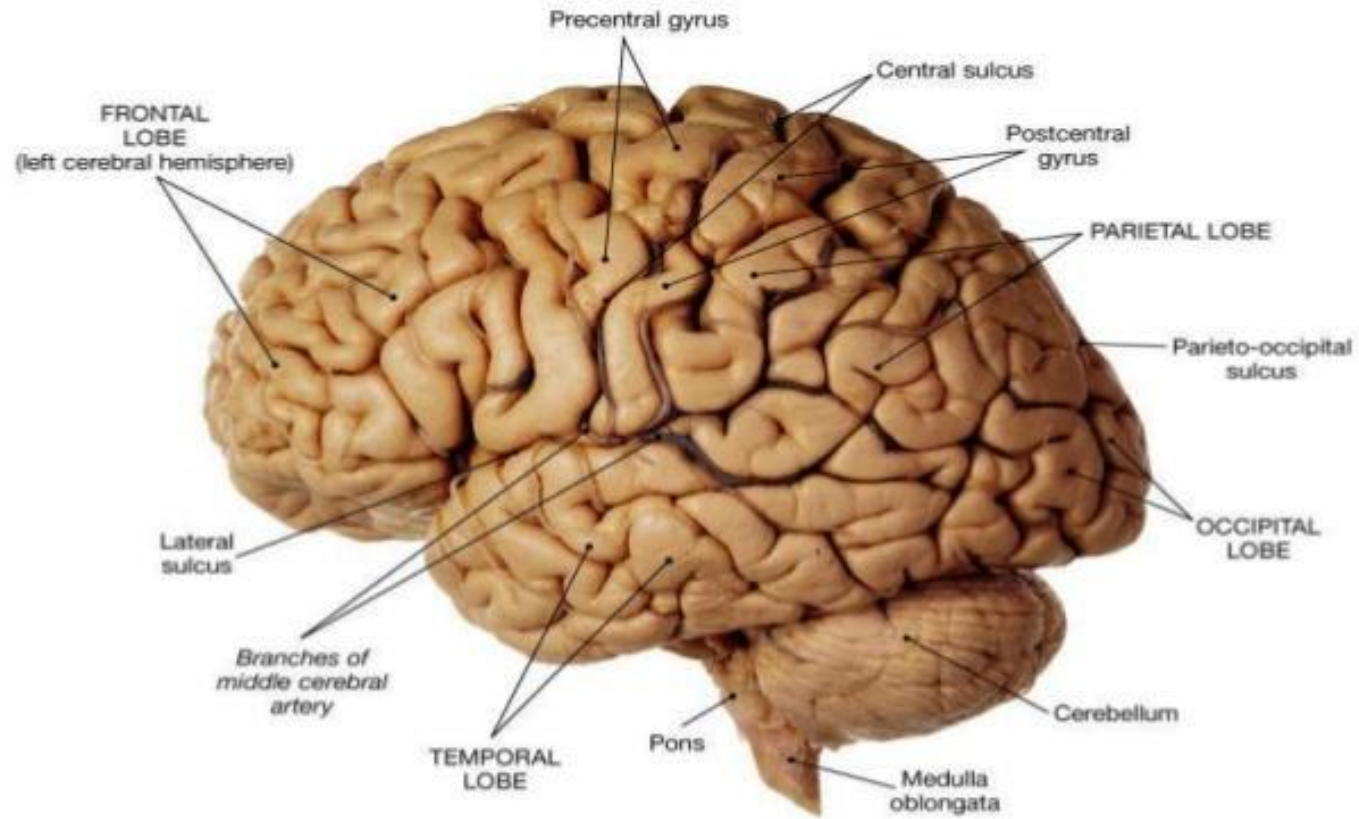


# “BRAIN VISUAL AID NOTES”

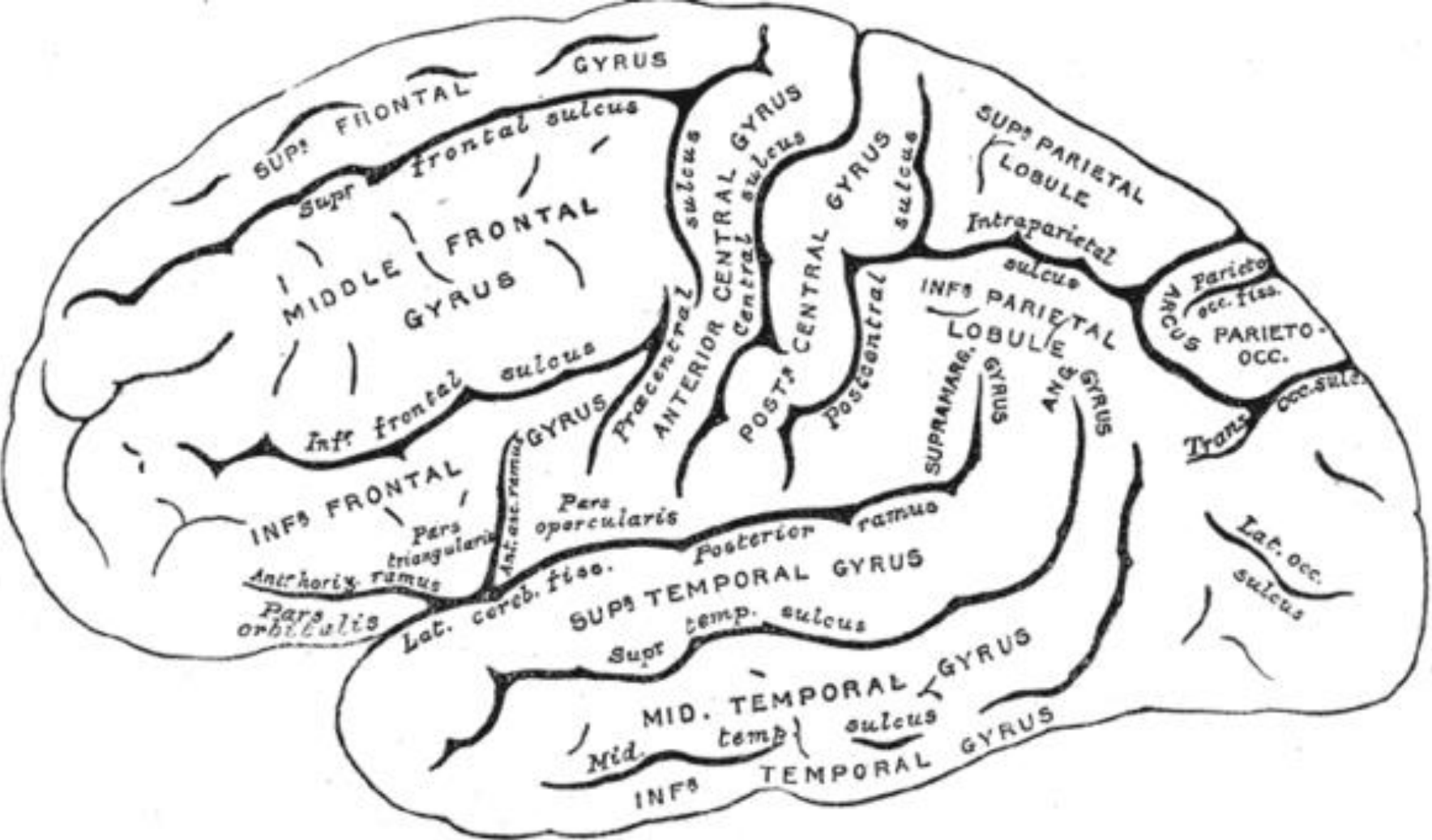


*MUDr. Azzat Al-Redouan*

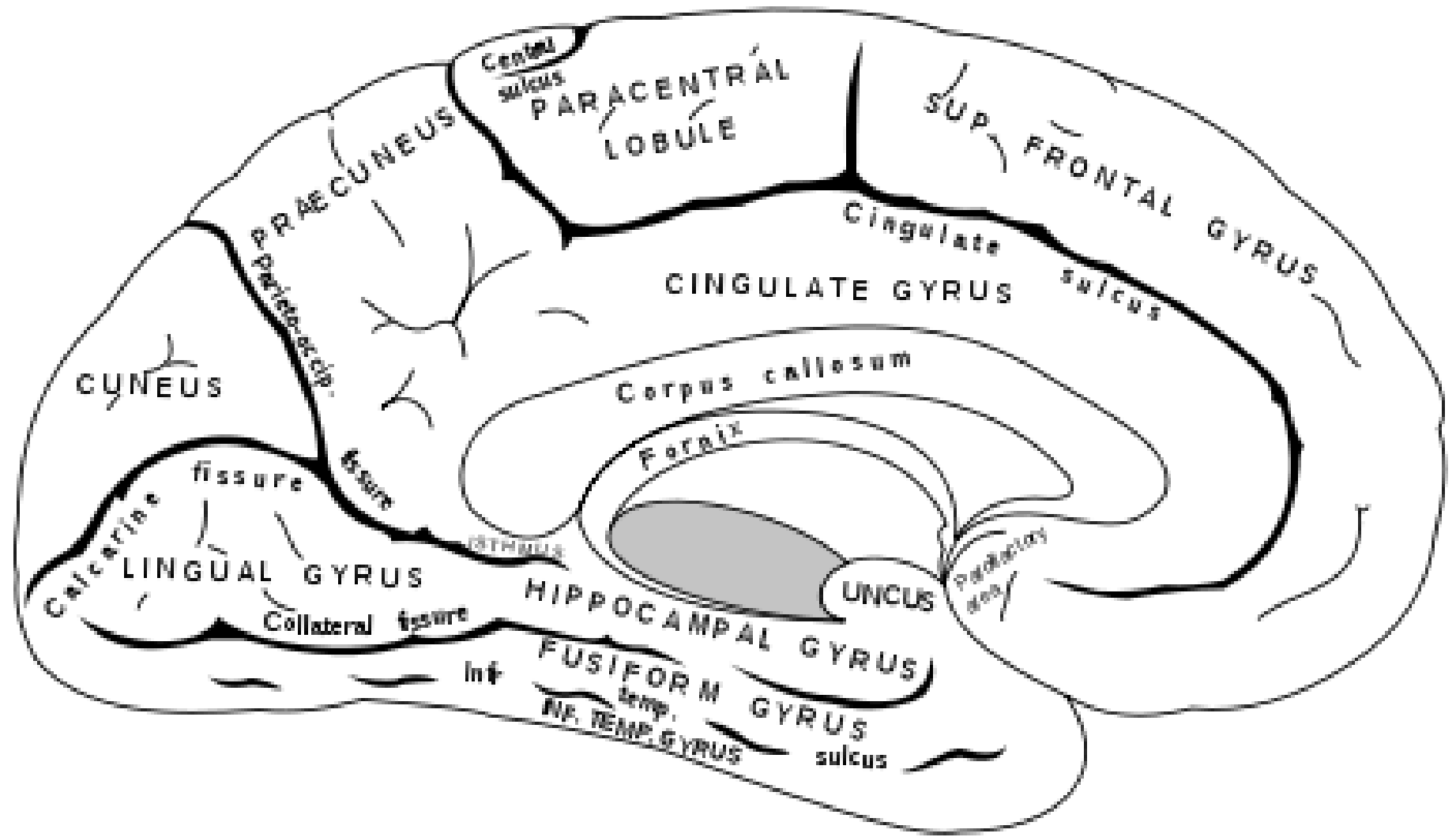
# Lobes



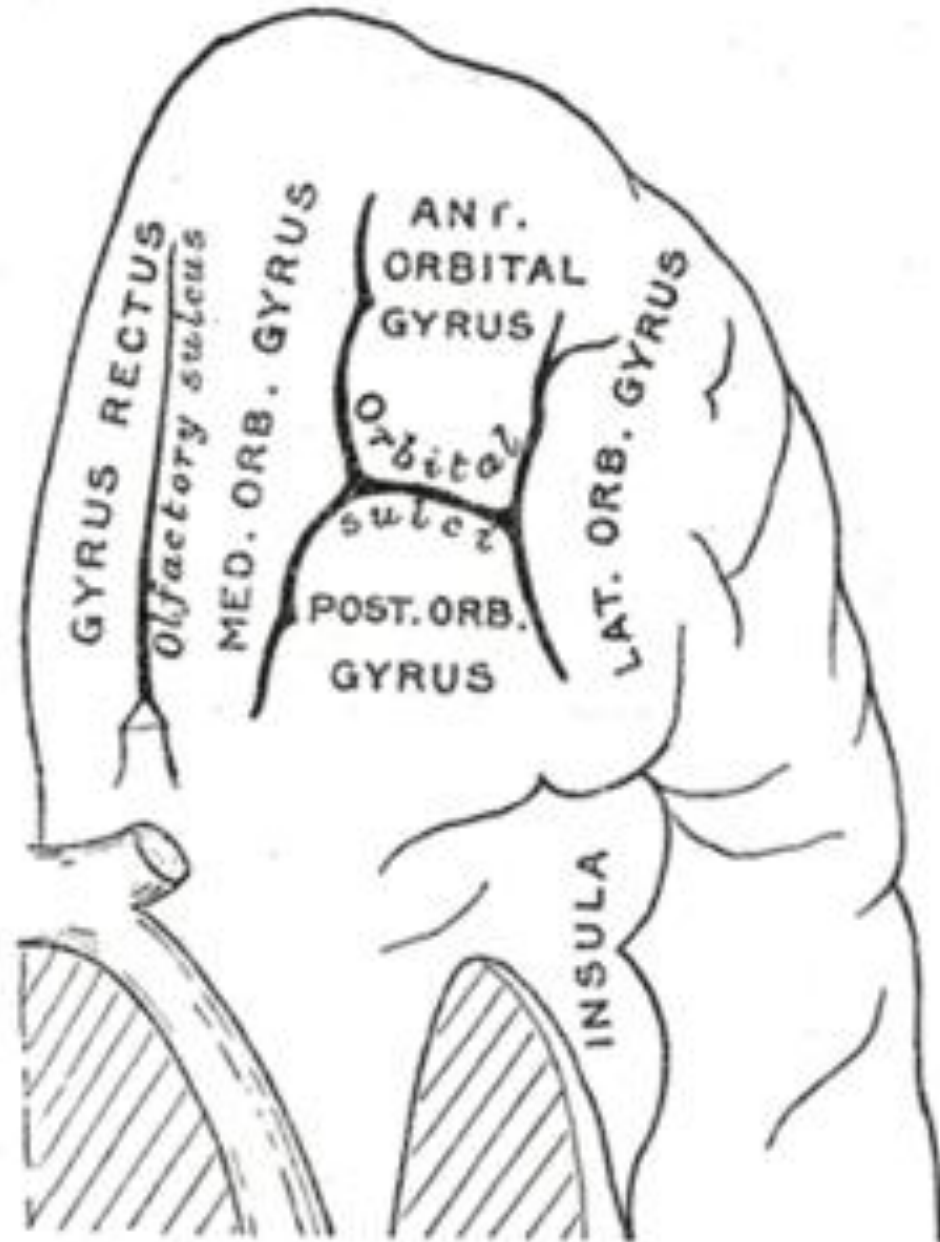
# Gyri & Sulci – Lateral View



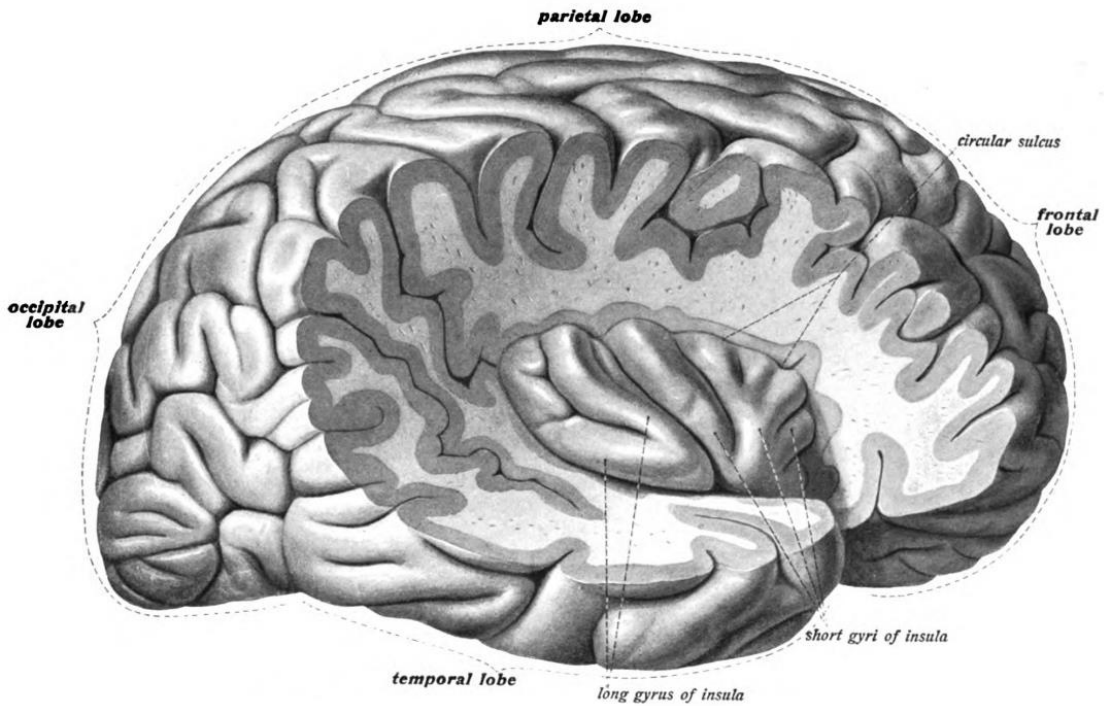
# Gyri & Sulci – Medial View



# Gyri & Sulci – Inferior view (Frontal Lobe)



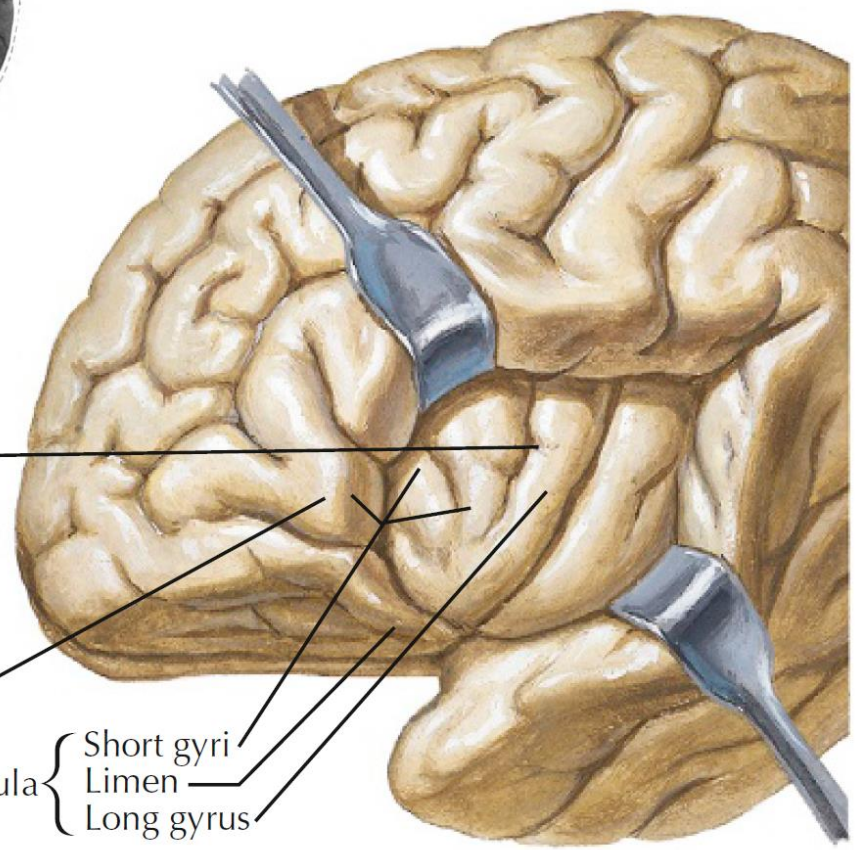
# Gyri & Sulci - Insula



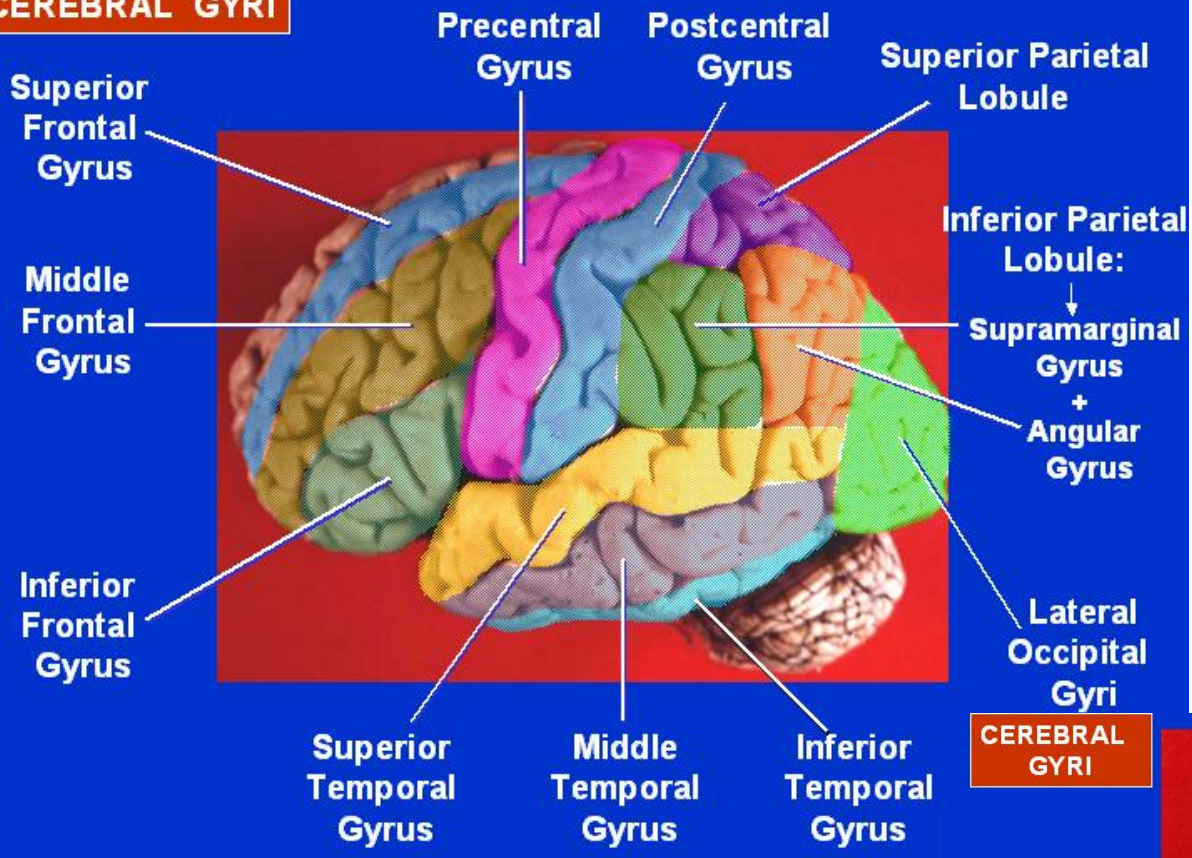
Central sulcus of insula

Circular sulcus of insula

Insula {  
Short gyri  
Limen  
Long gyrus



**CEREBRAL GYRI**

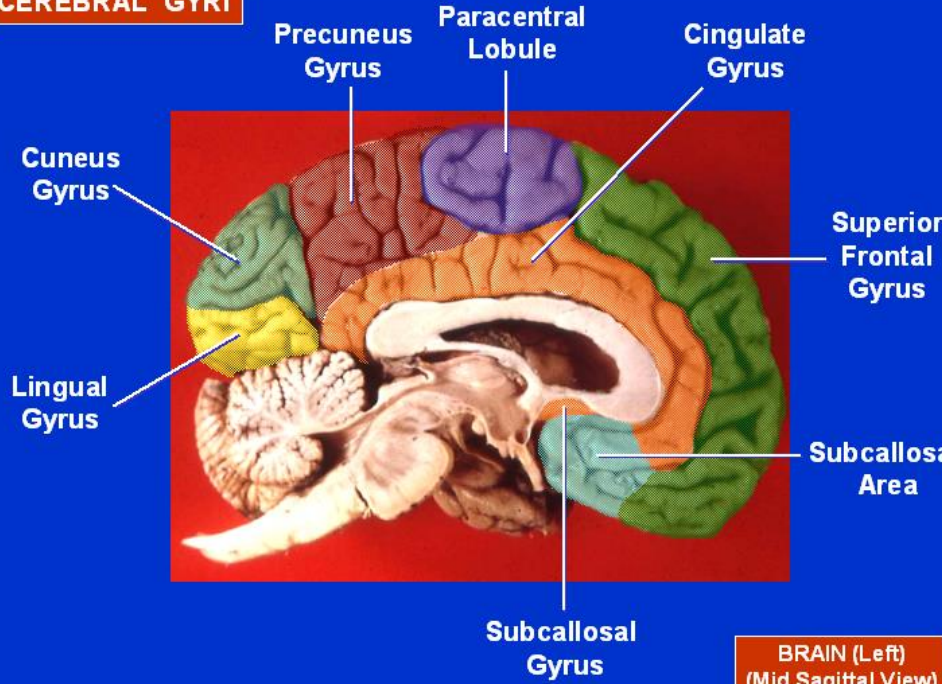


**CEREBRAL GYRI**



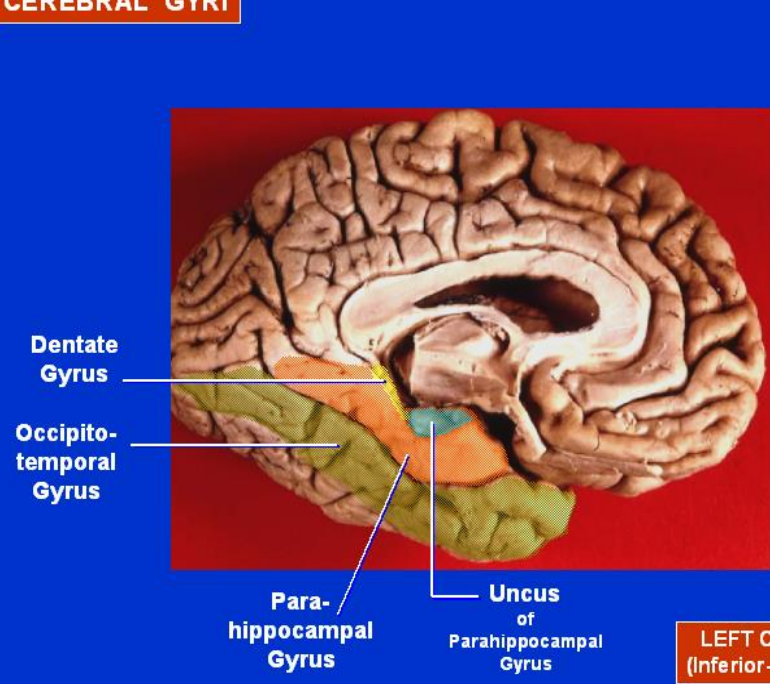
**BRAIN (Inferior View)**

**CEREBRAL GYRI**



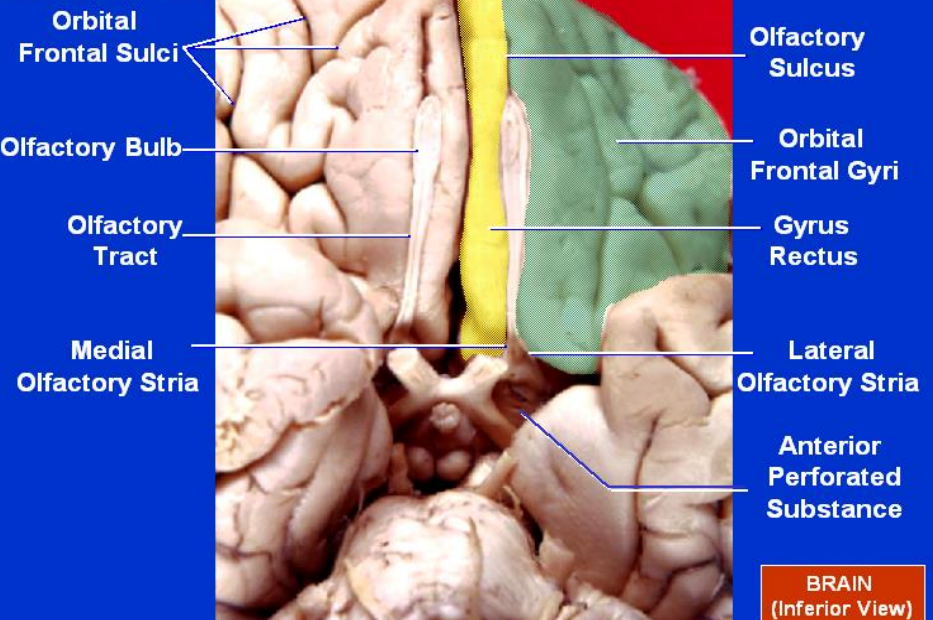
**BRAIN (Left)**  
(Mid Sagittal View)

**CEREBRAL GYRI**



**LEFT CEREBRUM**  
(Inferior-medial View)

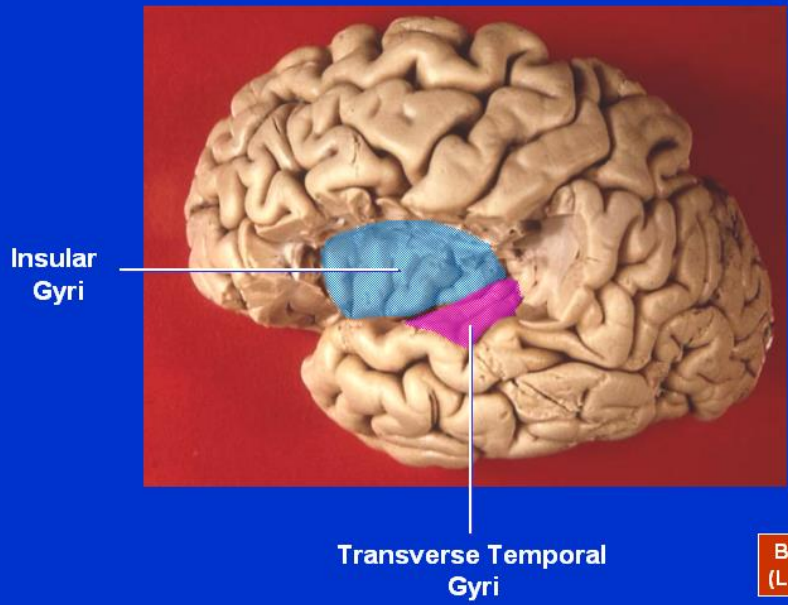
**CEREBRAL GYRI & SULCI**



**BRAIN**  
(Inferior View)

**CEREBRAL GYRI**

( Inferior Portion of Lateral Frontal & Parietal Lobes Resected )

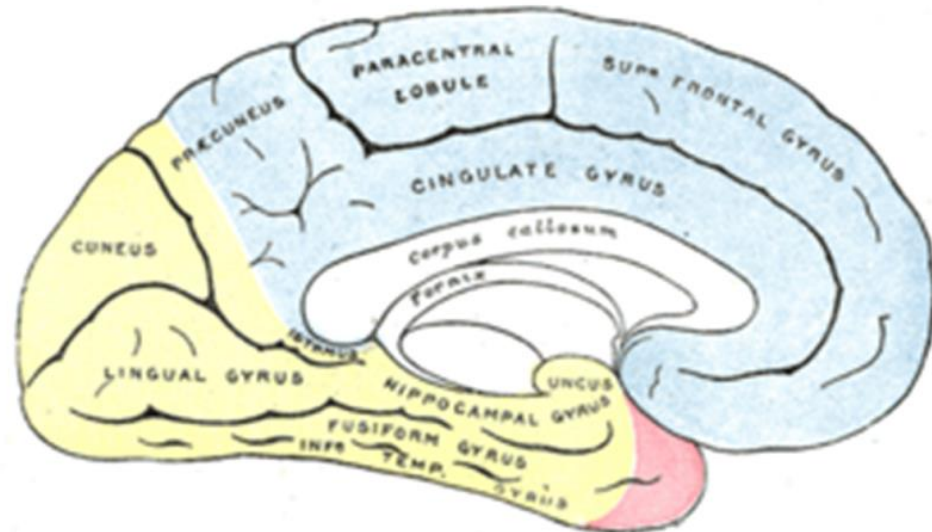
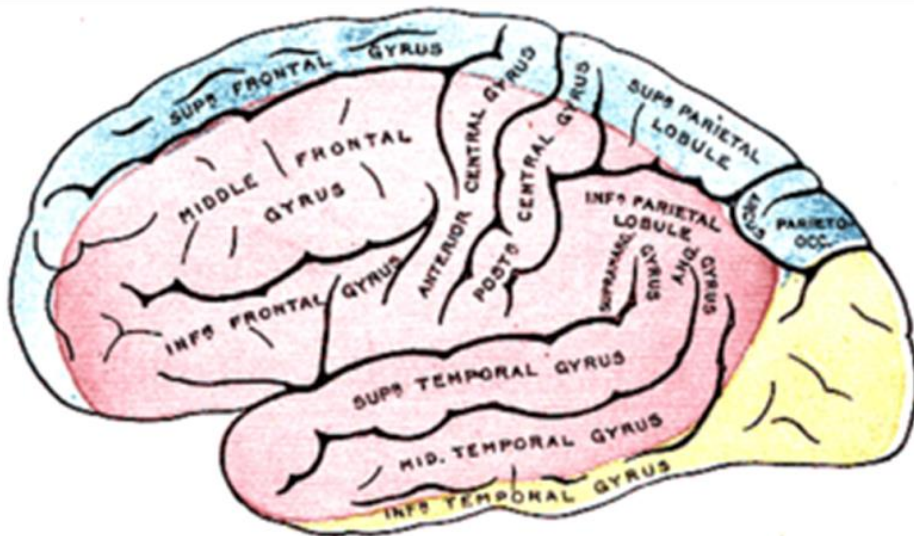
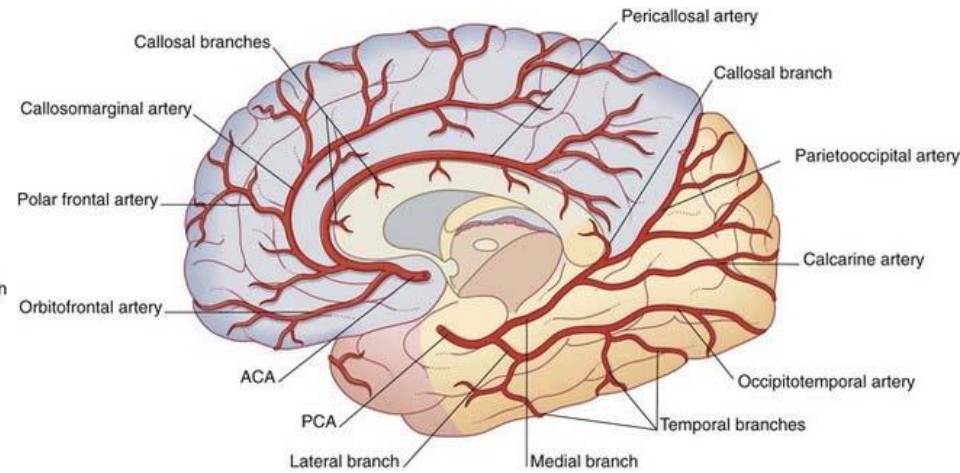
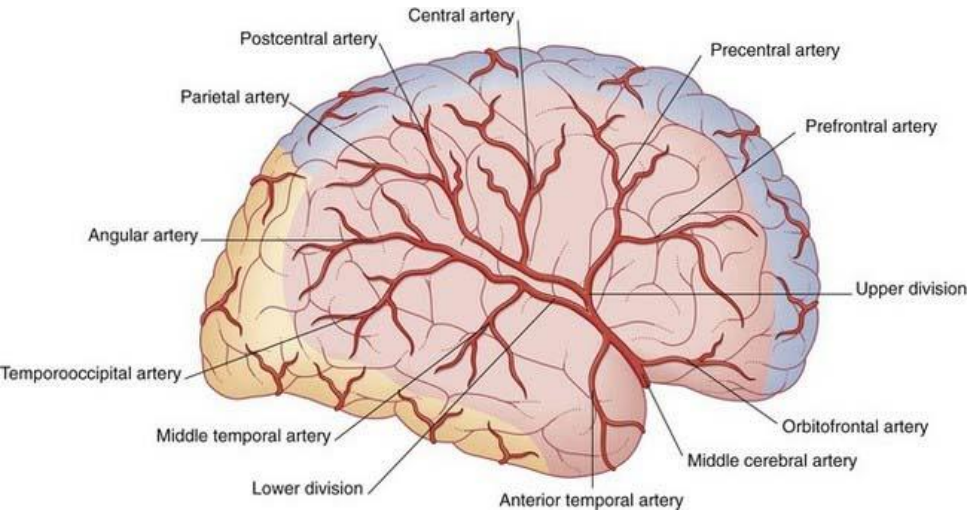


**BRAIN (Left)**  
(Lateral View)

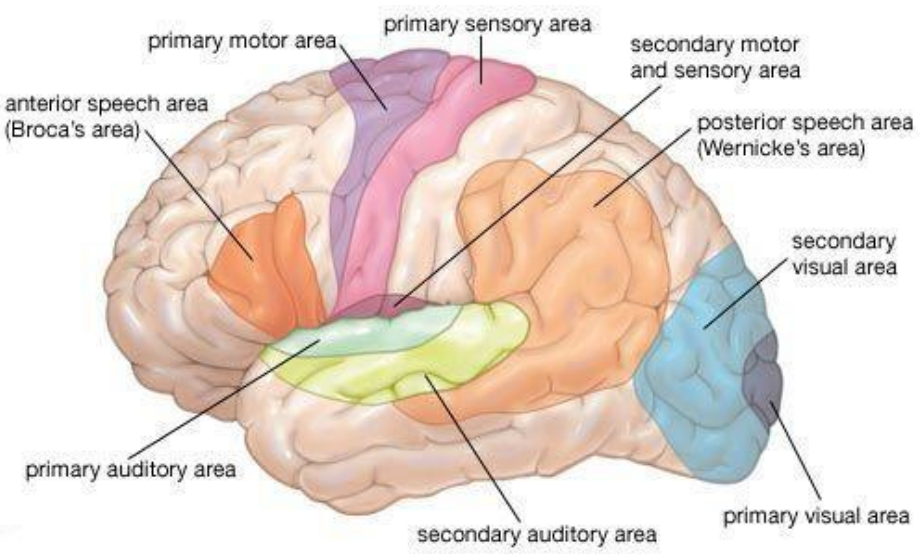
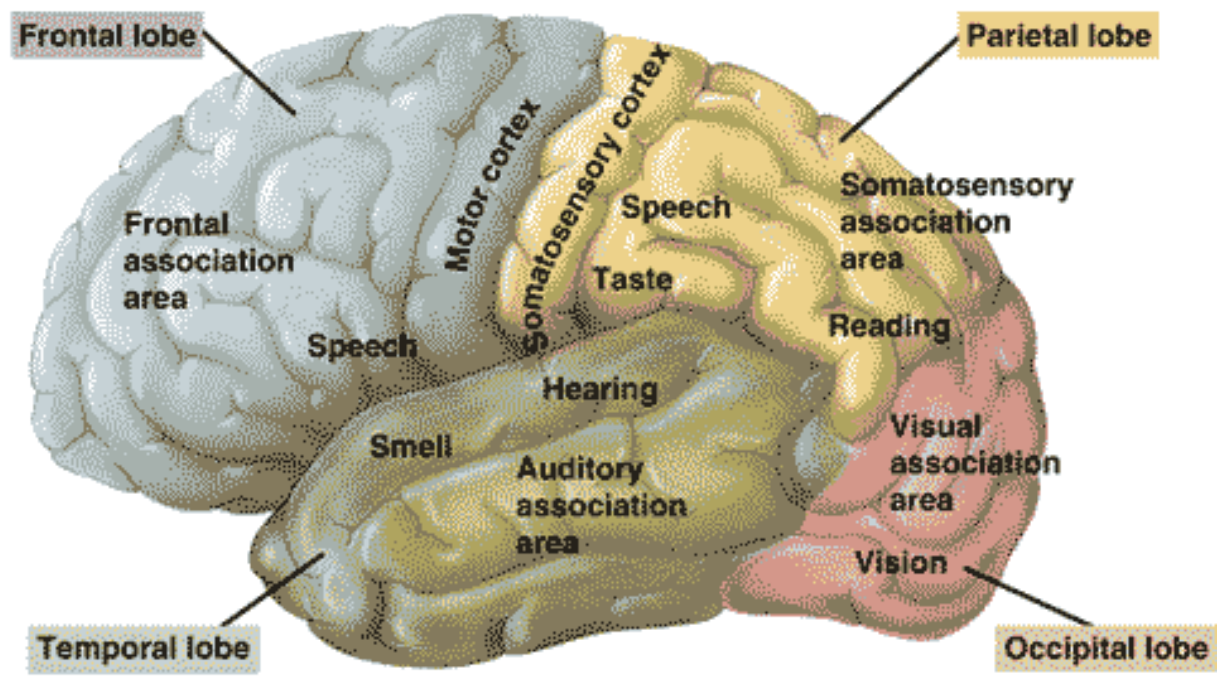


# Gyri Blood Supply Division

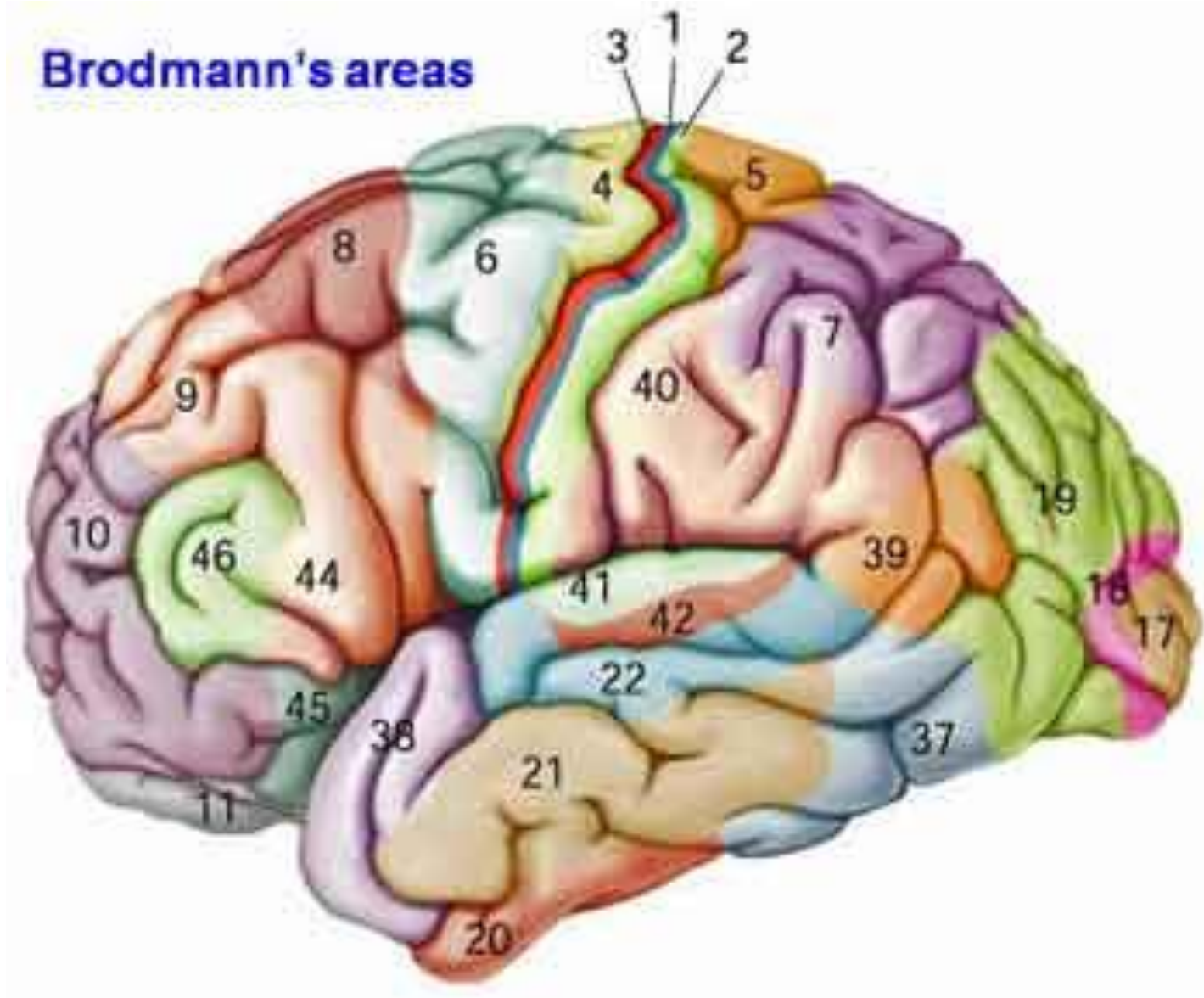
## “Clinical Significant – Stroke”



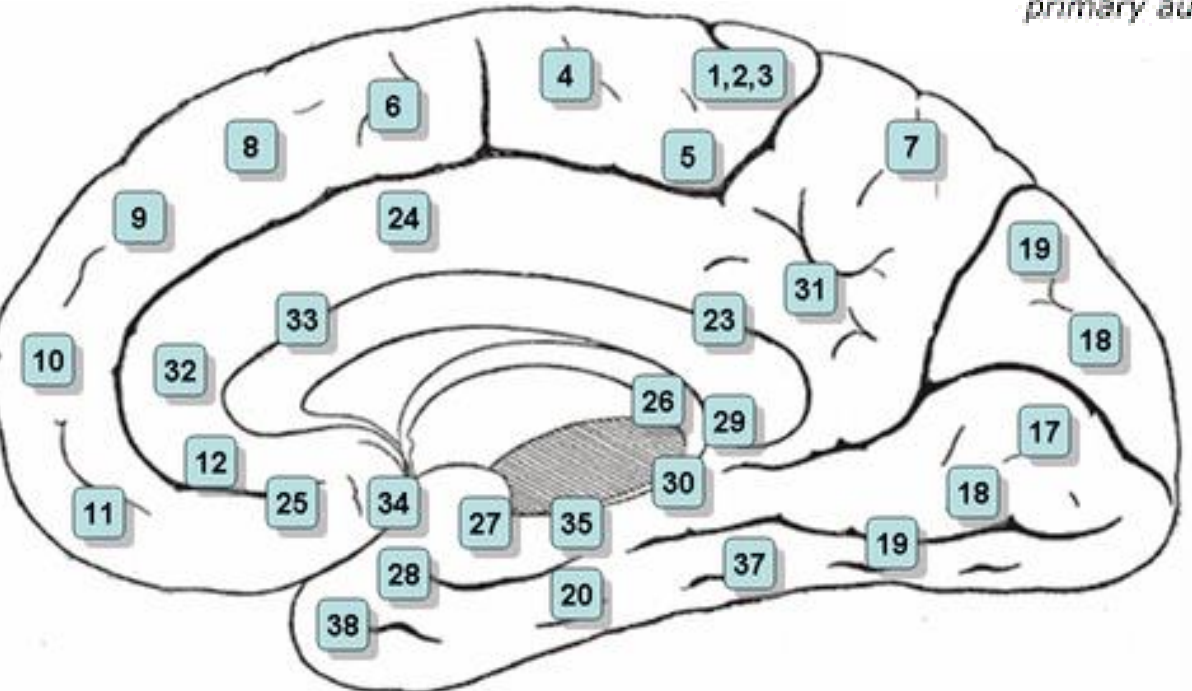
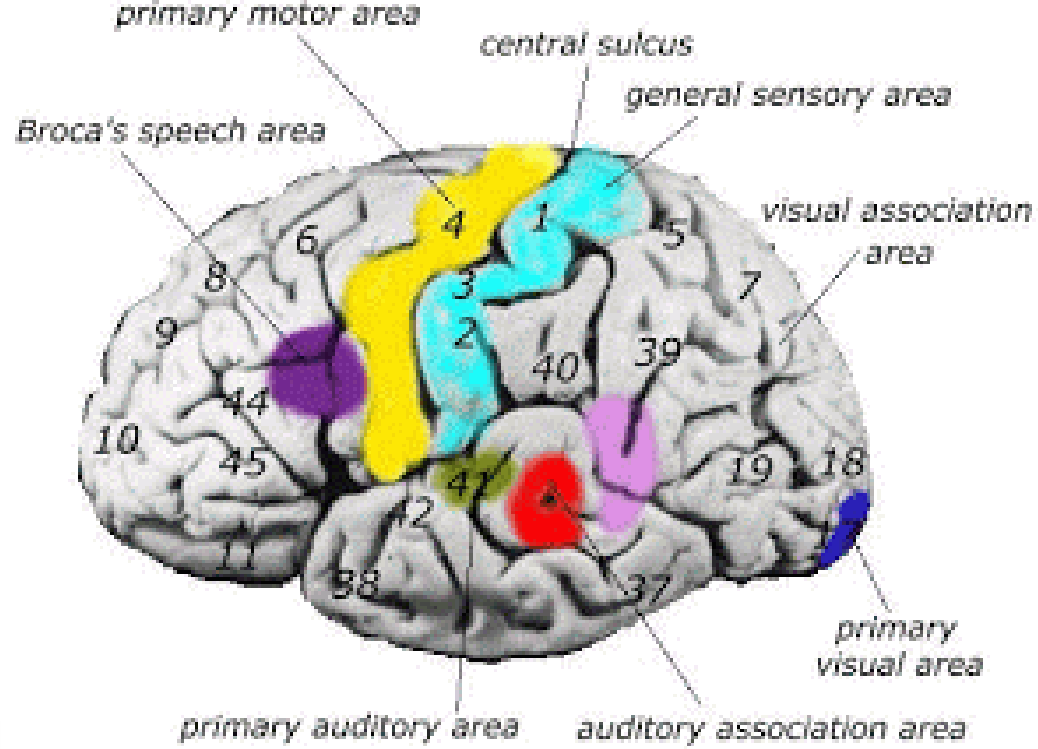
# Cortical Functional areas



# Brodmann's Areas



# Brodmann's Areas

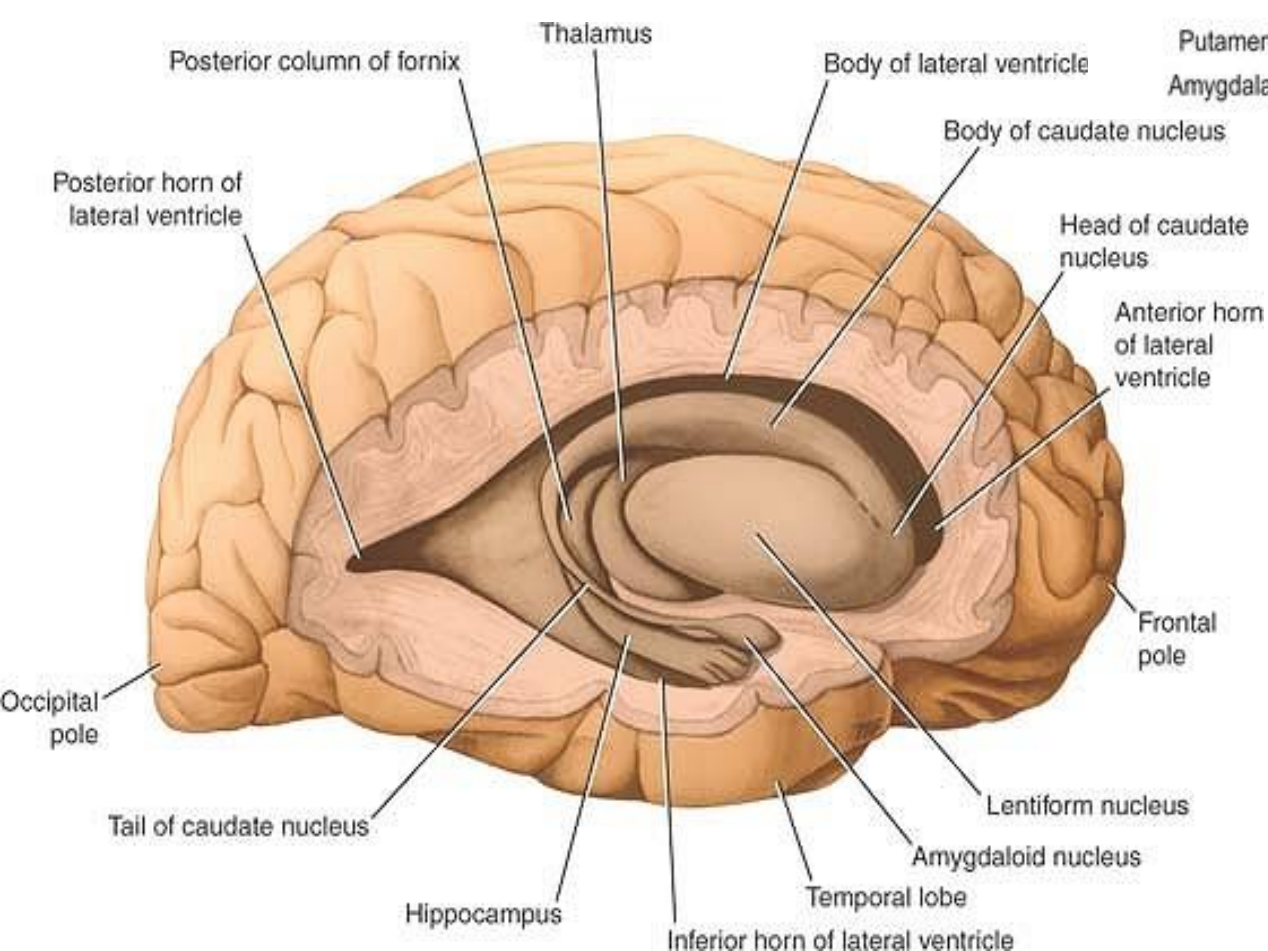
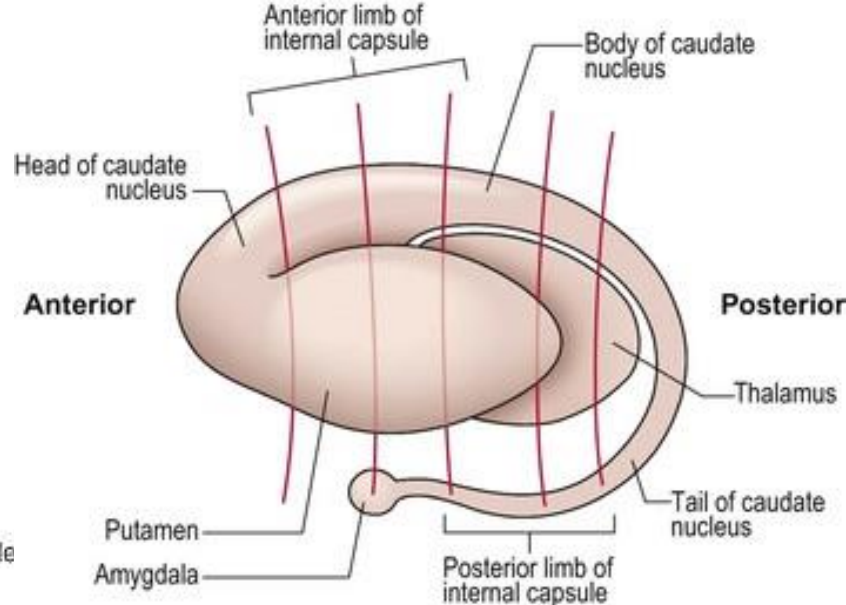


# Clinically Important Brodmann's Areas

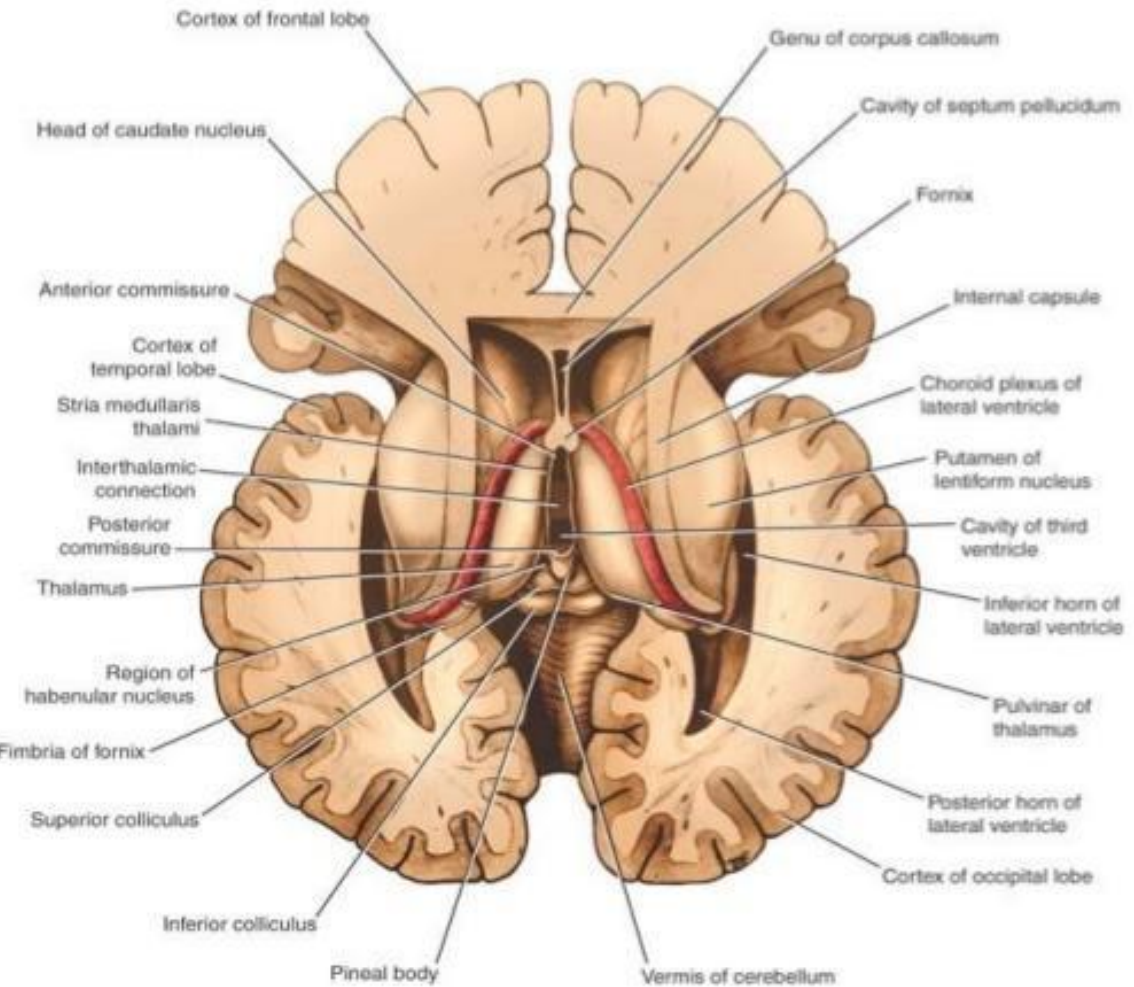
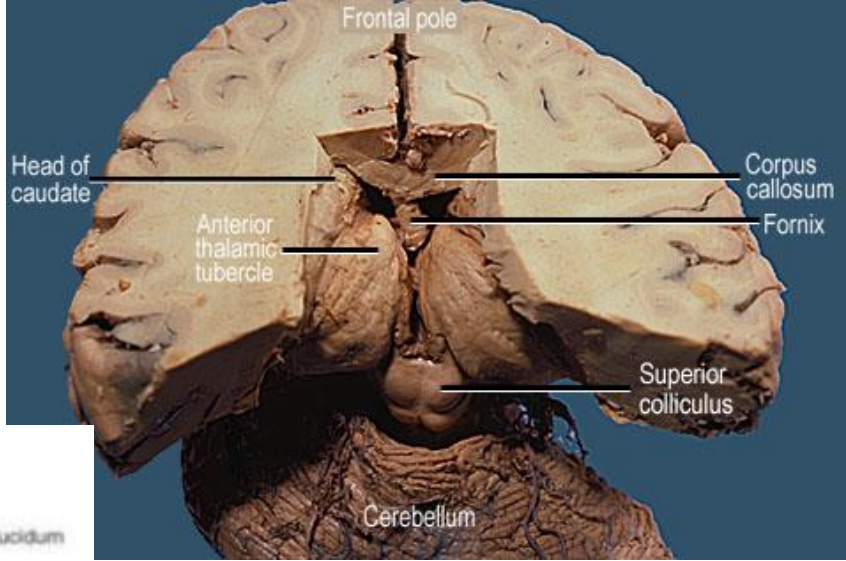
- area 4 → MI [precentral gyrus]
- area 6 → MP [posterior at Frontal gyrus]
- area 8 → FEF [posterior at medial Frontal gyrus]
- area 3, 1, 2 → SI [postcentral gyrus]
- area 40 → SII [superior at lateral Fissure]
- area 17 → VI  
18, 19 → VII [around calcarine sulcus]
- area 41, 42 → AI [lateral Fissure]  
22 → AII
- area 43 → G [posterior central gyrus]
- area 51 → O [olfactory Bulb]
- area 7, 5, 38 [limbic]
- area 44, 45 → Broca's [Inferior Frontal gyrus]
- area 22, 39, 40 → Wernicke's [Parieto-occipital region]

[Brodmann's areas]

# Brain Internal Structures

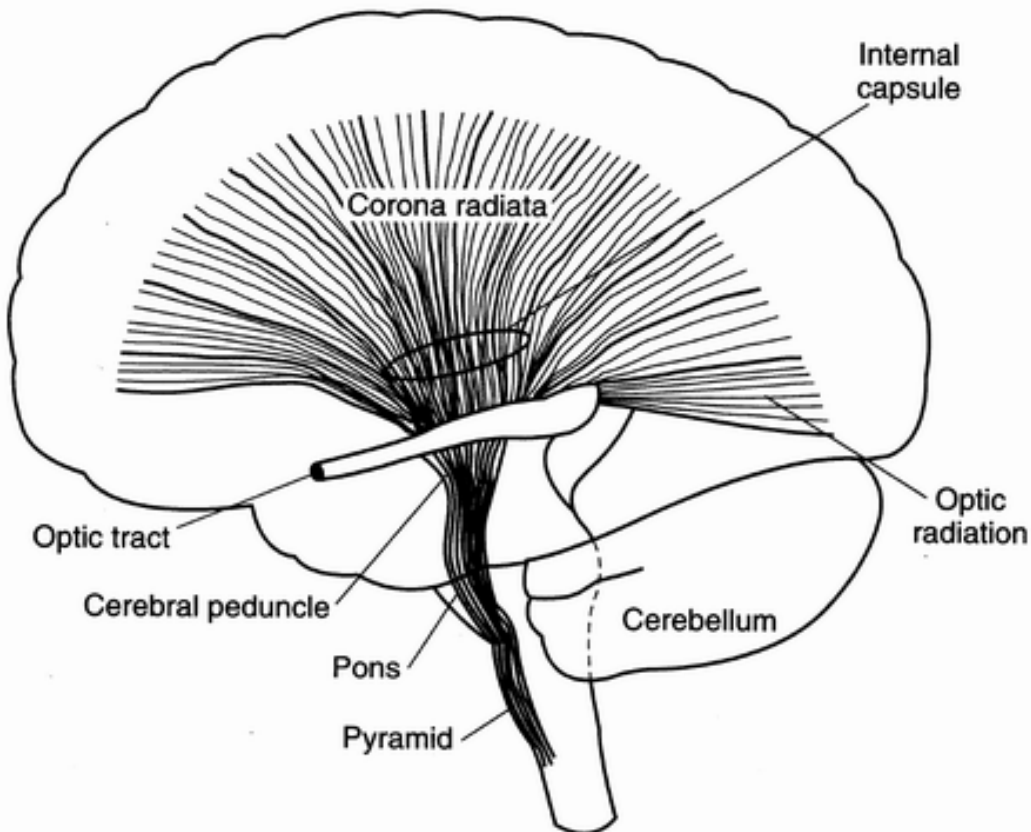
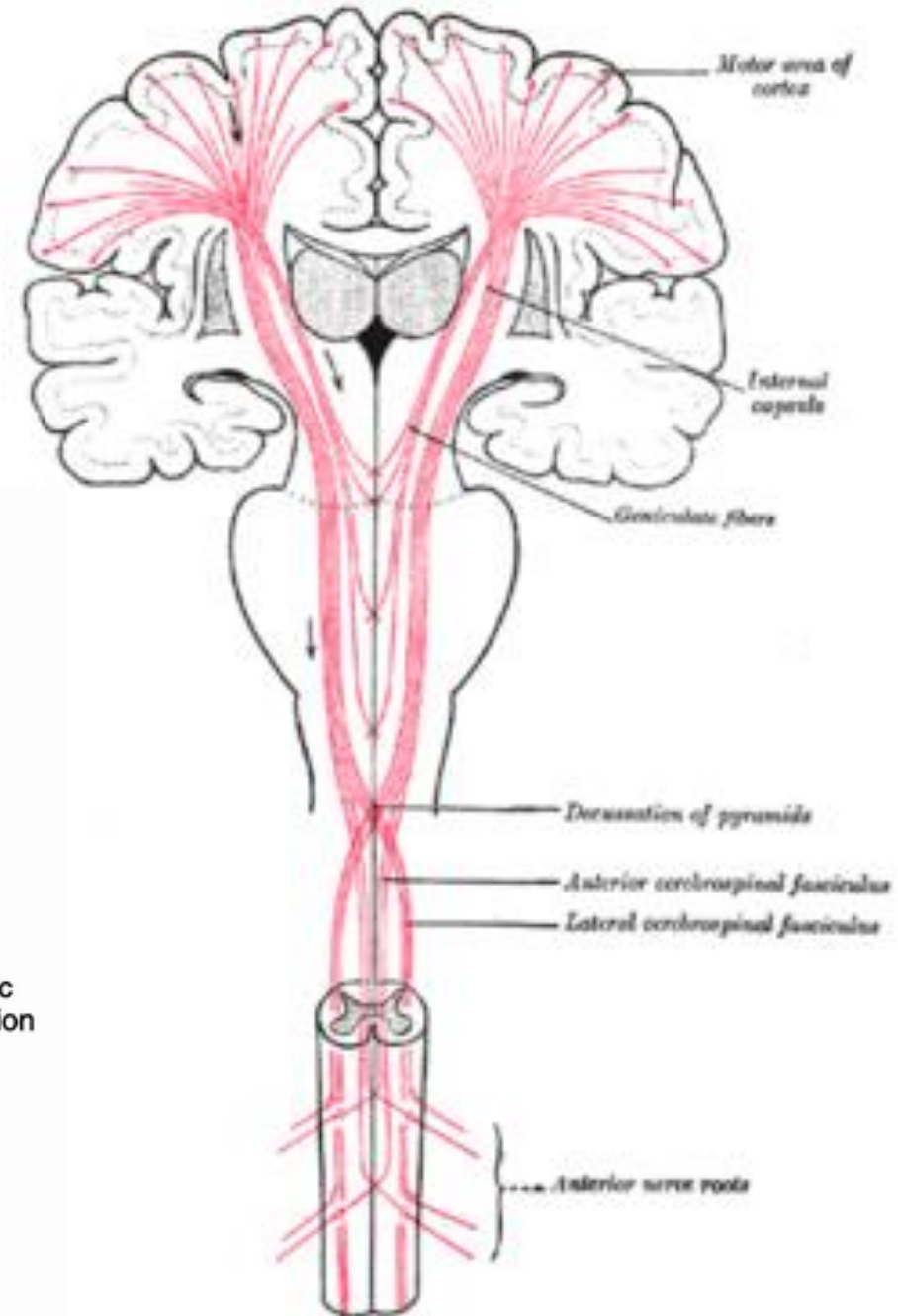


# Brain Internal Structures



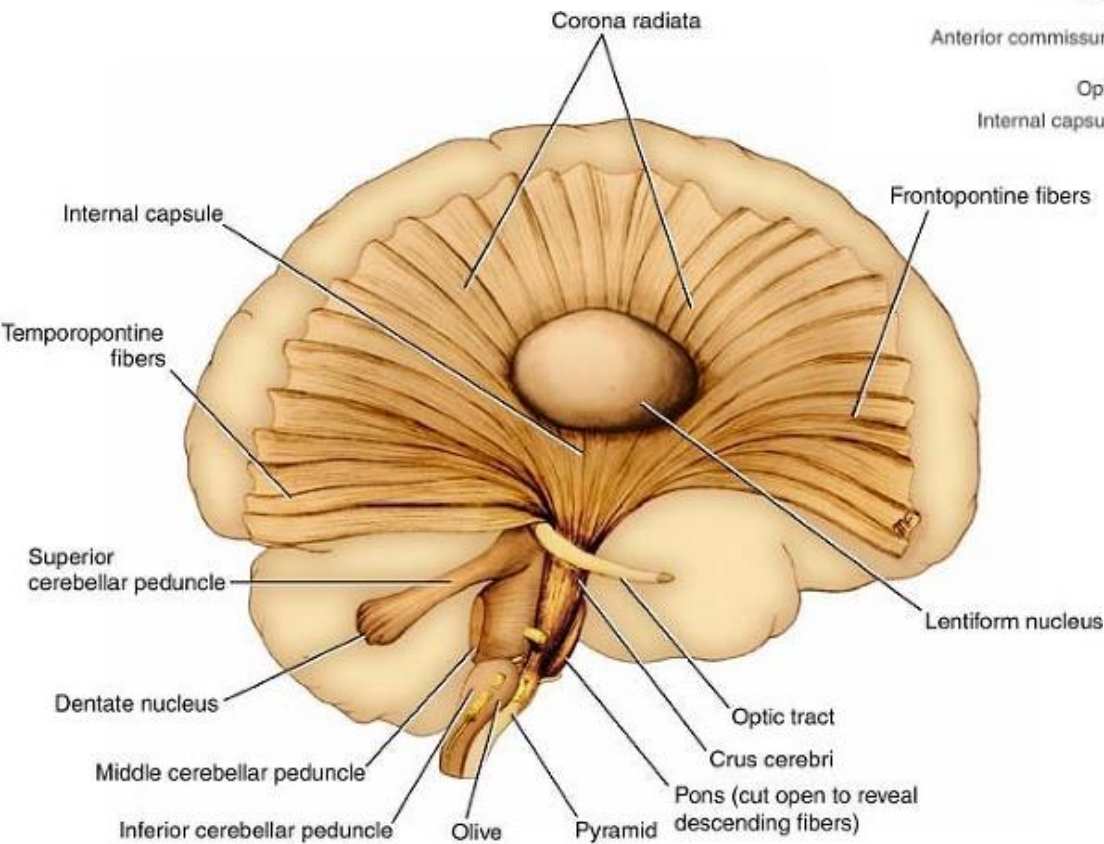
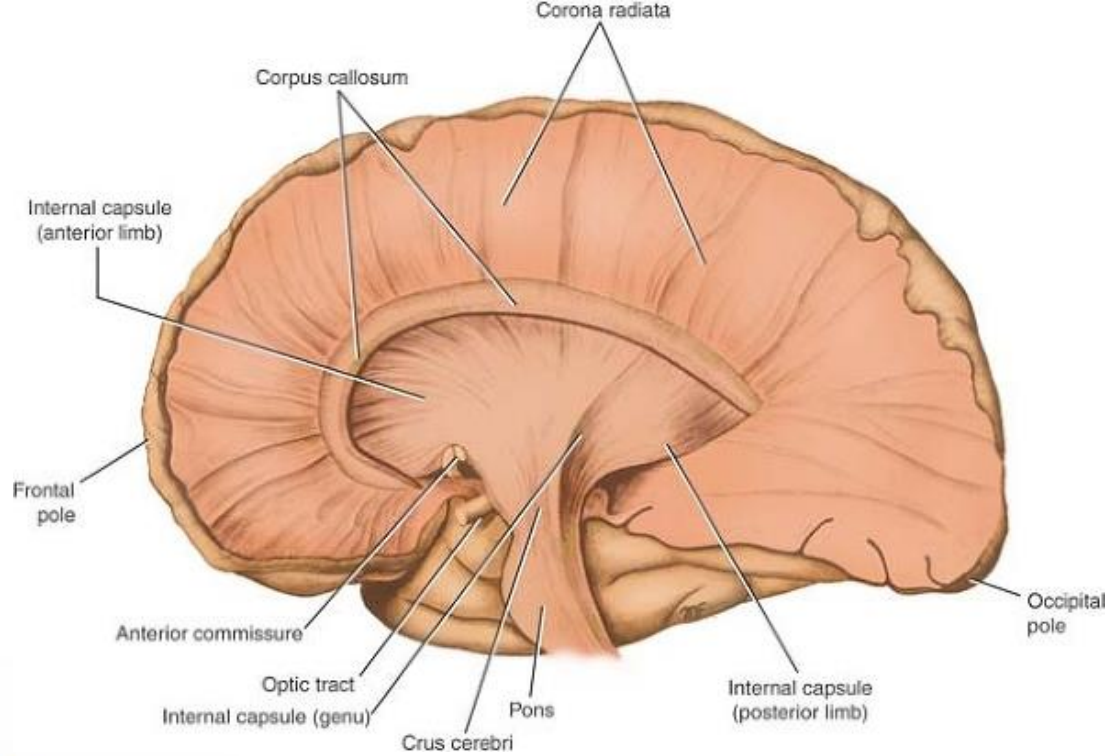
# Internal Capsule & Corona Radiata

“Illustrating Scheme”



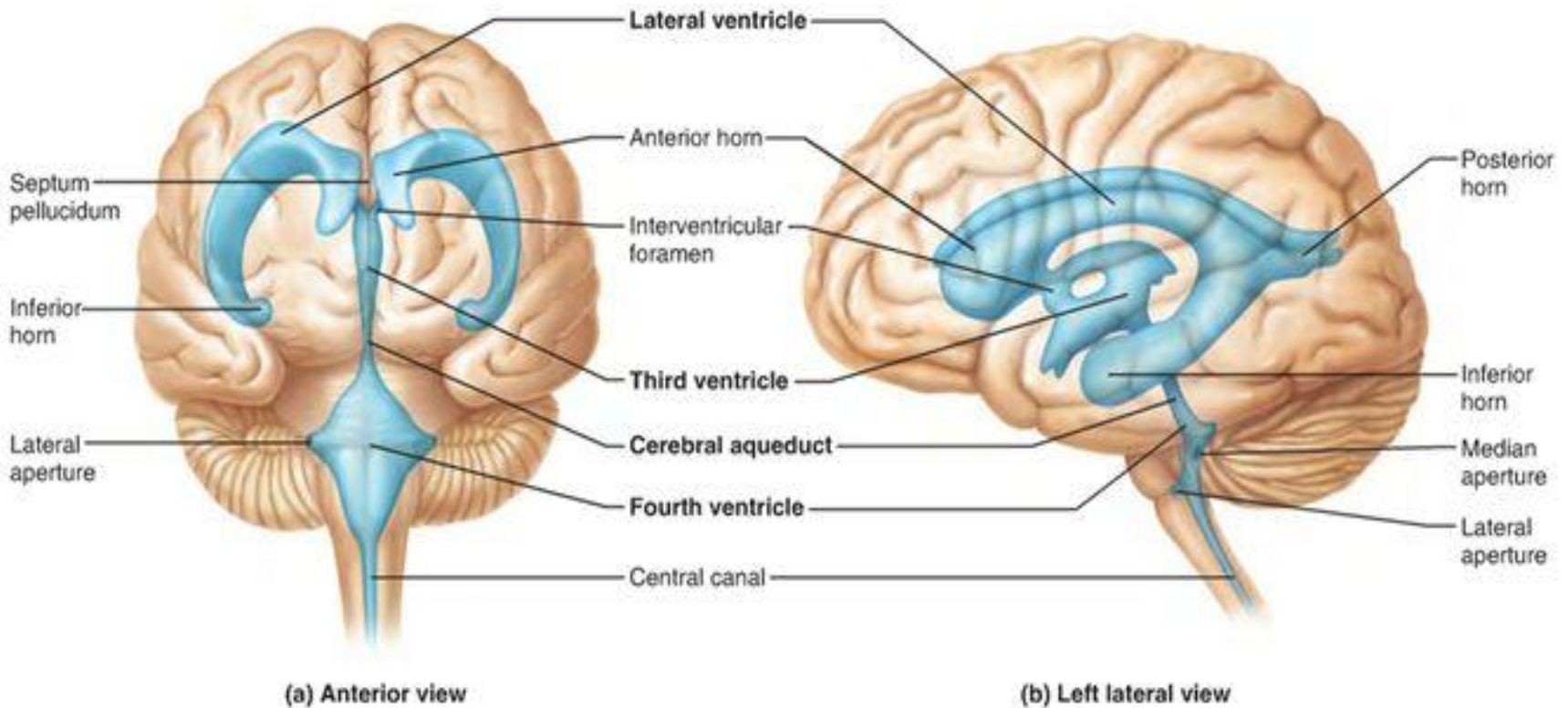


# Internal Capsule & Corona Radiata

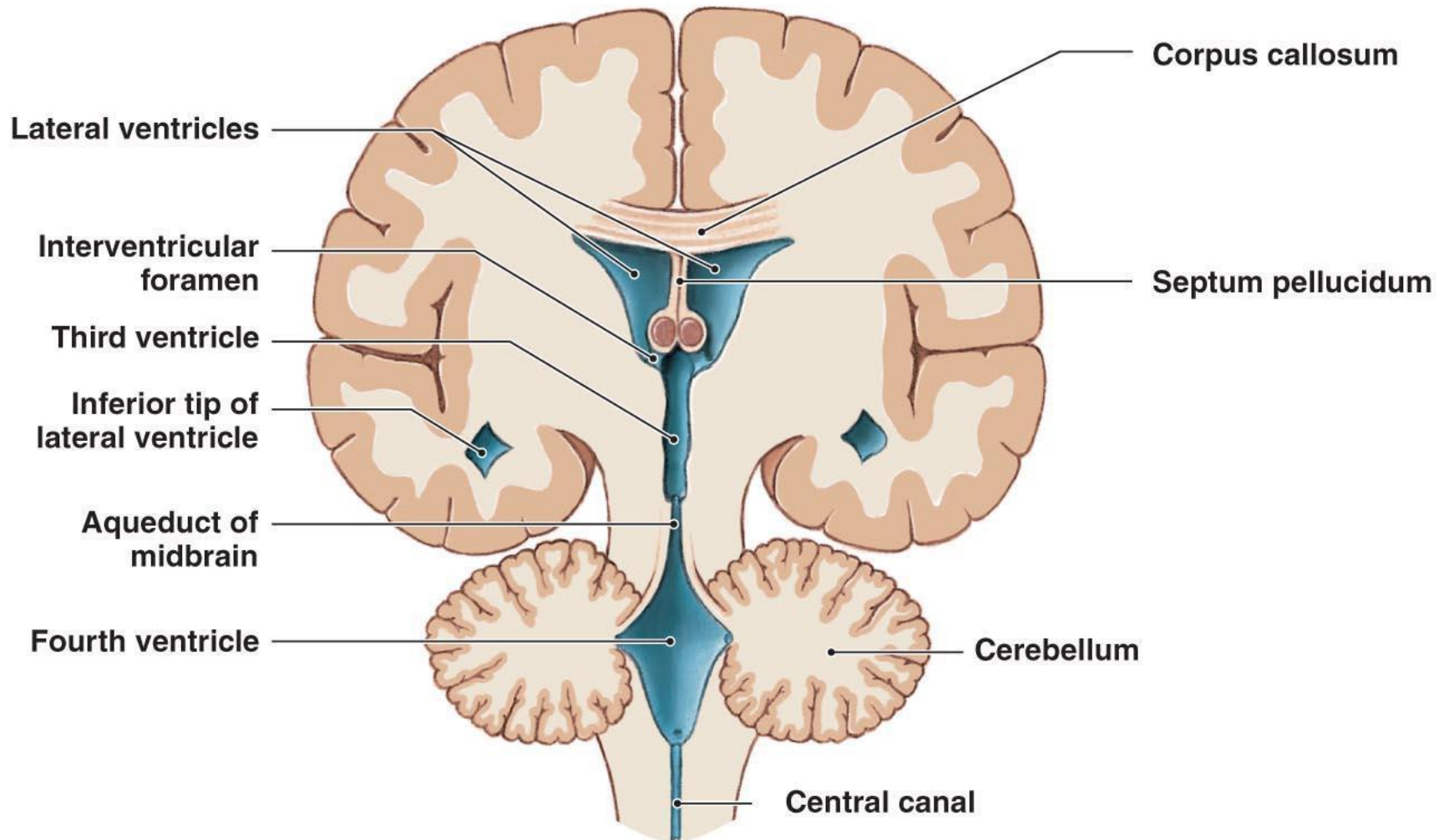


**“After Dissecting out The Cortex”**

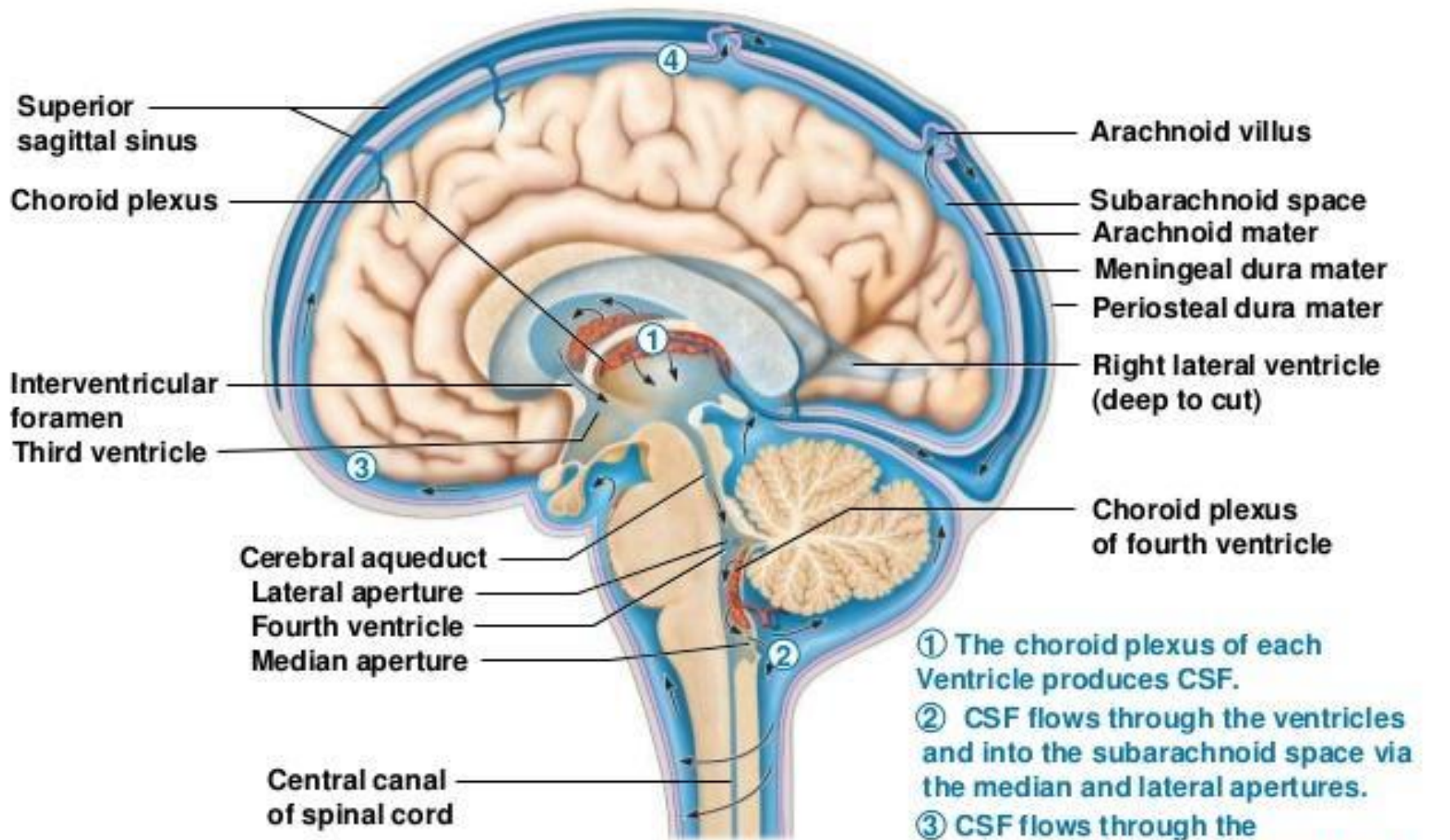
# Ventricles



# Ventricles – Coronal Section

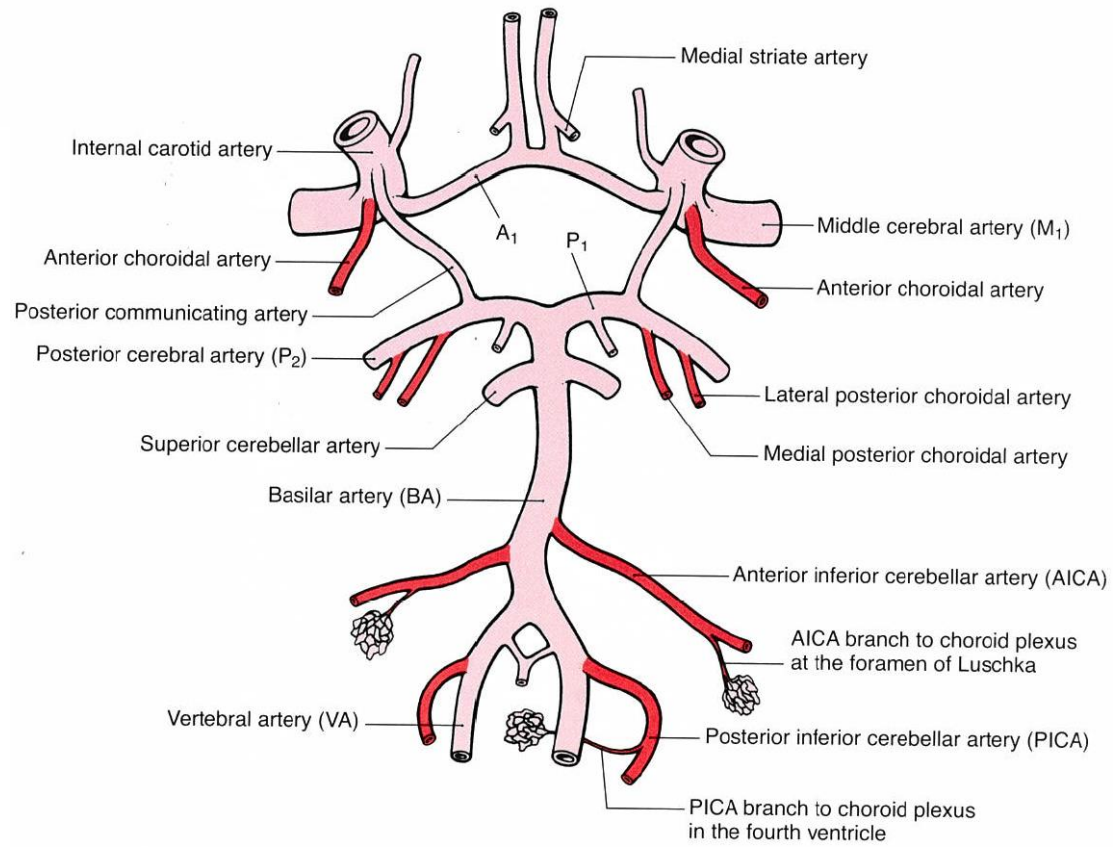
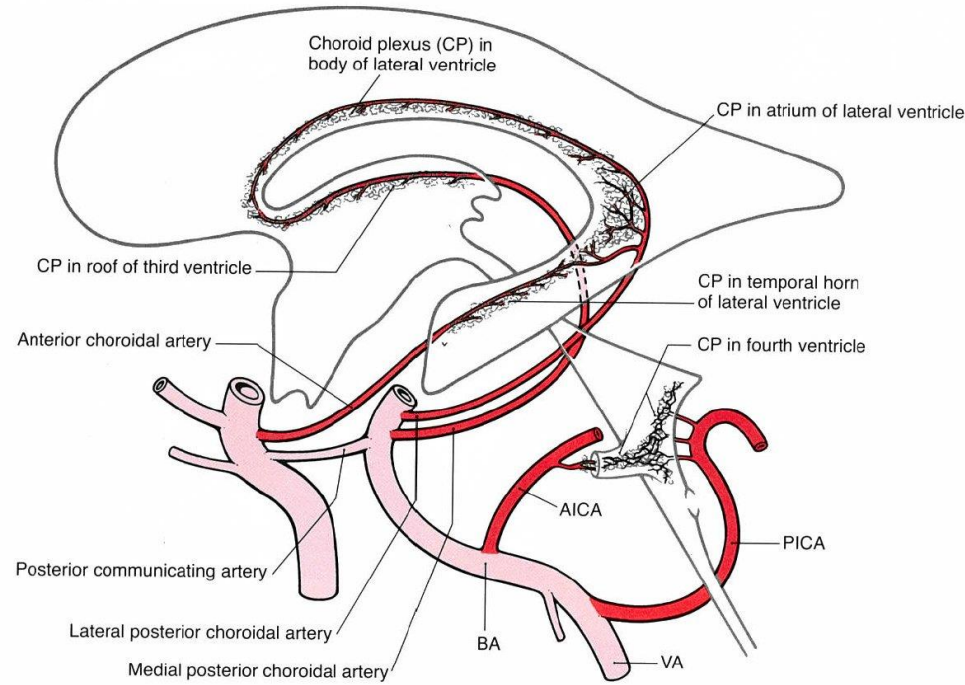


# Ventricles – CSF Circulation



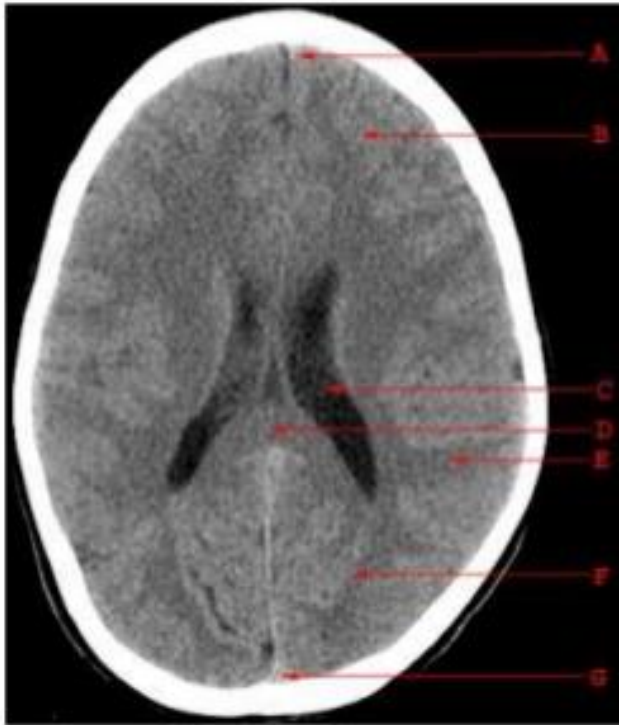
- ① The choroid plexus of each Ventricle produces CSF.
- ② CSF flows through the ventricles and into the subarachnoid space via the median and lateral apertures.
- ③ CSF flows through the subarachnoid space over brain and spinal cord.
- ④ CSF is absorbed into the dural venous sinuses via the arachnoid villi.

# Choroid Plexus & its Blood Supply

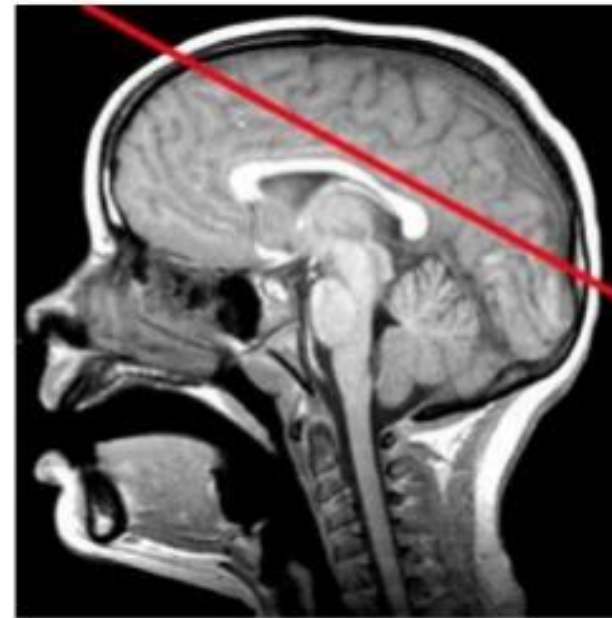


# Ventricles – CT

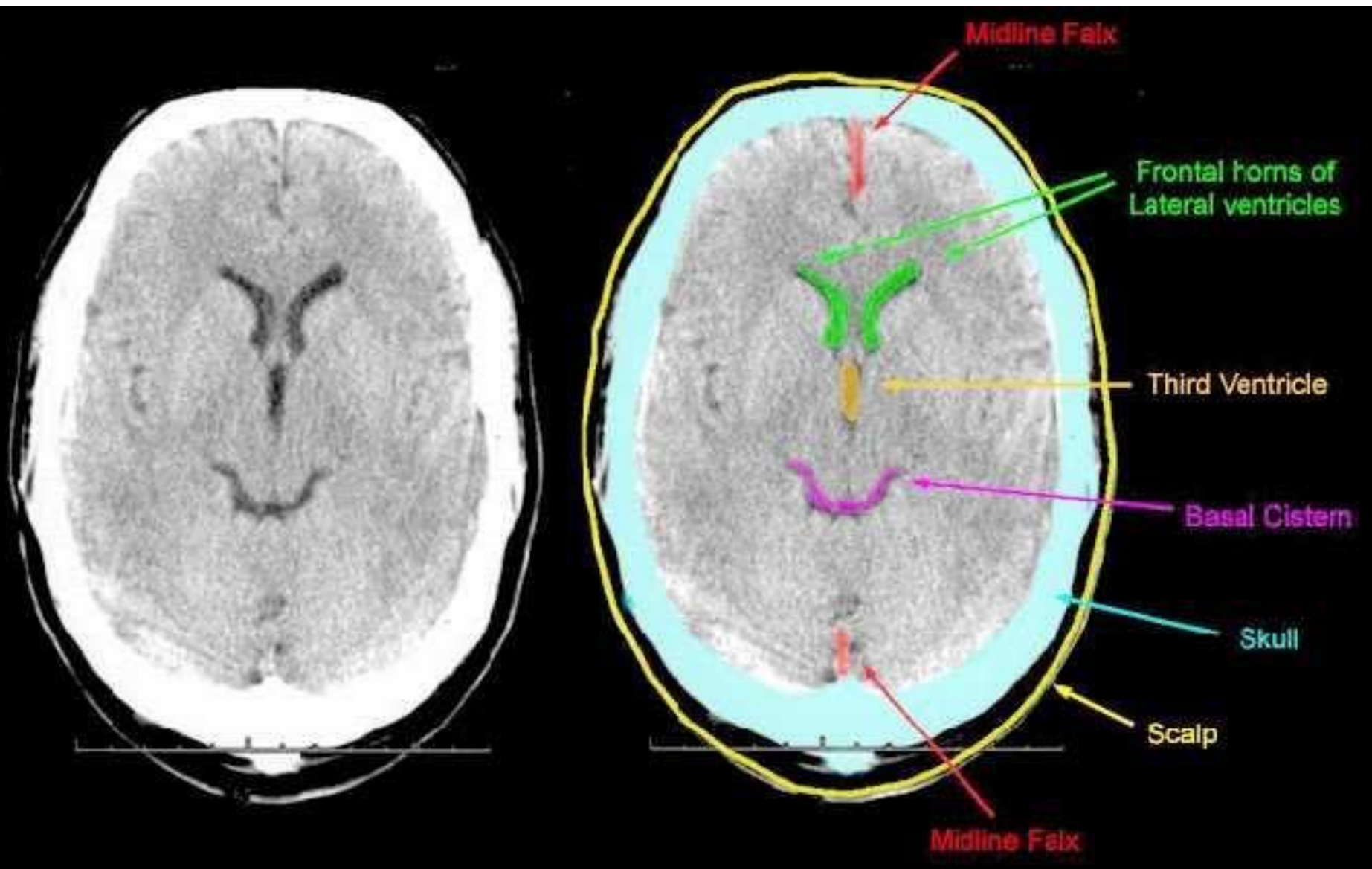
## Normal Anatomy



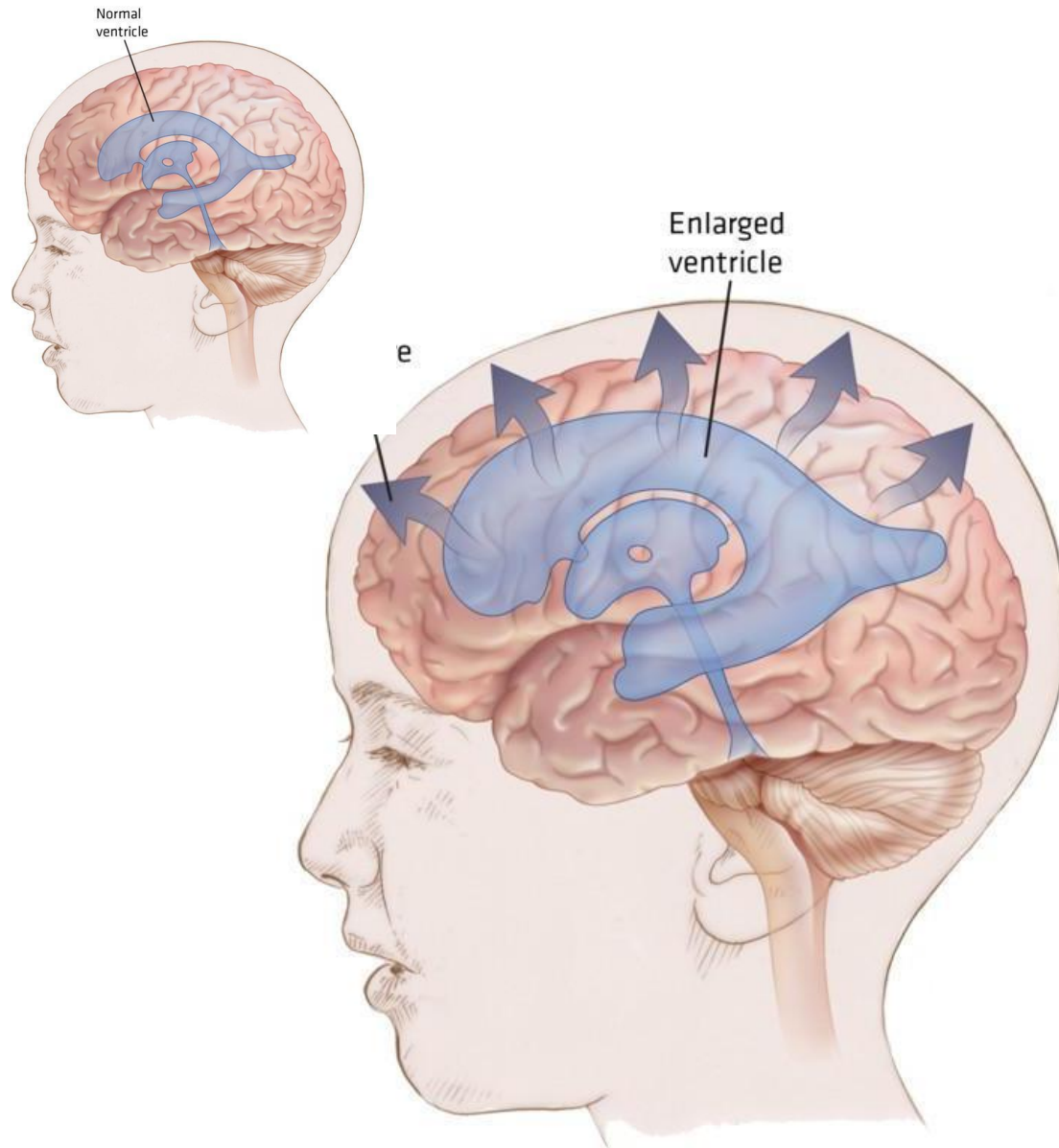
- A. Falx Cerebri
- C. Body of the Lateral Ventricle
- E. Parietal Lobe
- G. Superior Sagittal Sinus



- B. Frontal Lobe
- D. Splenic of the Corpus Callosum
- F. Occipital Lobe

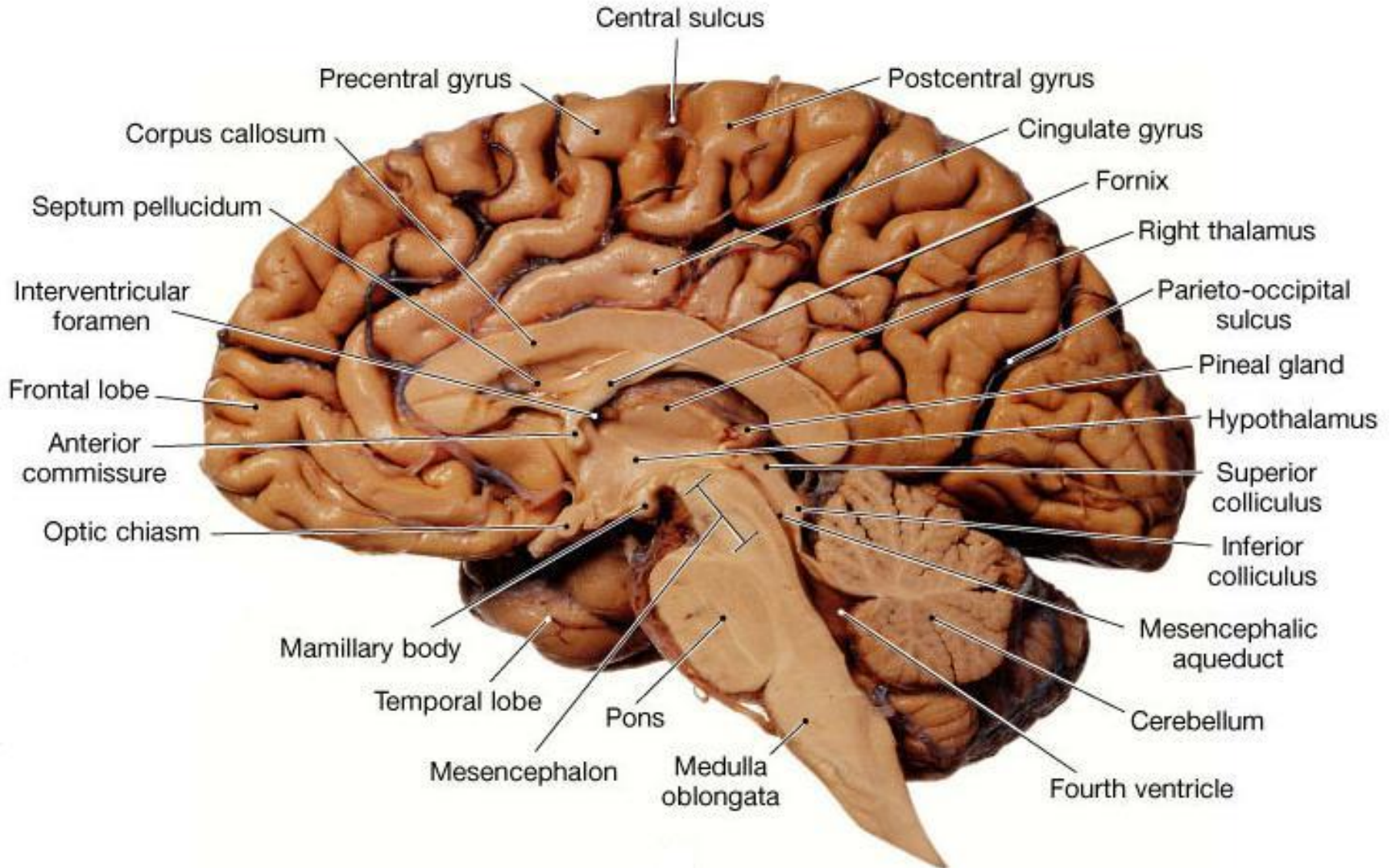


# Ventricles – Hydrocephalus

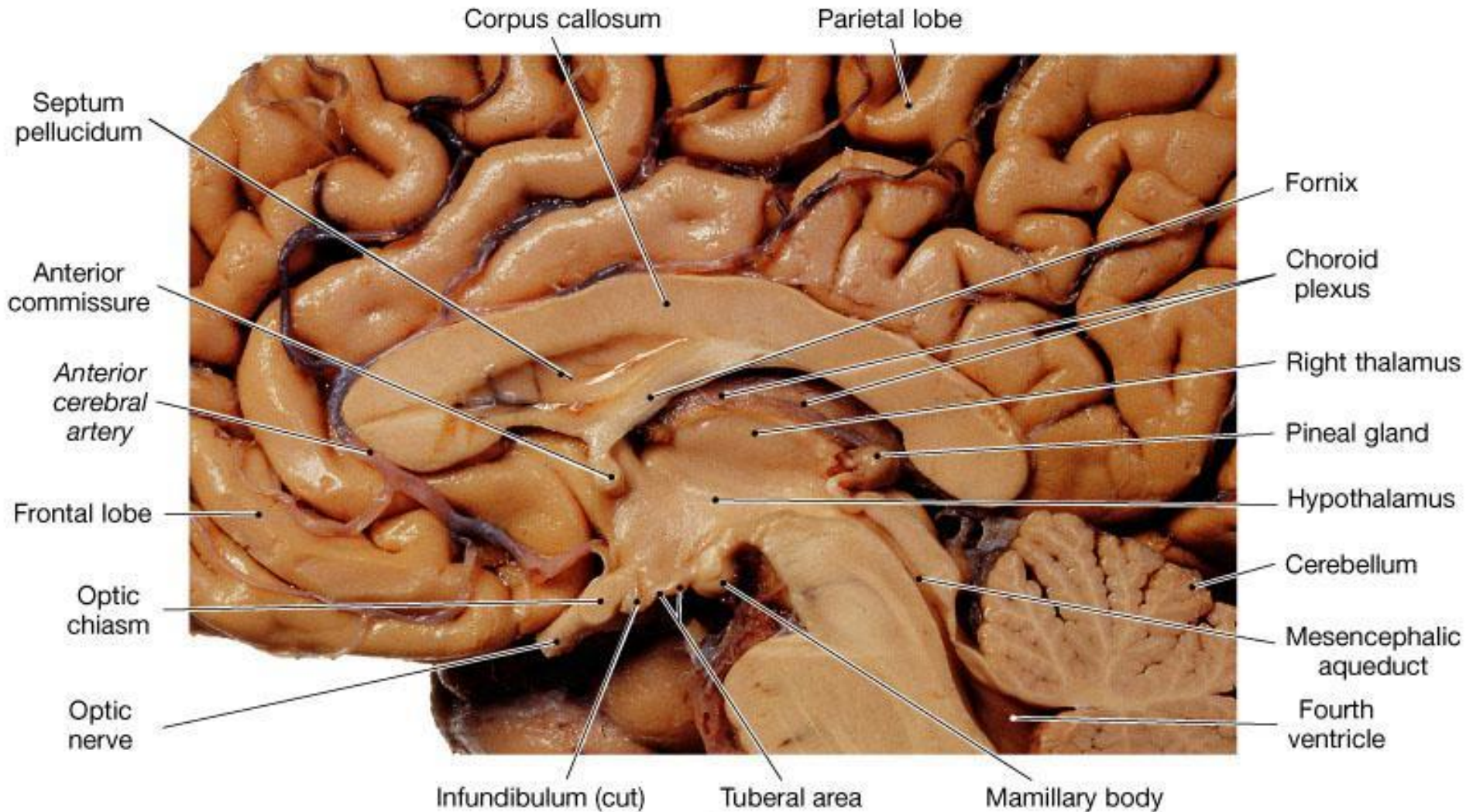




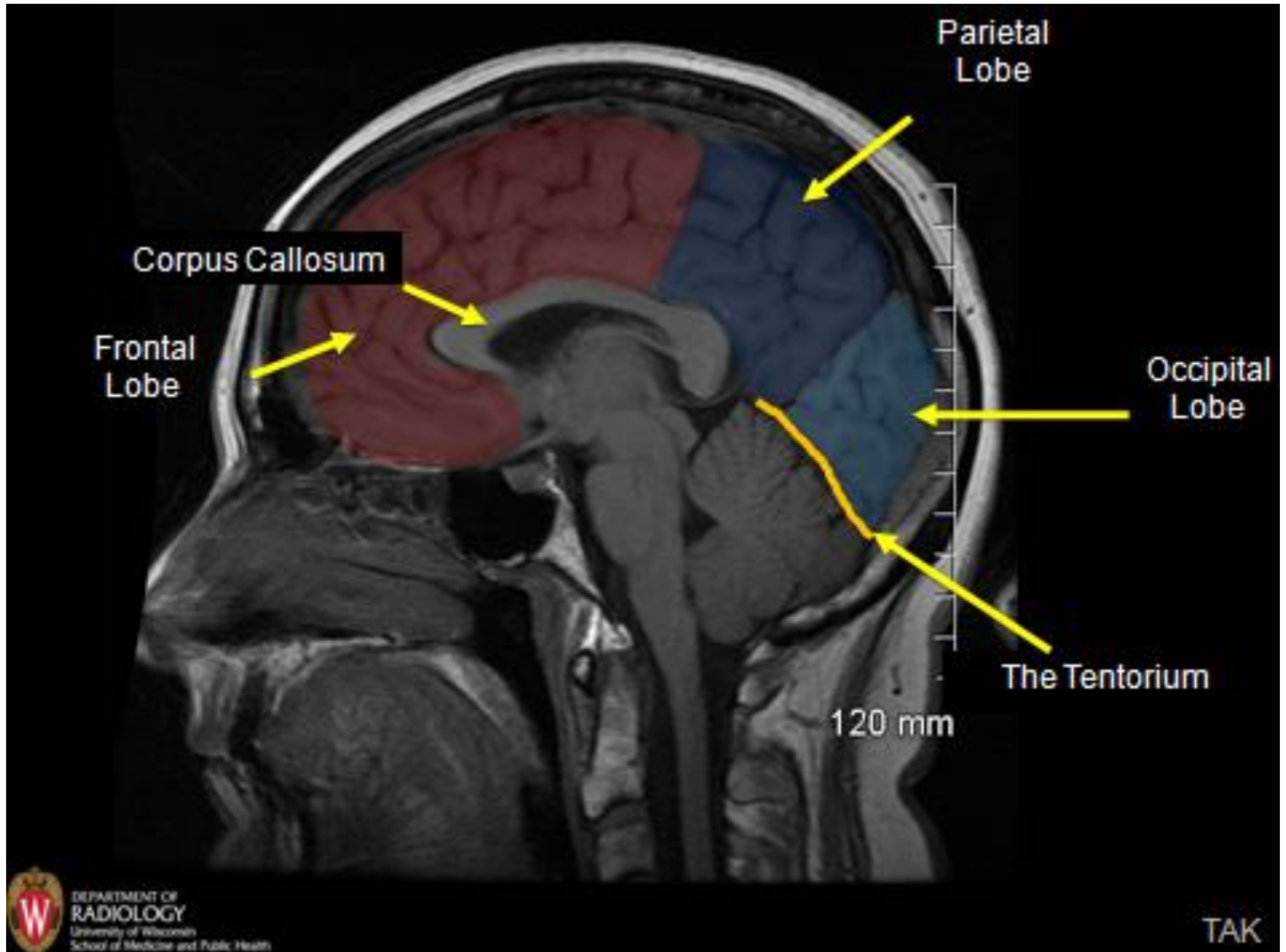
# Brain Sections – Sagittal



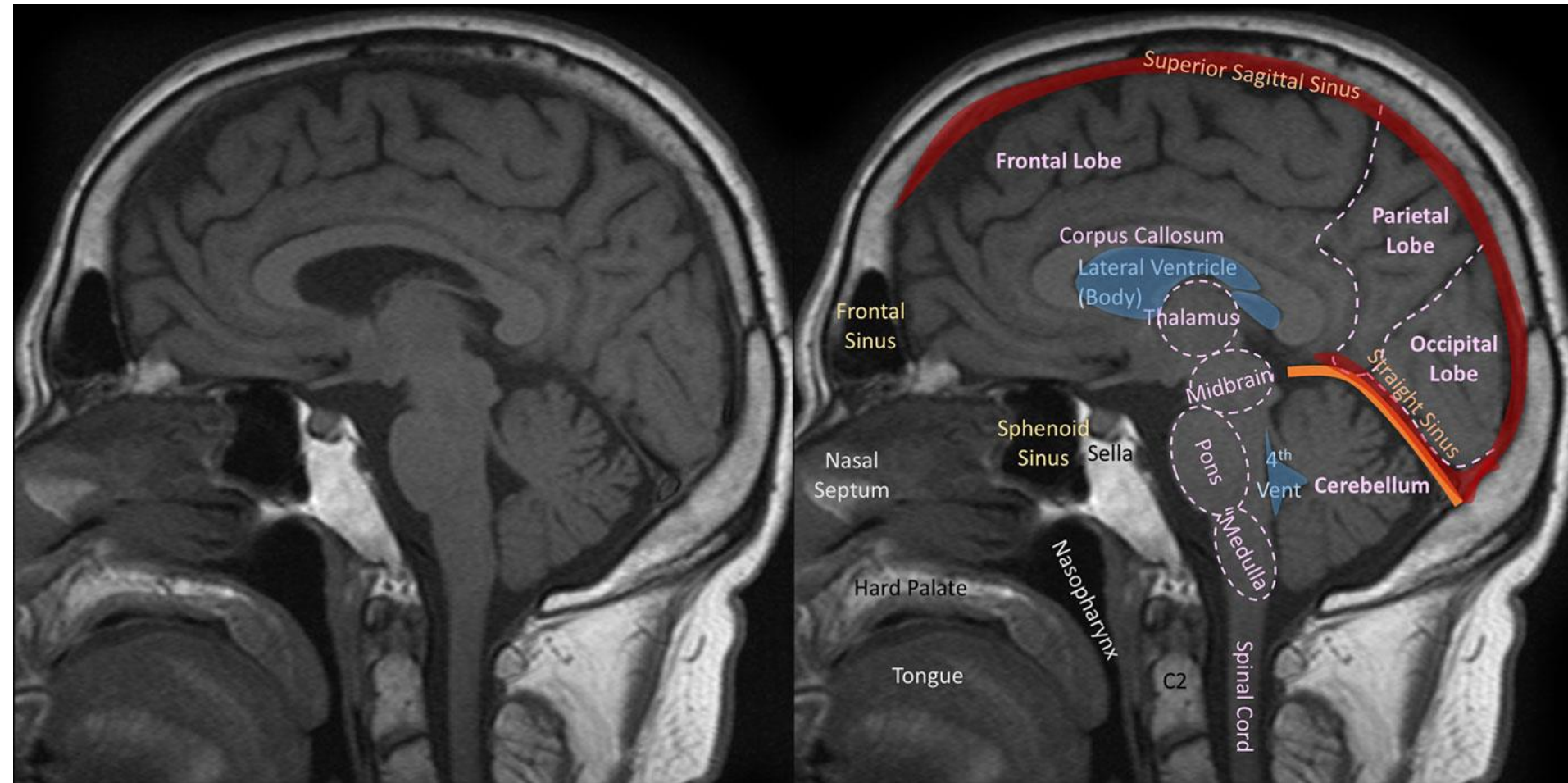
# Brain Sections – Sagittal



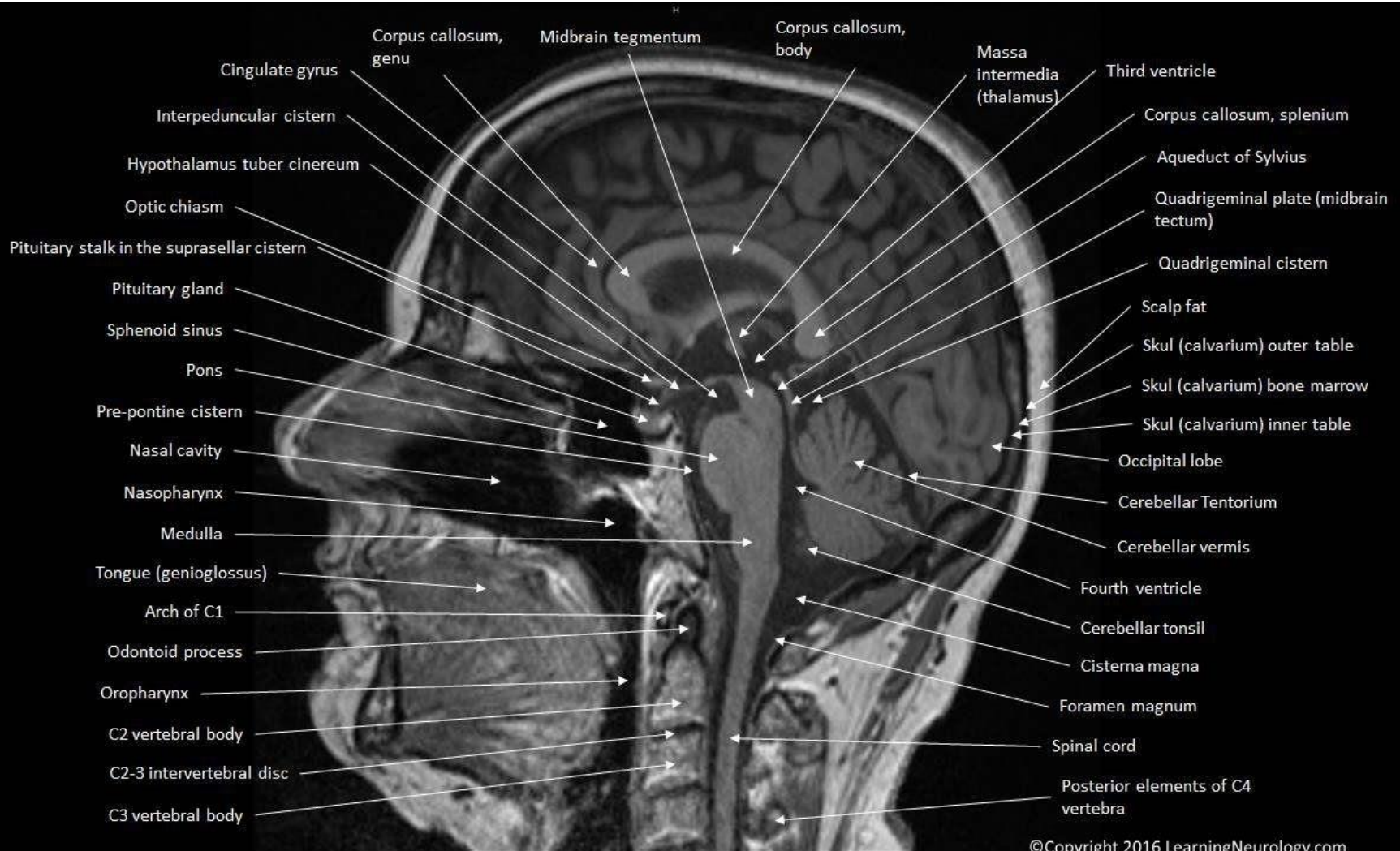
# Brain Sections – Sagittal



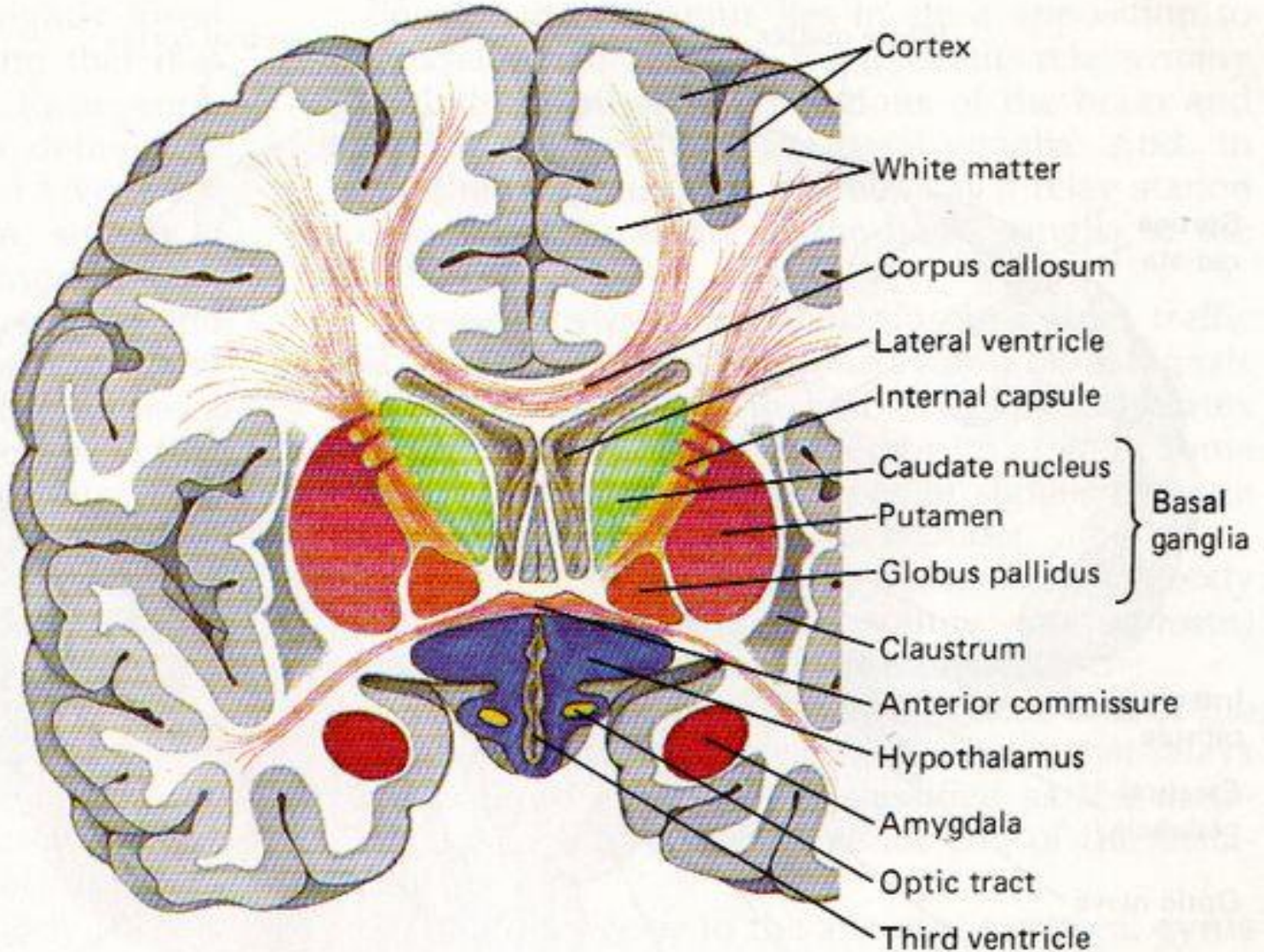
# Brain Sections – Sagittal



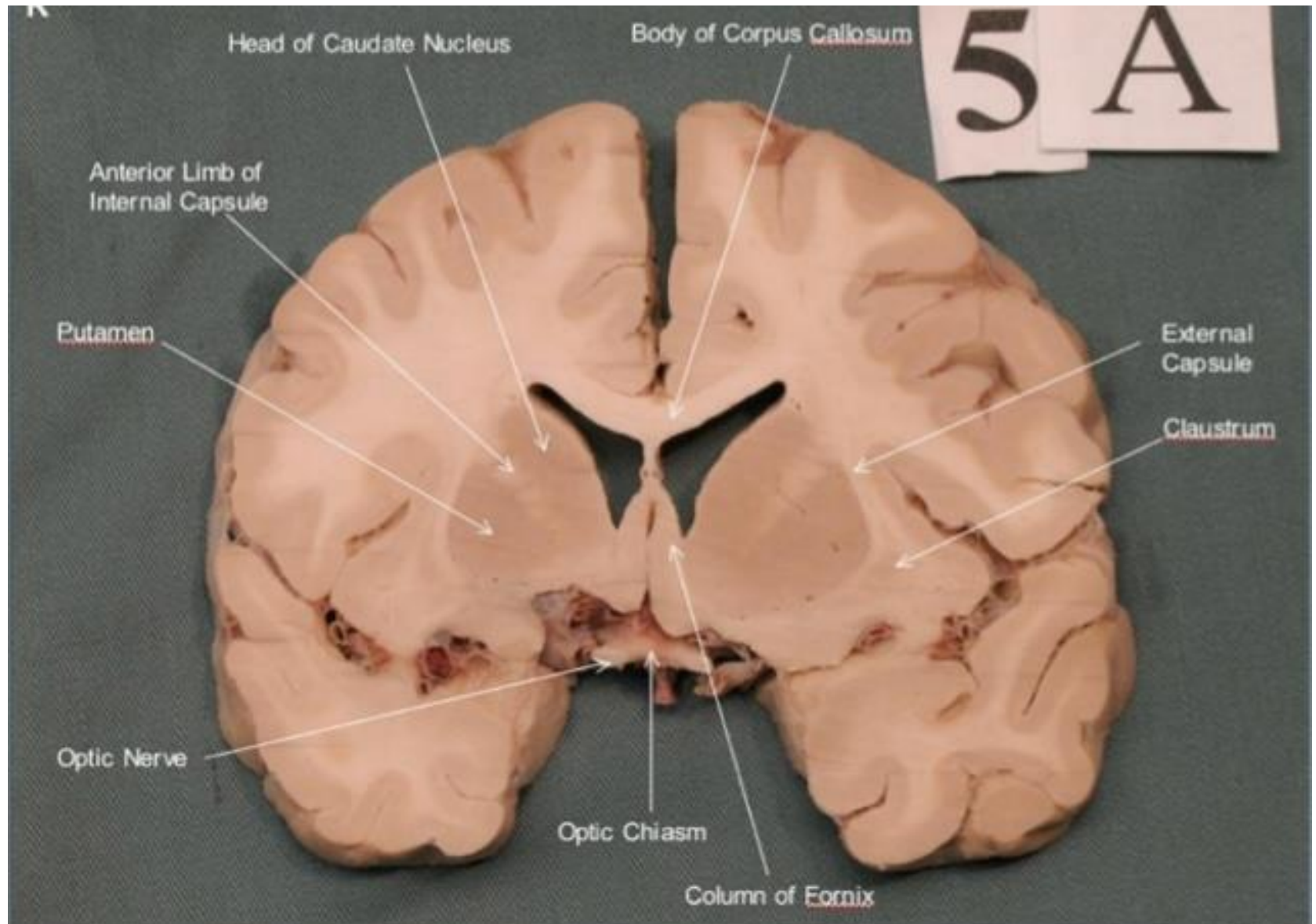
# Brain Sections – Sagittal



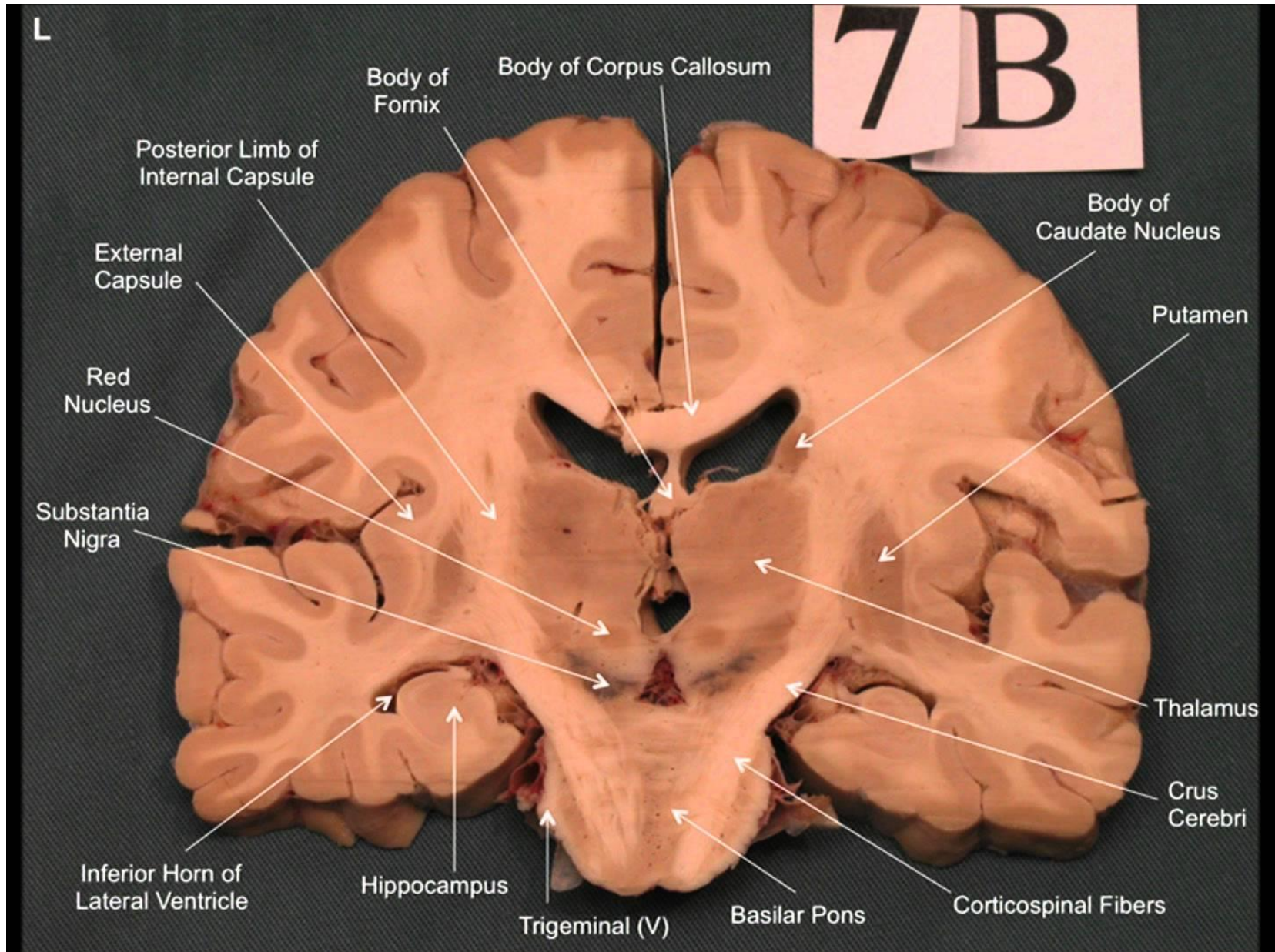
# Brain Sections – Coronal



# Brain Sections – Coronal



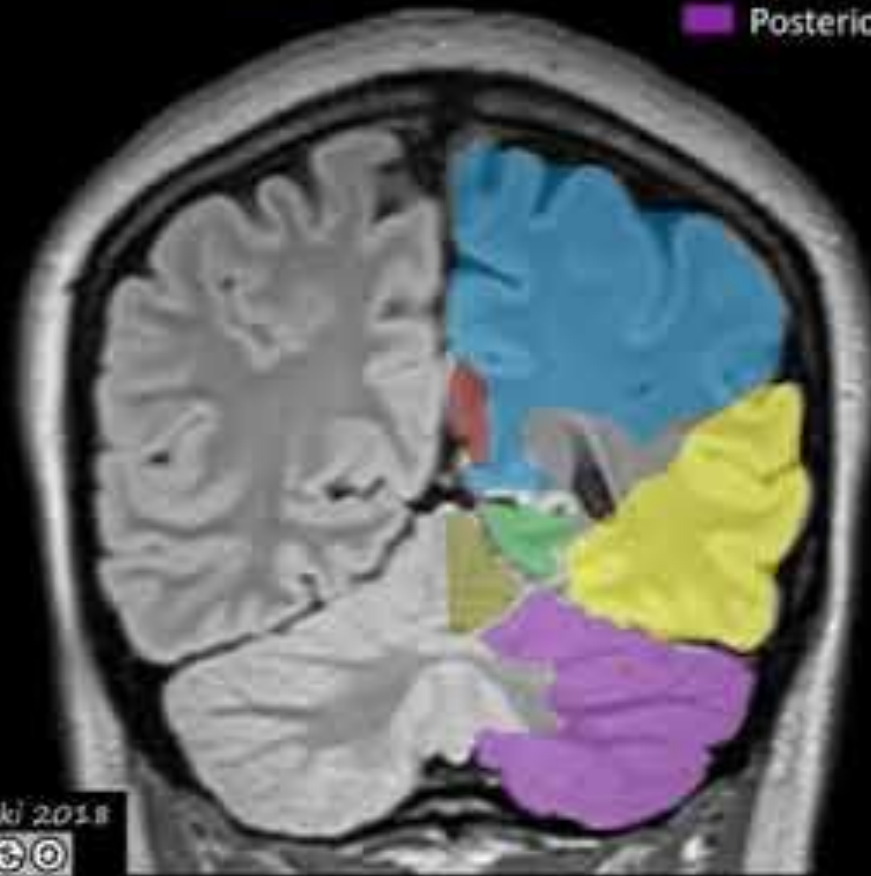
# Brain Sections – Coronal





# Brain Sections – Coronal

 Frontal	 Cingulate gyrus	 Midbrain
 Parietal	 Thalamus	 Pons
 Temporal	 Caudate nucleus	 Medulla oblongata
 Occipital	 Lentiform nucleus	Cerebellum -
 Insular	 Hippocampus	 Anterior lobe
		 Posterior lobe

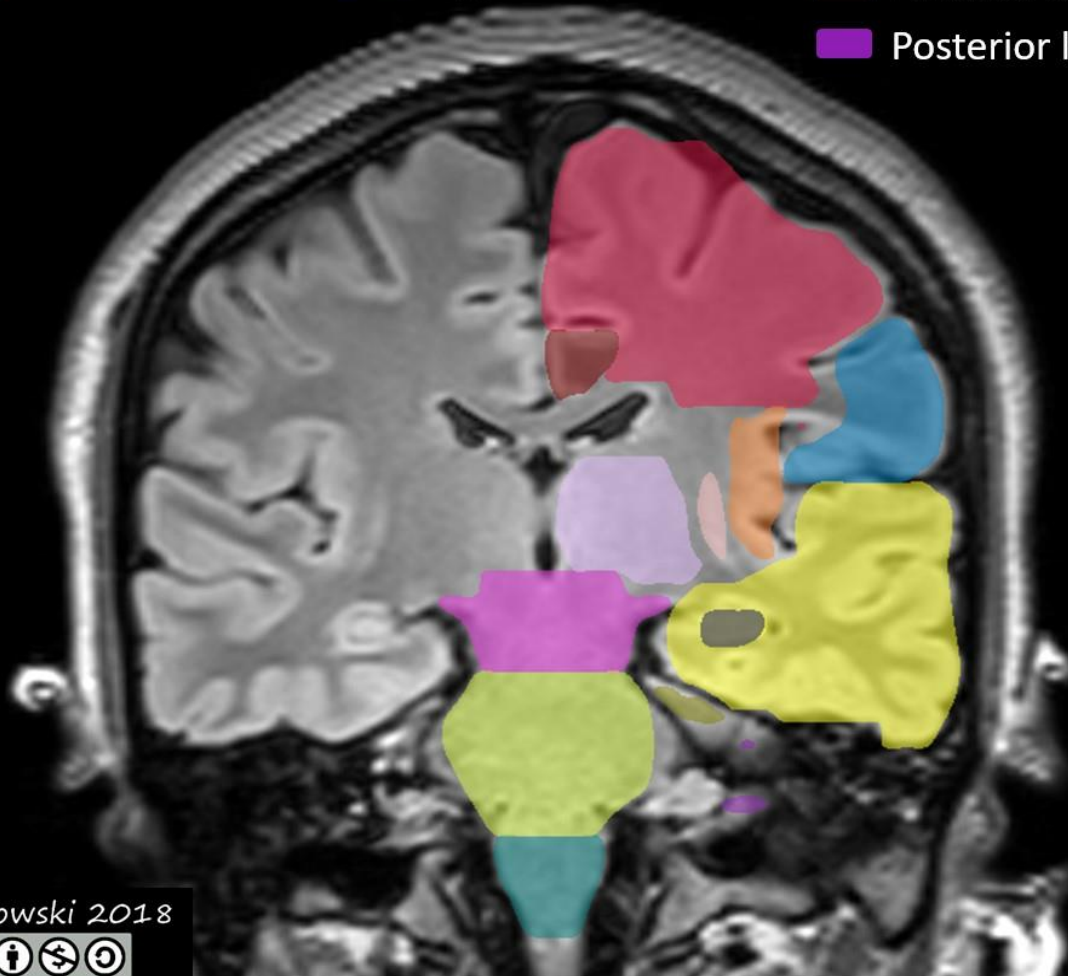


M. Debowski 2018



# Brain Sections – Coronal

- |           |                   |                   |
|-----------|-------------------|-------------------|
| Frontal   | Cingulate gyrus   | Midbrain          |
| Parietal  | Thalamus          | Pons              |
| Temporal  | Caudate nucleus   | Medulla oblongata |
| Occipital | Lentiform nucleus | Cerebellum -      |
| Insular   | Hippocampus       | Anterior lobe     |
|           |                   | Posterior lobe    |

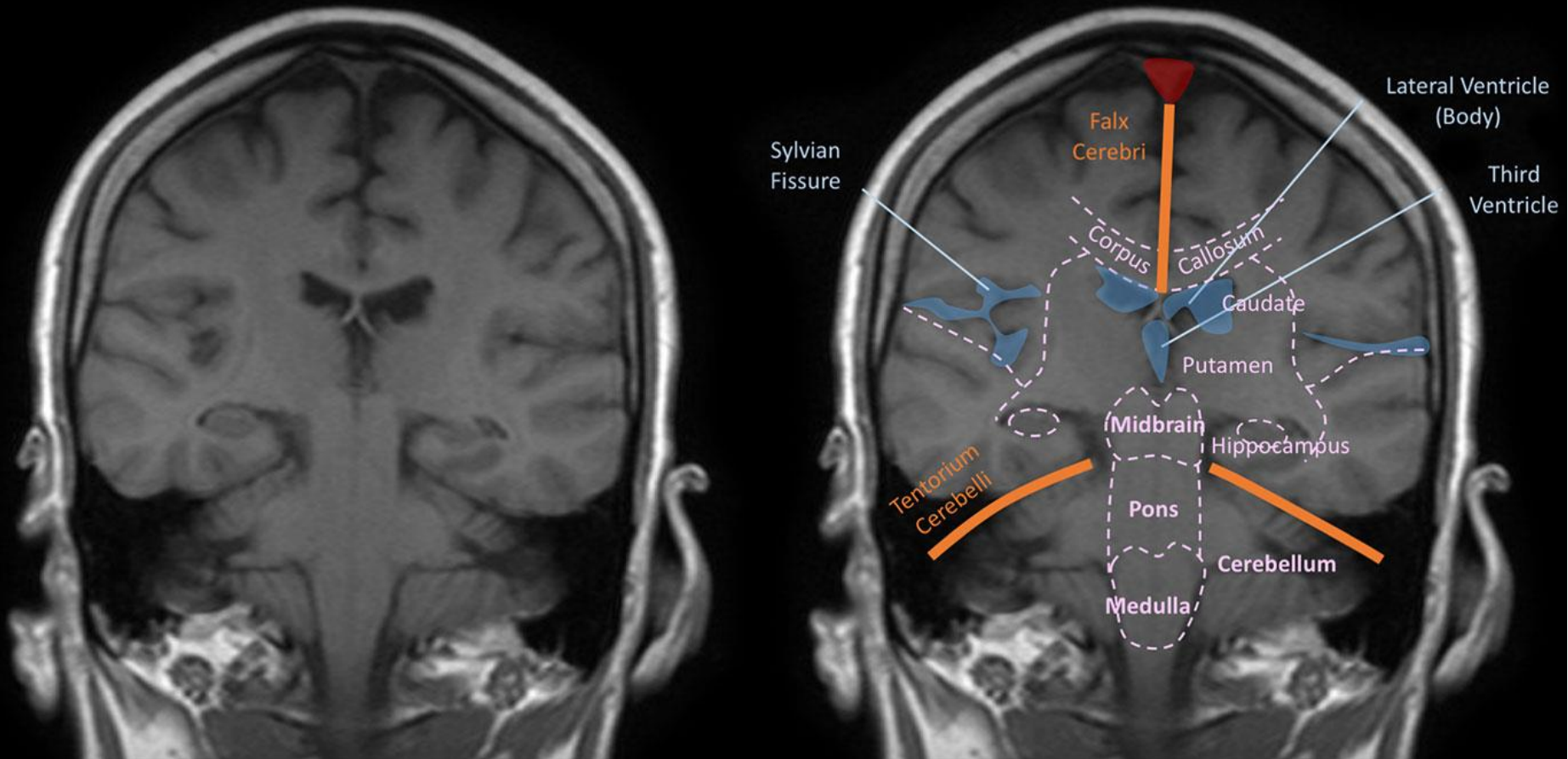


M. Debowski 2018

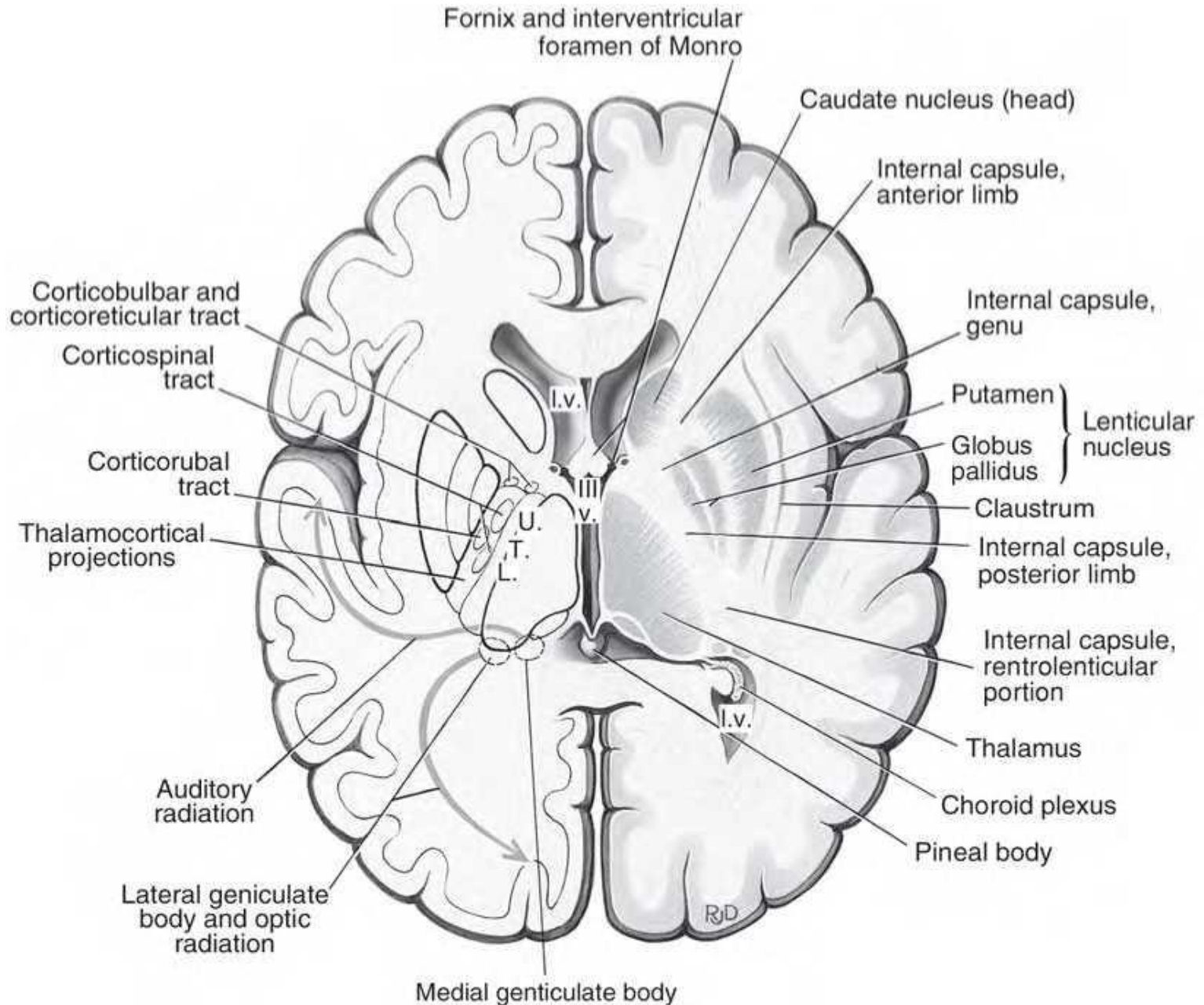


BY NC SA

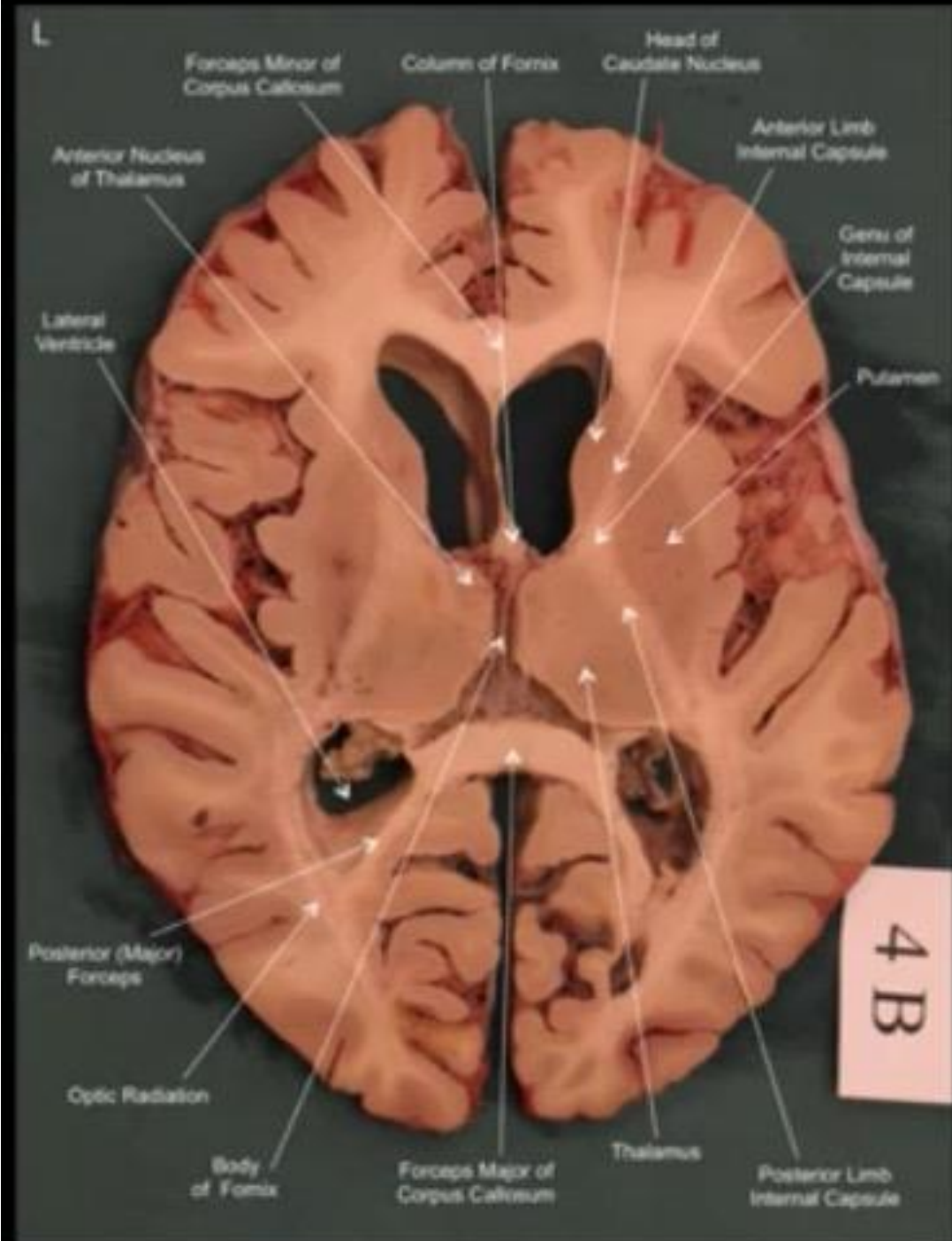
# Brain Sections – Coronal



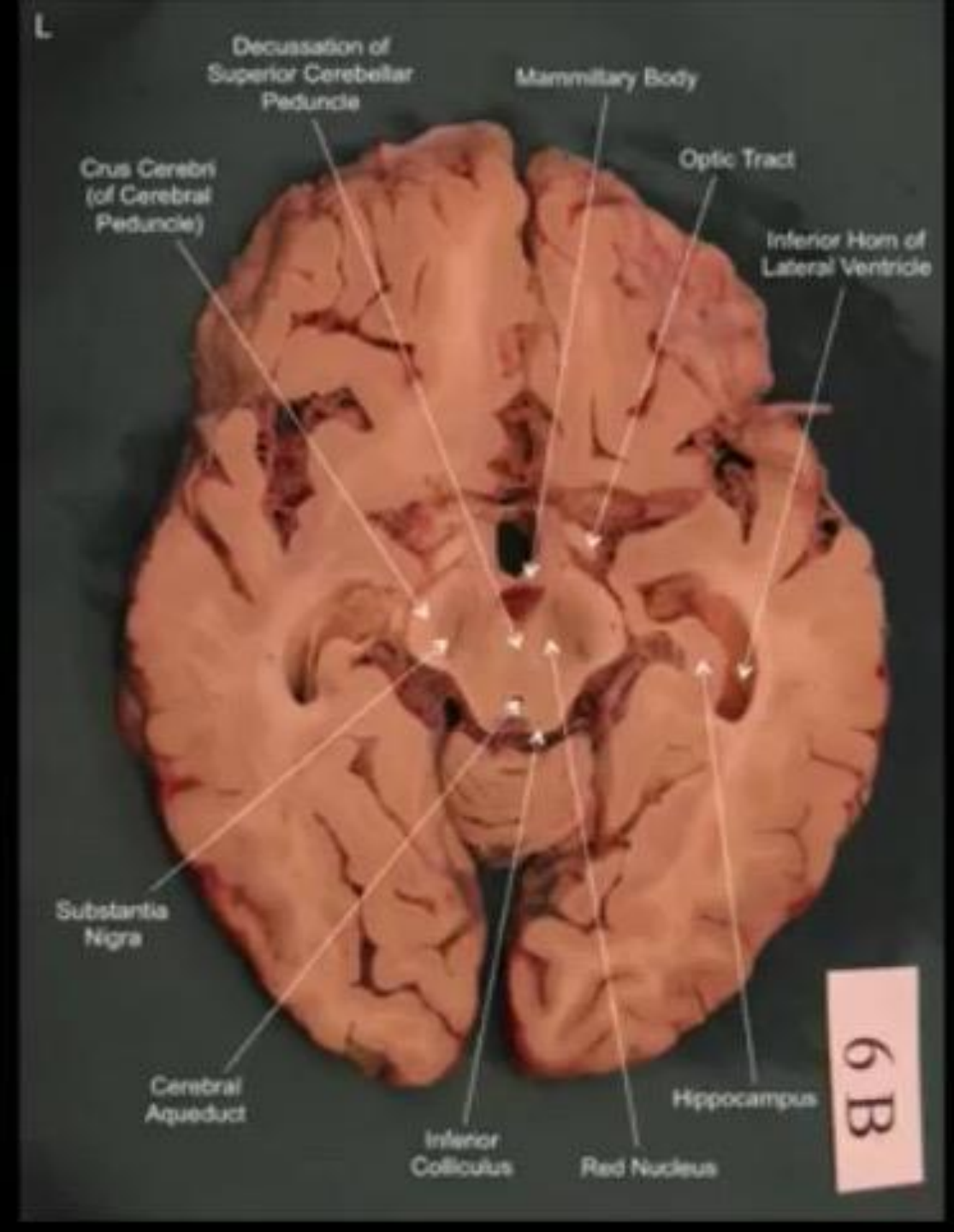
# Brain Sections – Axial (Transverse)



# Brain Sections – Axial (Transverse)



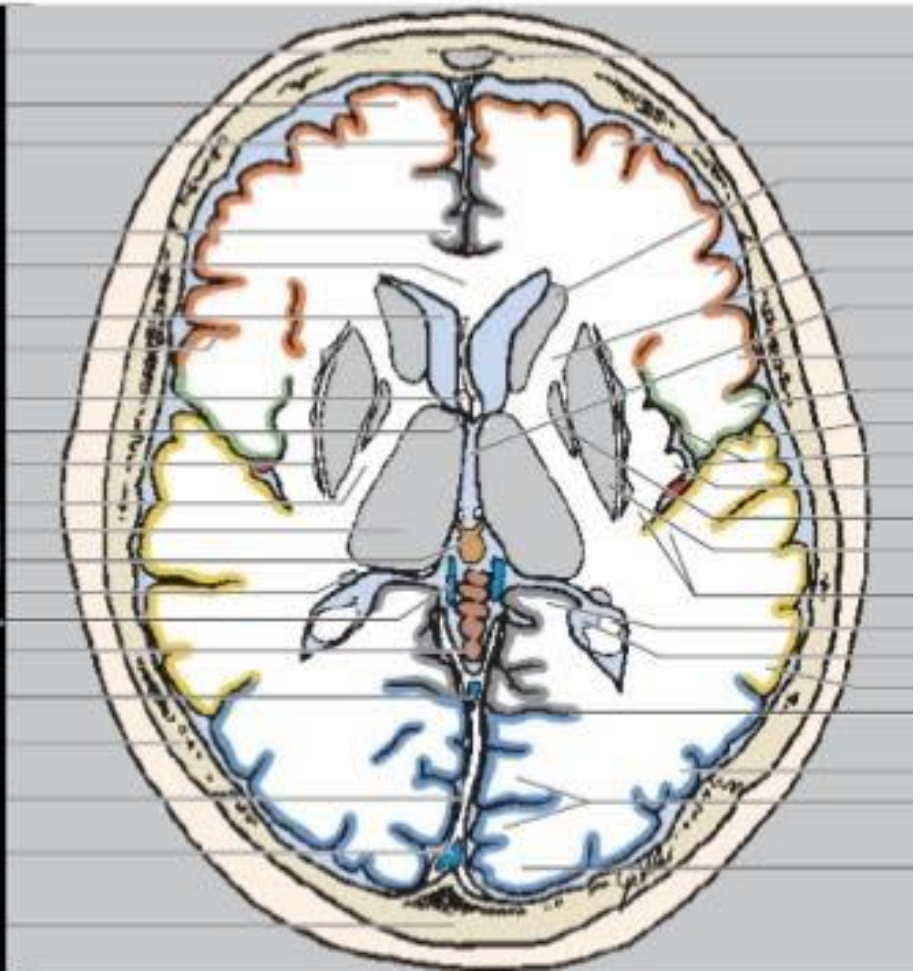
# Brain Sections – Axial (Transverse)



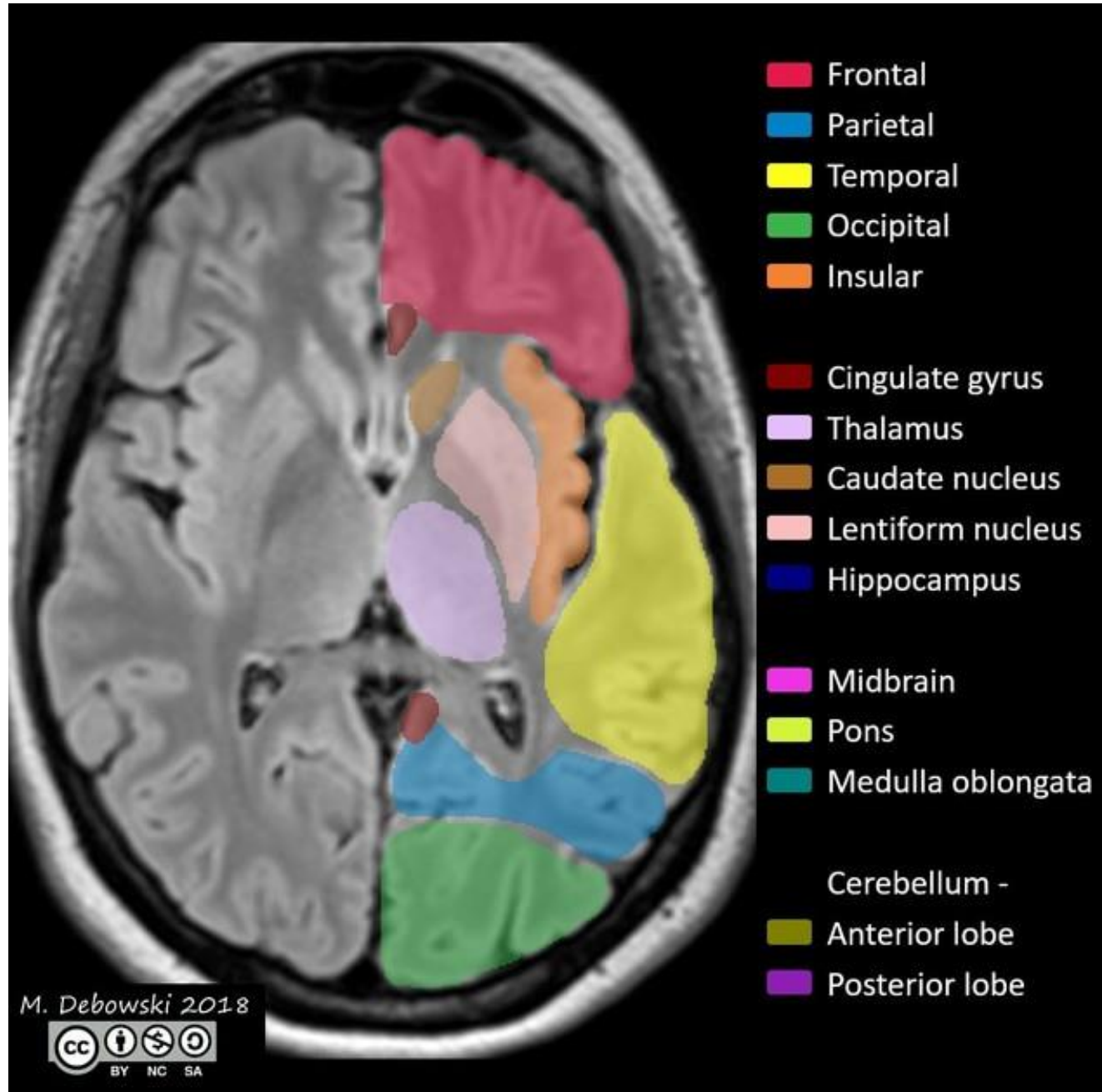
# Brain Sections – Axial (Transverse)



- Frontal lobe
- Temporal lobe
- Occipital lobe
- Cerebellum
- Mesencephalon

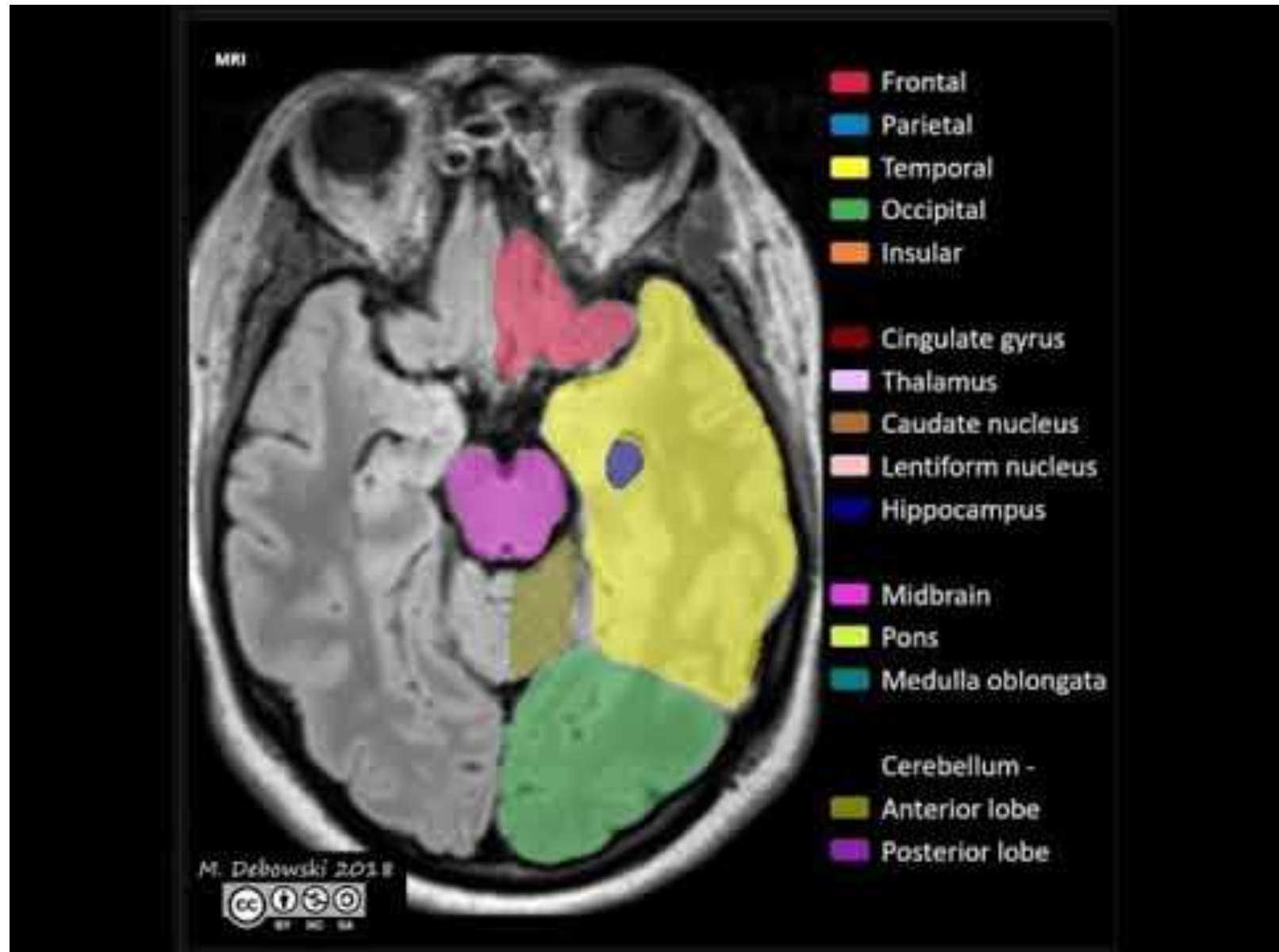


# Brain Sections – Axial (Transverse)

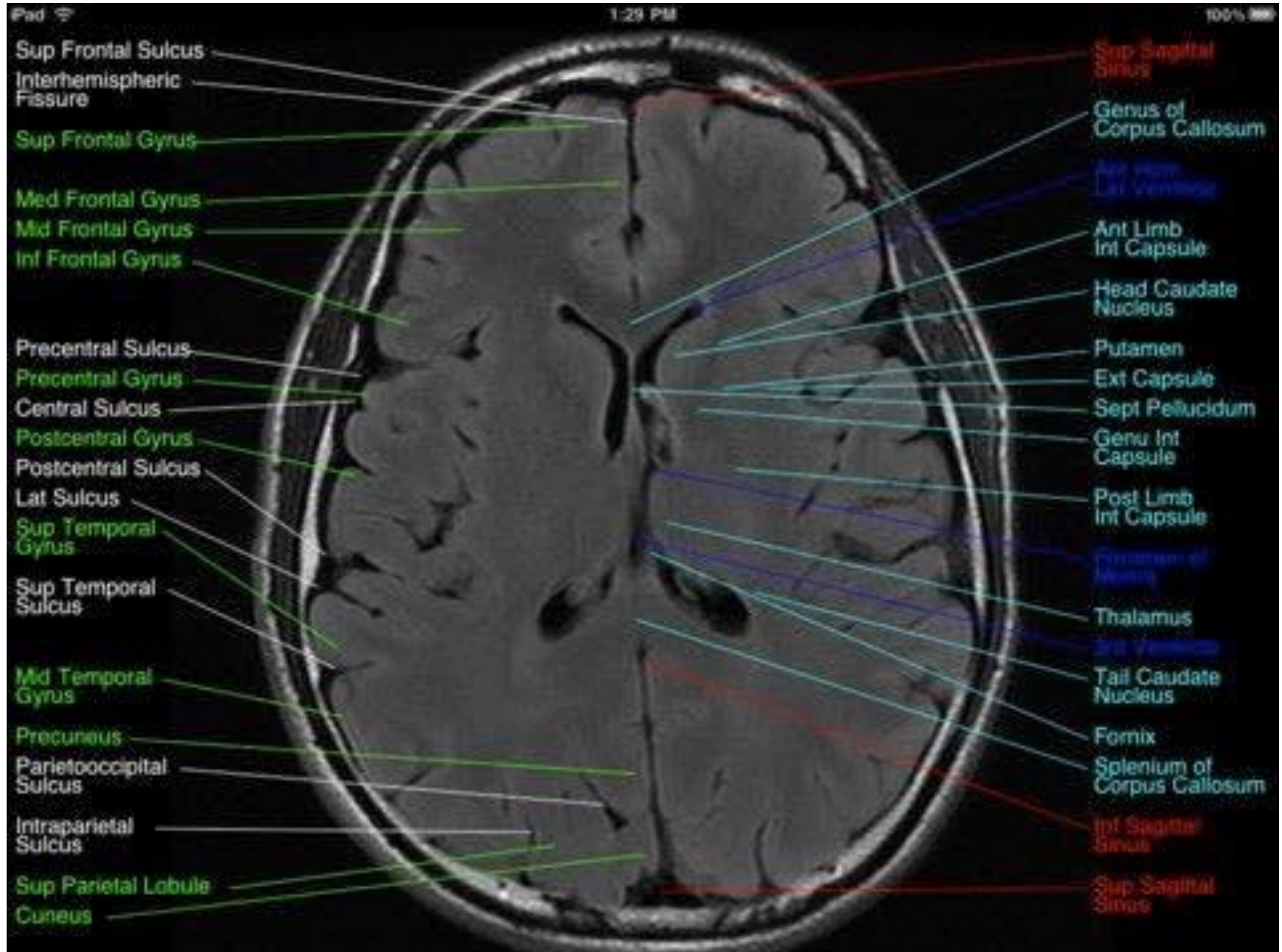




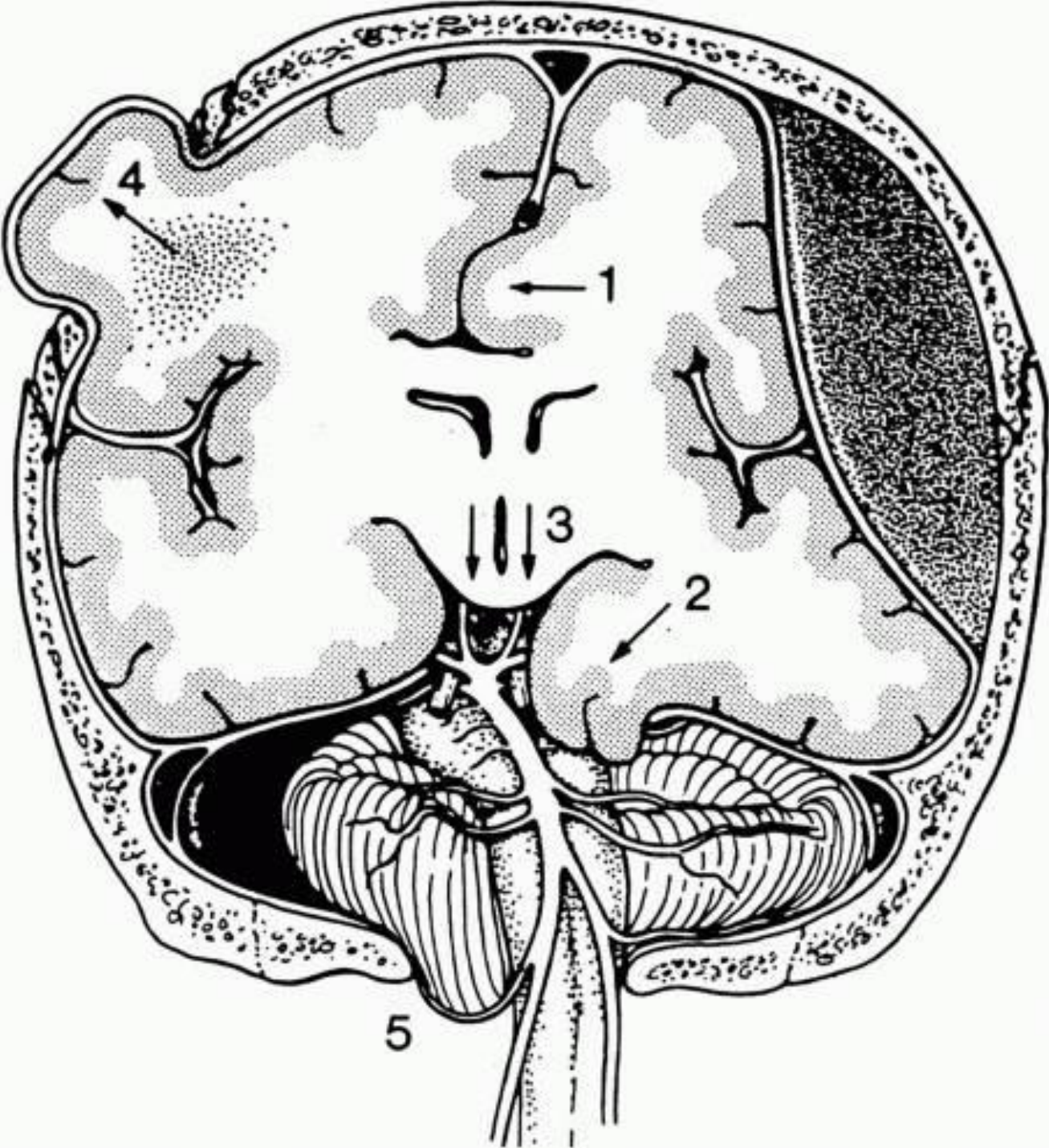
# Brain Sections – Axial (Transverse)



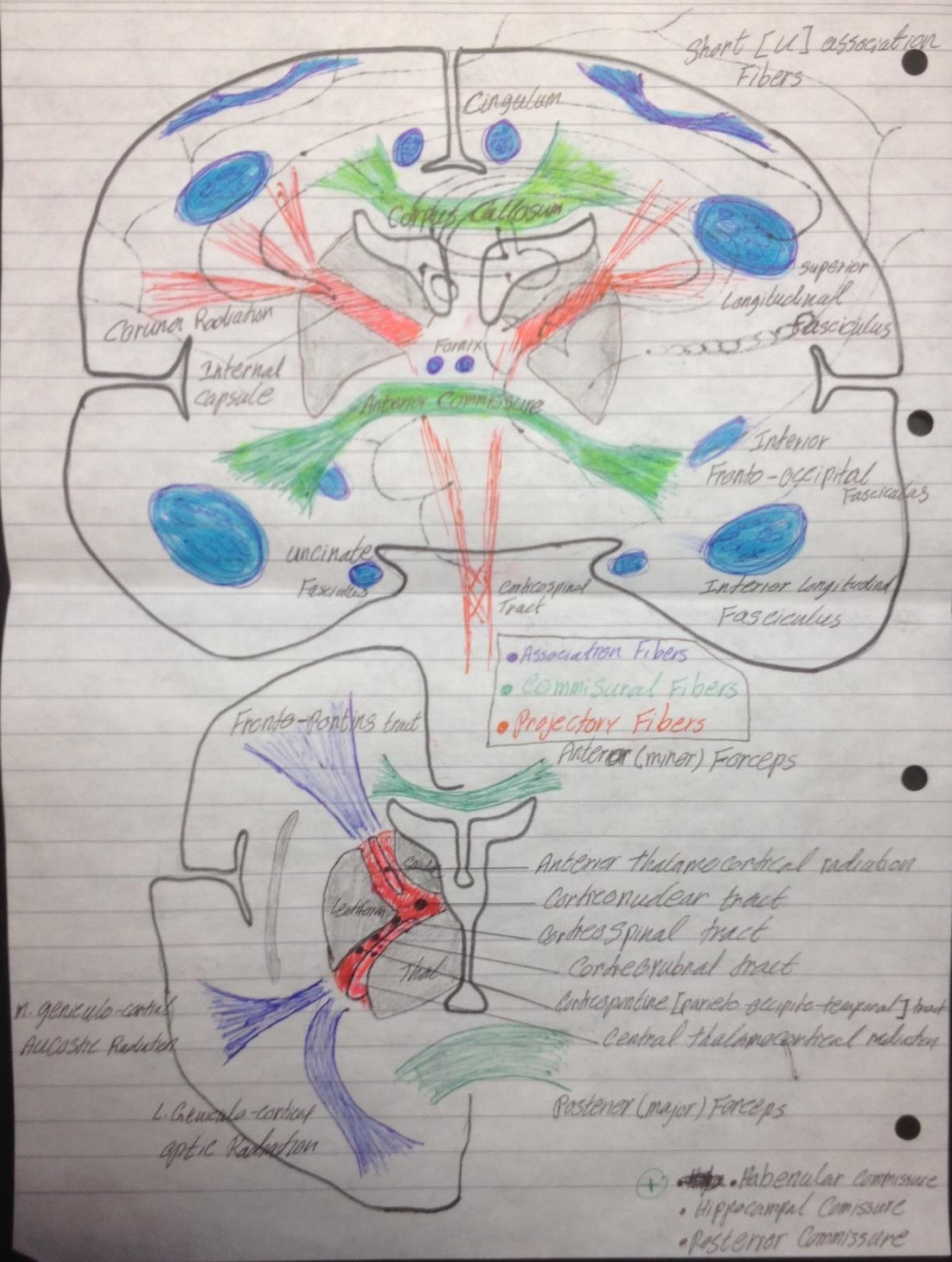
# Brain Sections – Axial (Transverse)



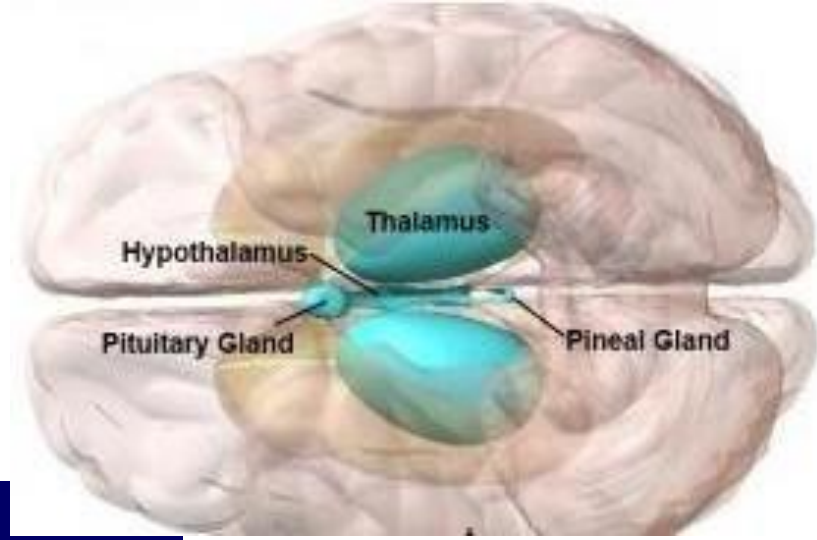
# Brain Hernias



(6) Association, Commissural, Projectory Fibers:



# Thalamus – Spatial Orientation

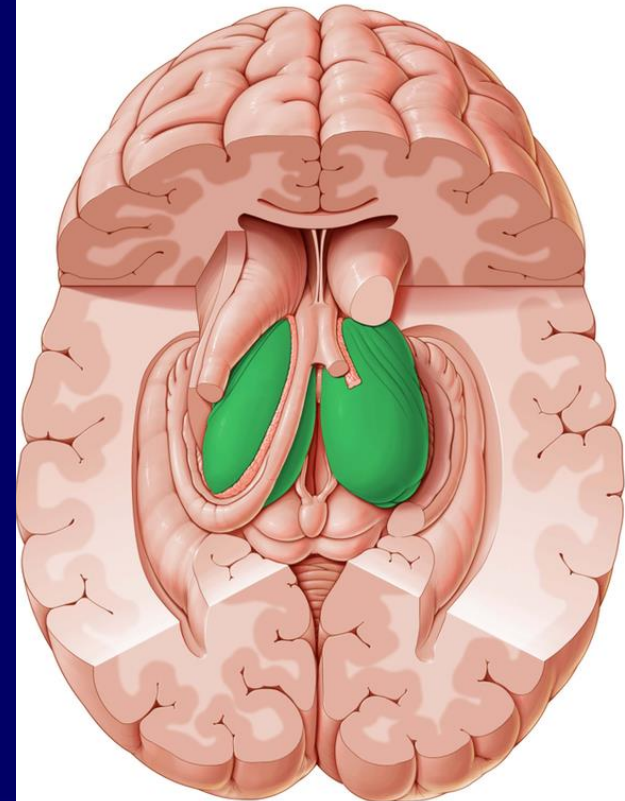
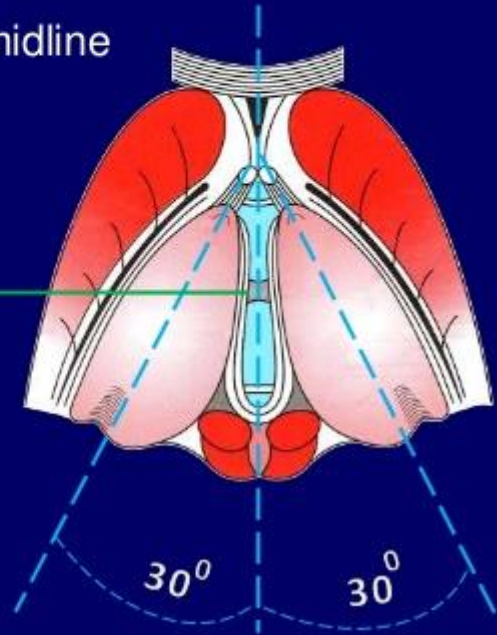


Two thalami on each side of slit like cavity of 3<sup>rd</sup> ventricle

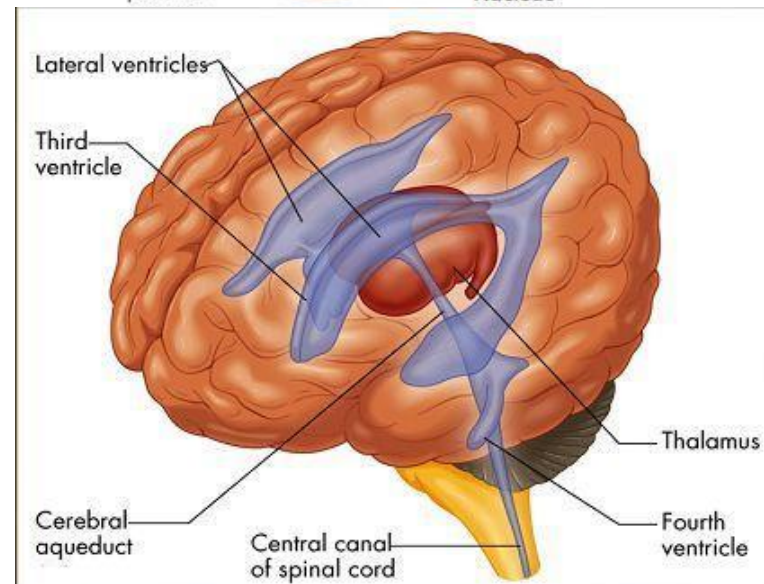
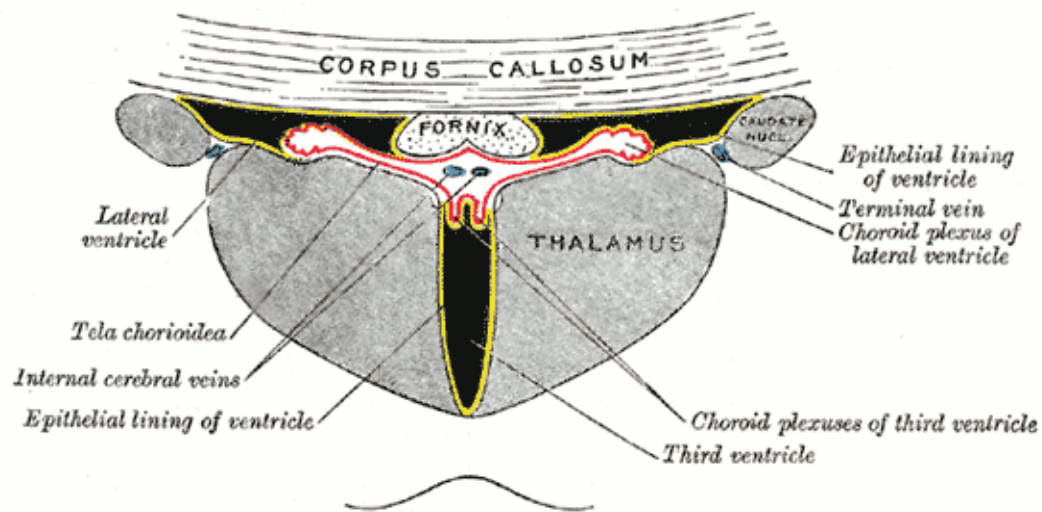
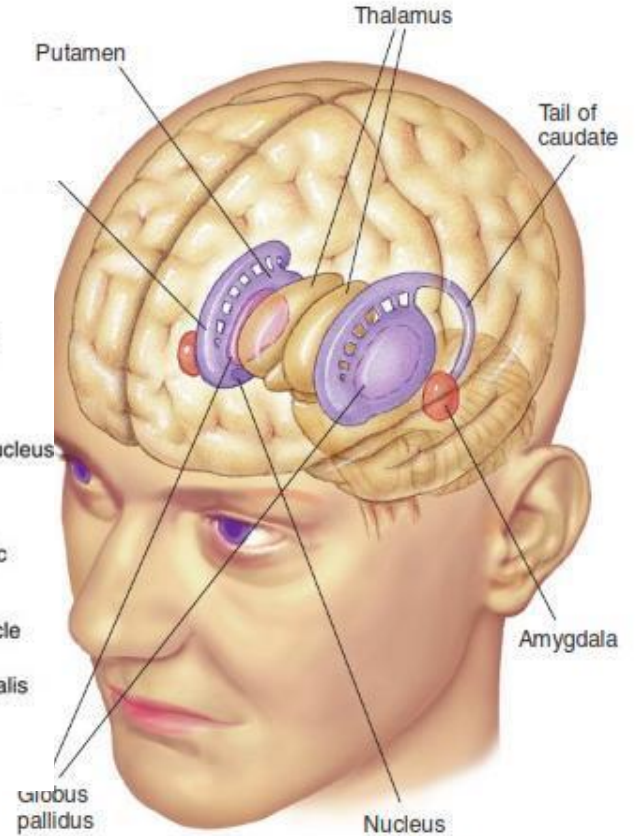
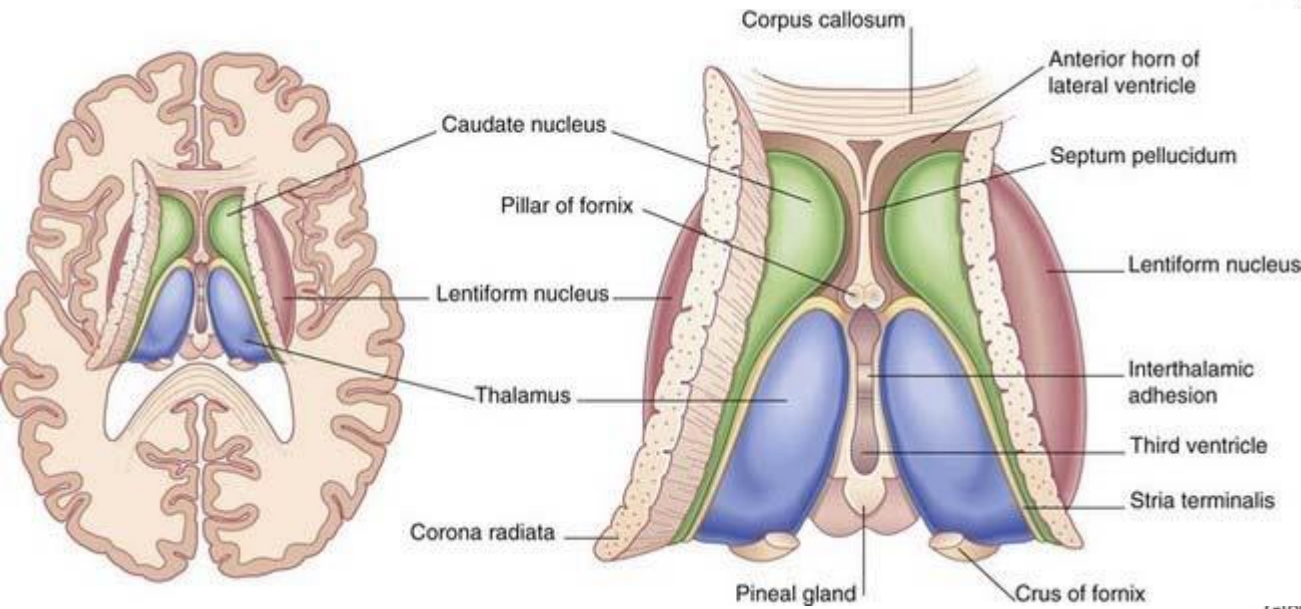
3 cms length x 1.5 cms breadth

Long axis 30 deg. oblique to midline

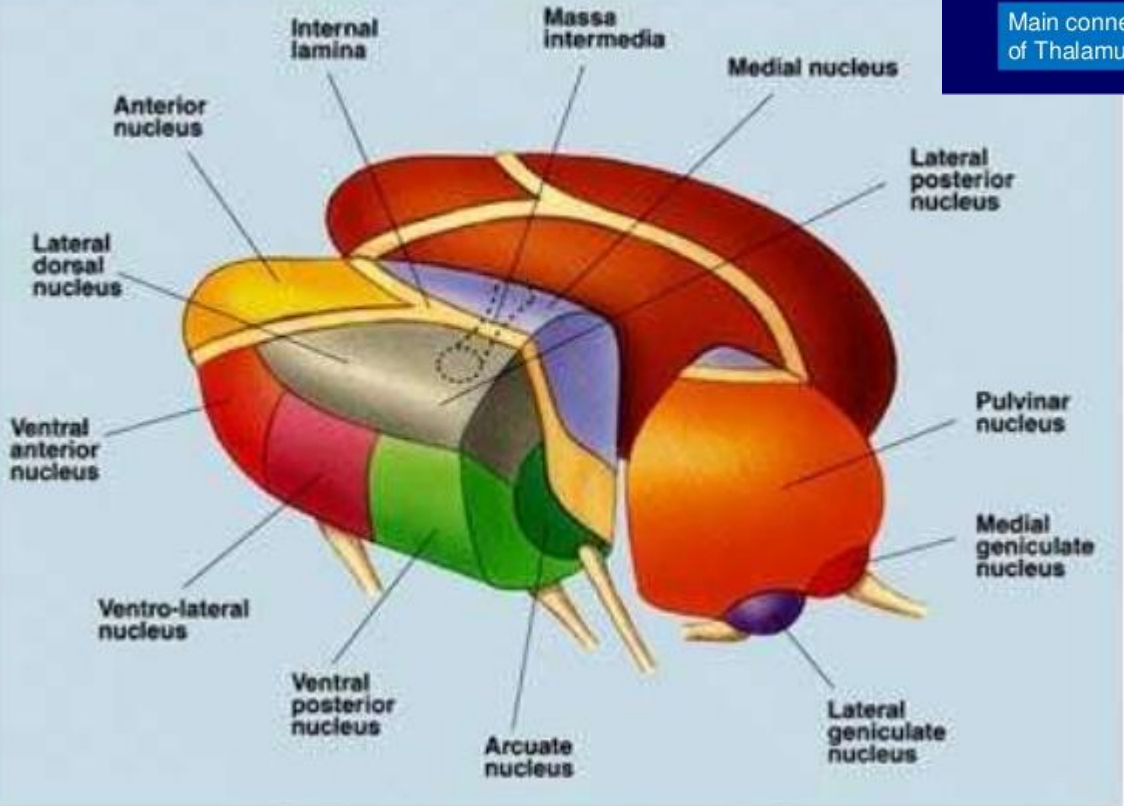
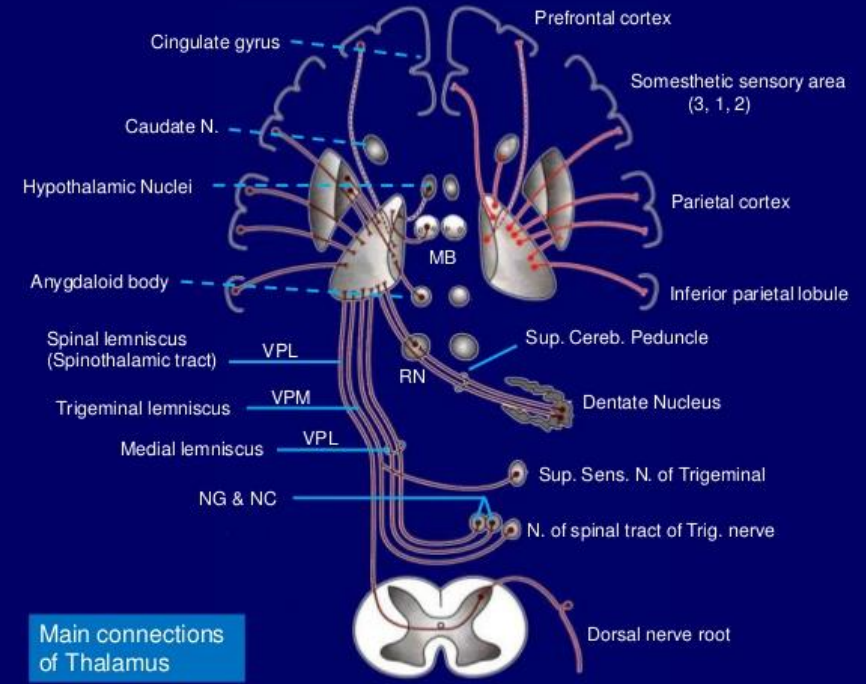
Interthalamic adhesion



# Thalamus - Topography

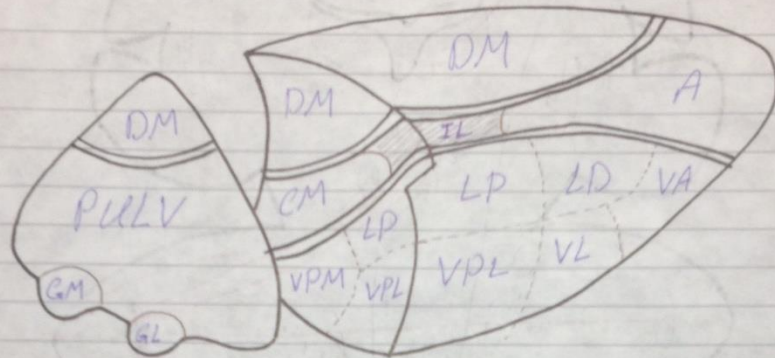


# Thalamus - Nuclei



## ② Nuclei of Thalamus:

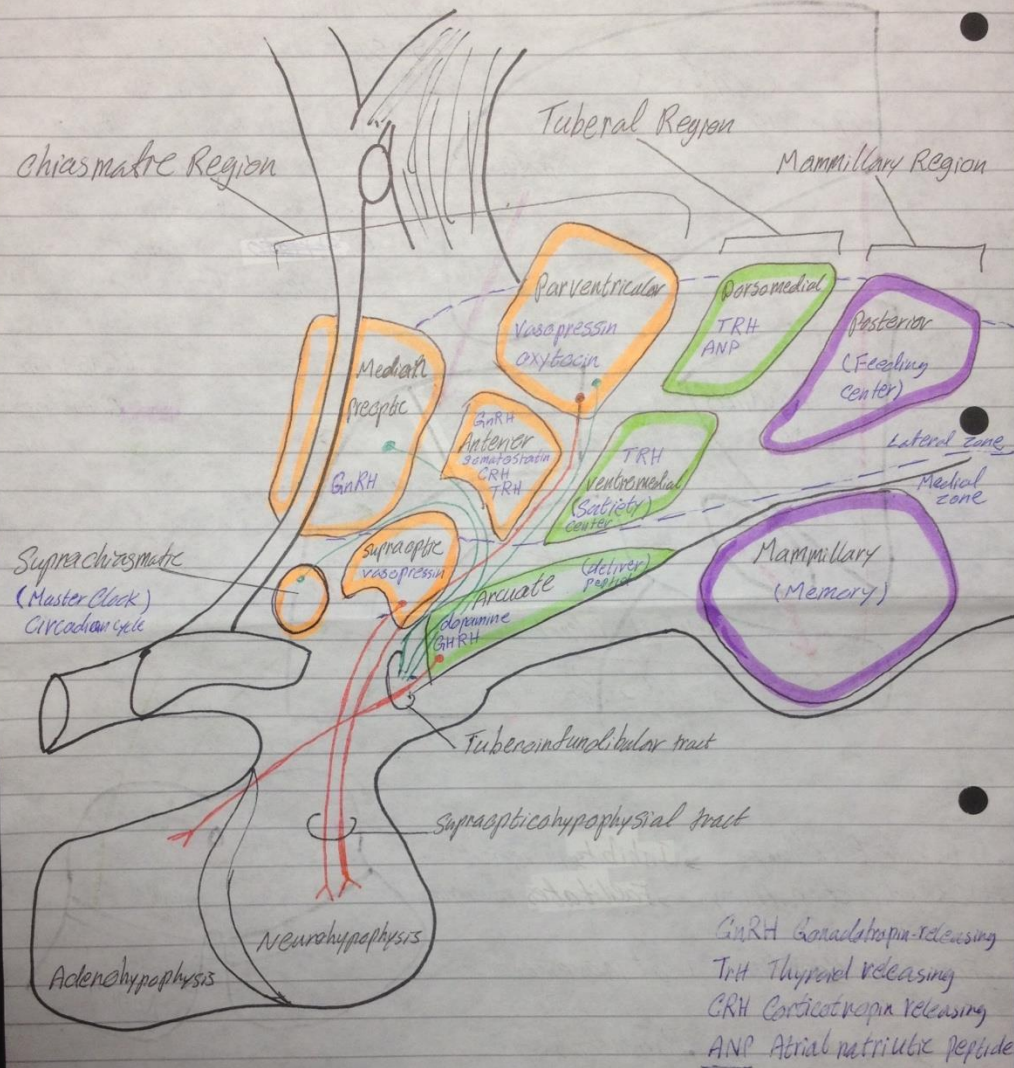
- ⊕ Function: Processing & Distribution Center - Cortex
- ↳ outside  
↳ inside
- Involved in: Consciousness, sleep, memory, sensorimotor activity



Input	Thal. Ncl.	Output
	<b>I) Relay Type</b>	
Mammillothalamic tract	A - Anterior	Cingulate gyrus
Hypocampus	LD - Lateral Dorsal	
Basal Ganglia	VA - VentroAnterior	Motor areas
Cerebellum	VL - Ventrolateral	
Medial Lemniscus	VPL - Ventral posterolateral <sup>*body</sup>	Somatosensory cortex
Spinothalamic tract	VPM - Ventral posteromedial <sup>*face</sup>	
Central tegmental tract		Insula
Breidum: inferior Colliculus	GM - Medial Geniculate	Auditory Cortex
Optic tract	GL - Lateral Geniculate	Visual Cortex
	<b>II) Association Type</b>	
Prefrontal Cortex	DM - Dorsomedial	Prefrontal Cortex
Association / limbic		
Parietal Lobe	LP - Lateral posterior	Parietal lobe
Occipital lobe	PULV - Pulvinar	Occipital lobe
Temporal lobe		Temporal lobe
Basal Ganglia	CM - Centromedial	Motor Cortex
Cerebellum		Sinaitum



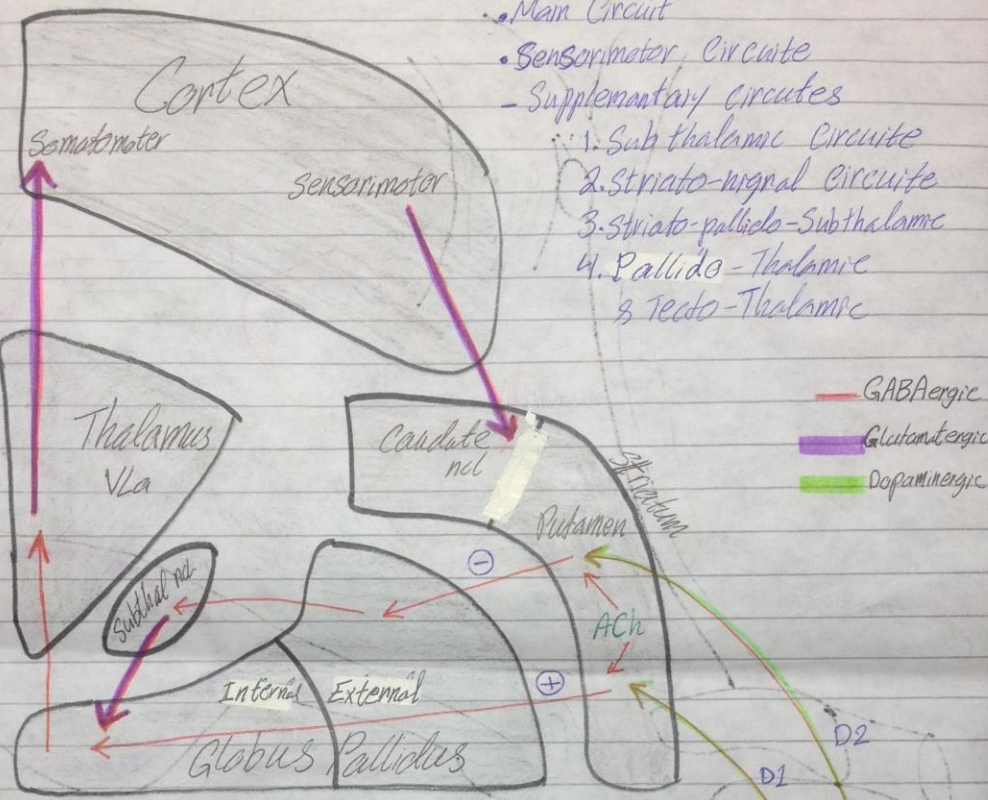
### (B) Nuclei of Hypothalamus:



#### \* Function:

- I) Lateral zone → Regulation of water & Food intake
- II) Chiasmatic Region → Cardiovascular Function, Circadian Rhythm, Body T
  - Tuberal Region → Satiety Center, Deliver peptides to portal vessels
  - Mammillary Region → Memory formation, ↑ BP/pupillary dilation/ conserve heat

# 4. Circuits of Basal Ganglia:

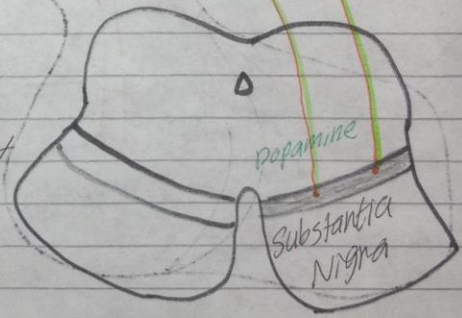


- Main Circuit
- Sensorimotor Circuite
- Supplementary circuite
  1. Subthalamic Circuite
  2. Striato-nigral Circuite
  3. striato-pallido-Subthalamic
  4. Pallido-Thalamic & Tecto-Thalamic

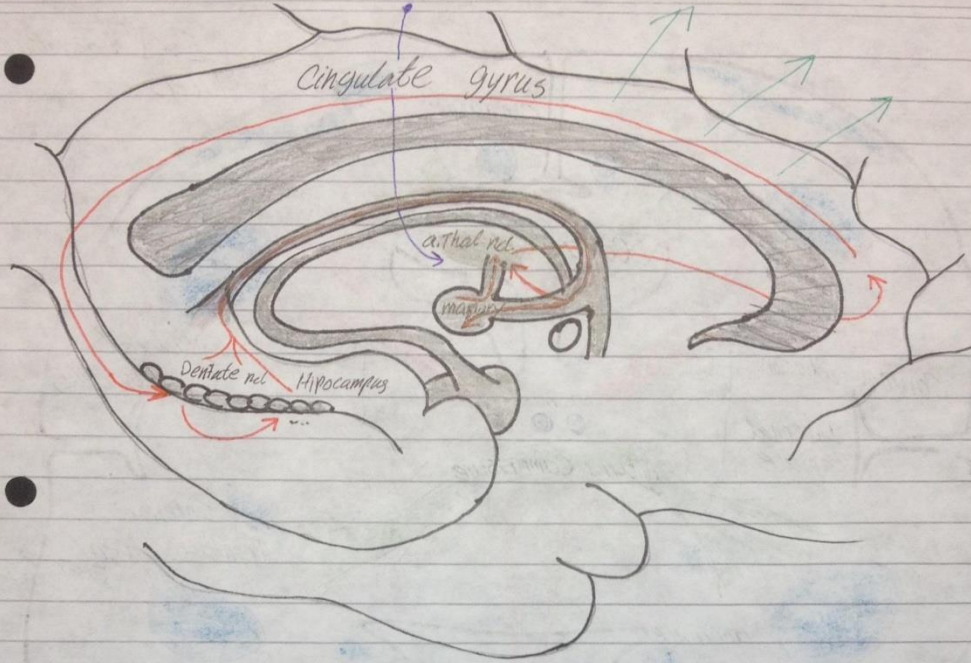
- D1: Direct pathway → Facilitates movement
- D2: Indirect pathway → Inhibits movement

⊗ Function: Coordination of movement

- Disorders →
- Parkinson's
  - Huntington's
  - Hypakinesia & Hyperkinesia
  - Dystonia



## ⑤ Limbic Circuit of Papez:



- ⊗ **Function:**
- Motivation & Feeling
  - Learning & Memory

## ⊗ Neo cortex - Hippocampal Formation

Primary sensory areas [SI, AI, VI]

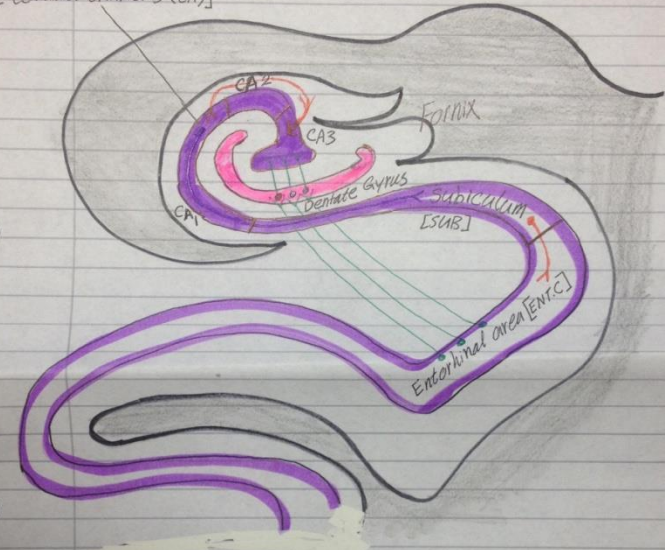
Associated Cortical areas [SII, AII, VII]

Gyrus Cinguli & gyrus parahippocampalis [28, 35, 36]

Hippocampus [Hippocampal Formation]

## ⊗ Andersen's Circuit - Limbic System:

Hippocampus  
[Corona cammari CCA]

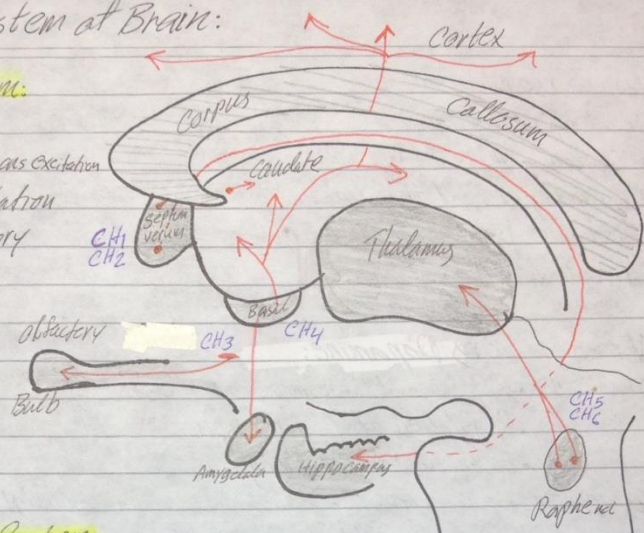


# ⑧ Chemical System at Brain:

## I Cholinergic System:

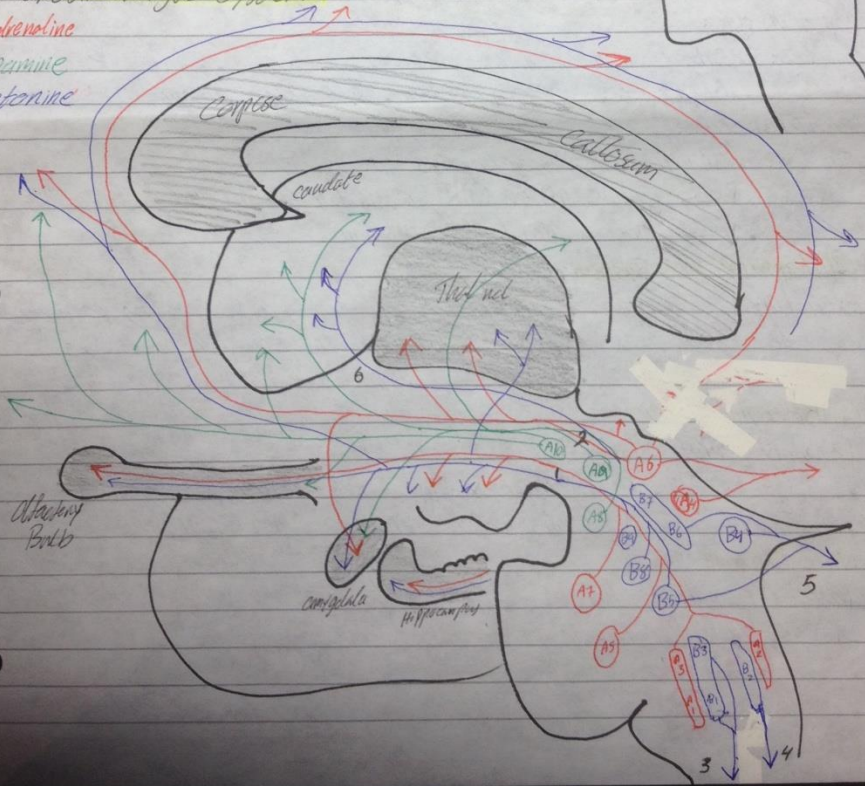
- ACh →
- Cortical neurons excitation
  - improve circulation
  - supports memory

- ⊕ supplies:
- Hippocampus
  - Olfactory
  - Neocortex
  - Thalamus



## II Monoaminergic System:

- Noradrenaline
- Dopamine
- Serotonine



1. Ventral ascending bundle
2. Dorsal ascending bundle
3. Descending ventral bundle
4. Descending dorsal bundle
5. Cerebellar bundle
6. Periventricular bundle

### A) Noradrenergic:

- ⊕ Function:
- Regulation of transmission of sensory signals
  - Regulation of Circulation
  - Essential for energizing

- ⊕ Supplies:
- spinal cord
  - brain stem - sensory cranial Ns
  - cerebellum - purkinje
  - Thalamus (VPL, VPM, geniculate body)
  - Hippocampus formation

### B) Dopaminergic:

- ⊕ Supplies:
- Substantia nigra - compact part
  - Striatum
  - Globus Pallidus
  - Neocortex

- ⊕ Function:
- ↓ Parkinsonism

### C) Serotonergic:

- ⊕ Function:
- analgesia in descending sys
  - ↑ → tremor, ↑BP, ↑HR, Confusion, unconsciousness
  - ↓ → Depression, irritability, insomnia

### III Glutamatergic System:

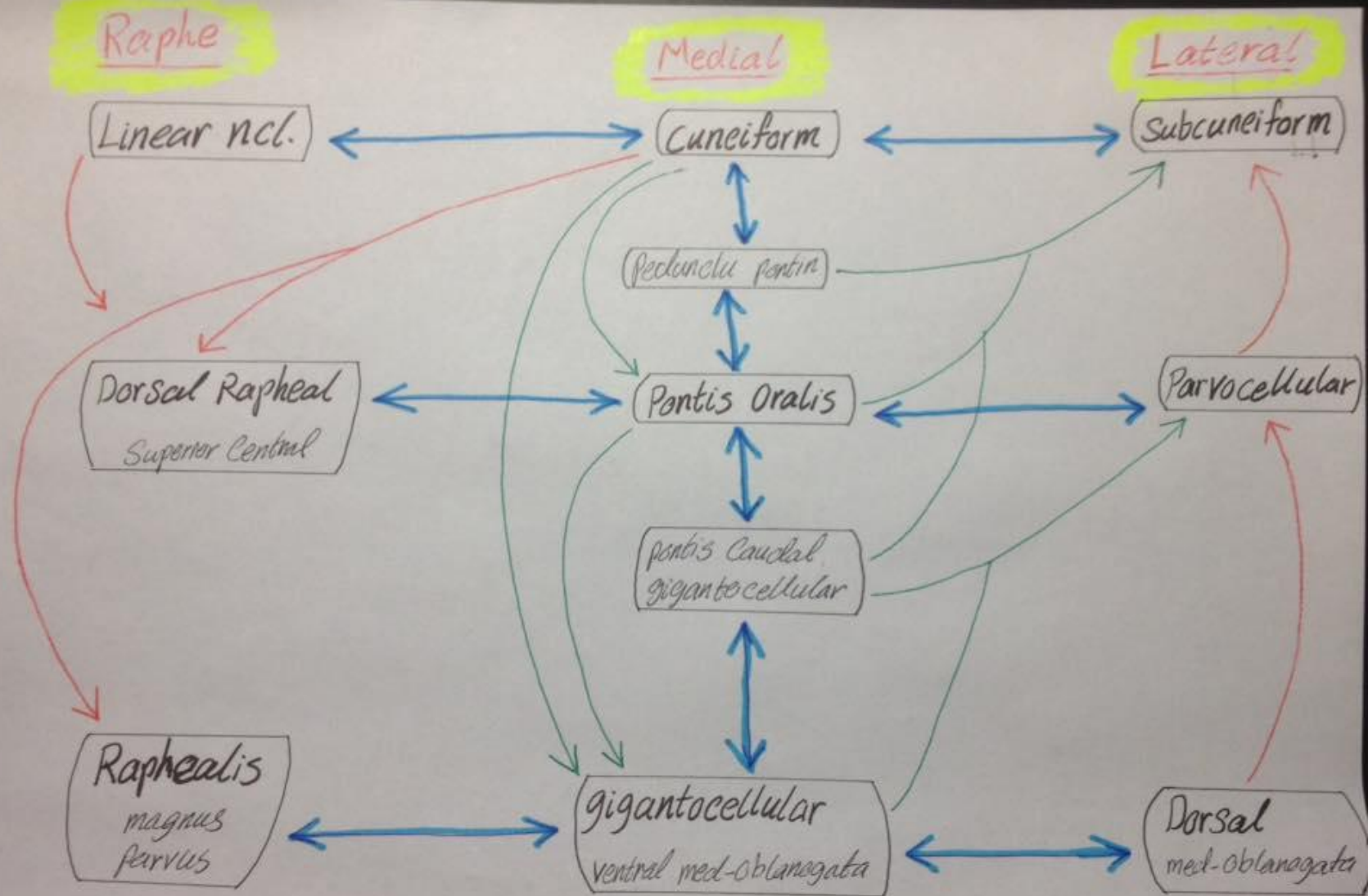
- Excitatory
- Associated cortical pathways
  - Commissural pathways
  - Ascending & Descending pathways
  - Efferent cerebellar pathways
  - Descending brain stem pathways

### IV GABAergic System:

- Inhibitory neurotransmitter
- local interneurons at neocortex, hippocampus, thalamus, cerebellum
  - Efferent projections at Globus pallidus, striatum, purkinje cells

### V Nitric Oxide:

- Gaseous neurotransmitter [local interneurons]
- ↑ neurotransmitter releas
  - Vasodilation
  - neurodegenerative dis



[Longitudinal Systems of Reticular Formation]