

Special thanks to :
Kholoud Al-dosari & Jumanah Albeeybe
for sharing their nots.



Lecture 3 :

Radiology of cerebral hemispheres



KSU | Collage of Medicine
2nd Year | CNS BLOCK

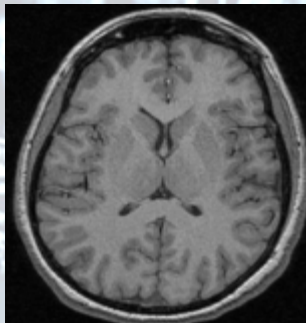
❖ Notes

“Questions in this lecture are going to be about if a lesion in part of brain given, what function could be affected or function could be spared (Not affected)? or if a function is affected, what part of brain could have the lesion?” **Dr.Ibrahim AlOraini** said.

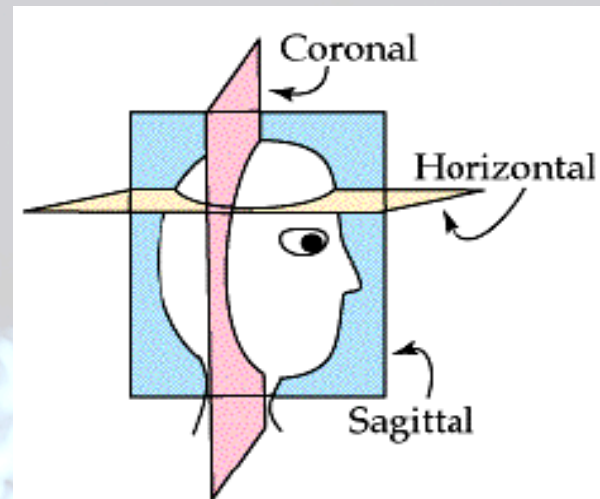
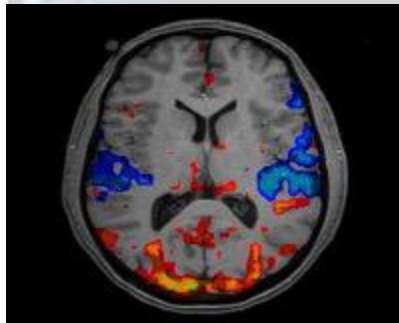
Radiology of cerebral hemispheres

➤ What we image?

Morphology



Function



Computed Tomography (CT)

Ionizing Radiation

Quick (2-3min)

Low resolution

Single plane

Magnetic Resonance Imaging (MRI)

No ionizing radiation

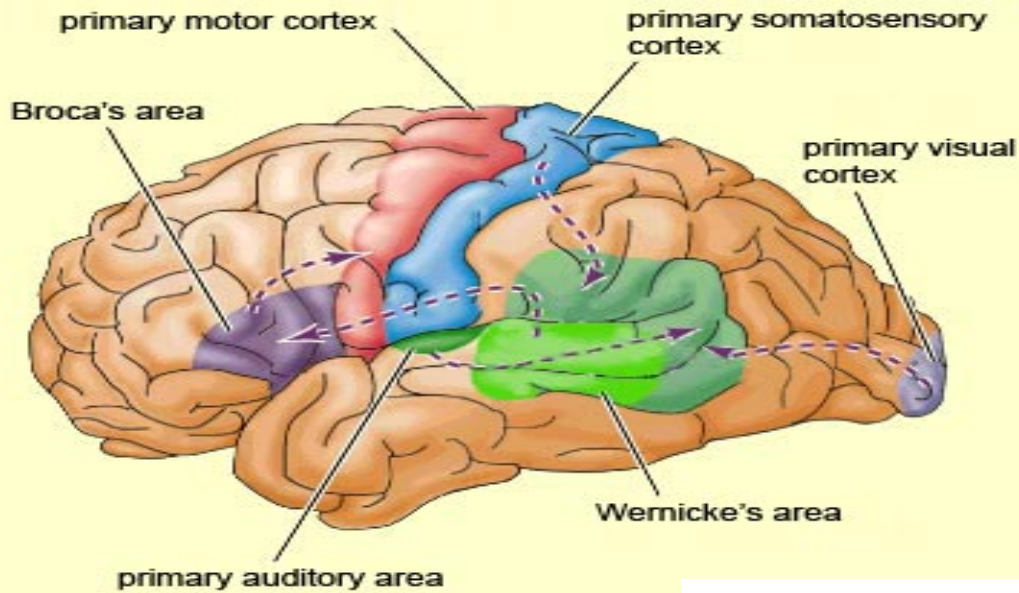
Lengthy (15-20min)

High resolution

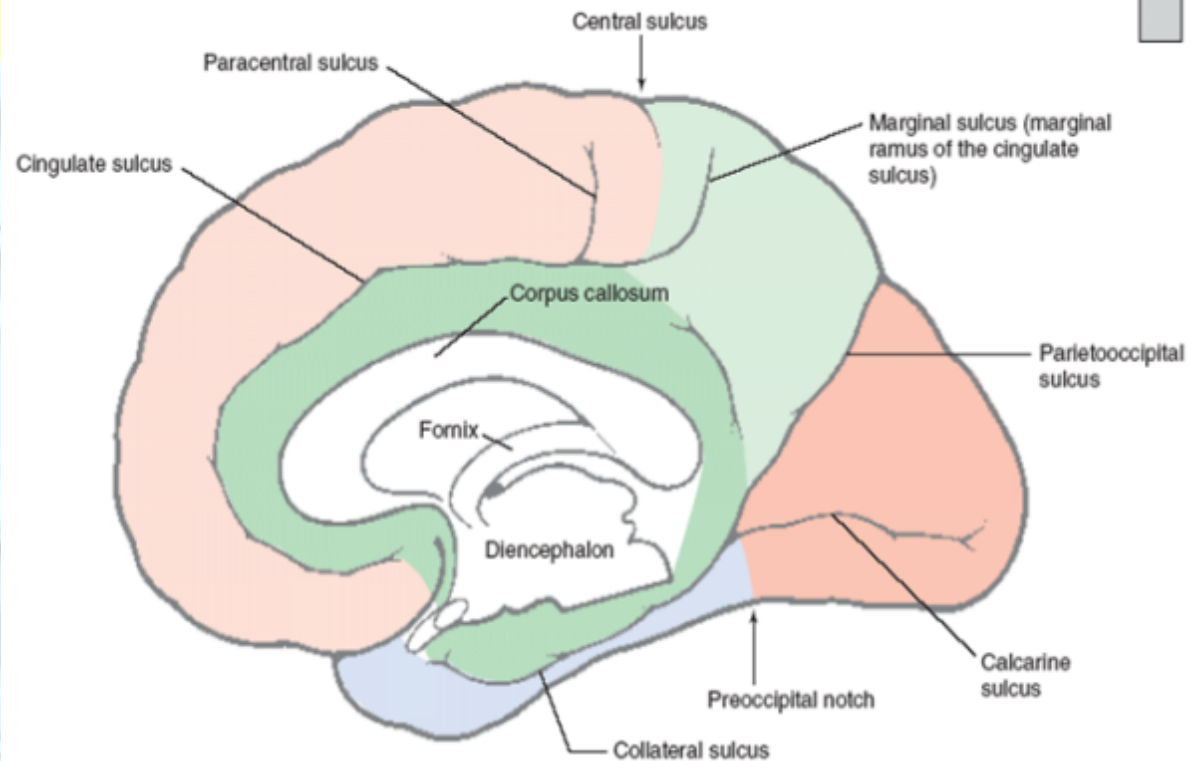
Multiple planes

Notes that will help you in the next pictures:

- **precentral gyrus** occurs in frontal lobe.
- **postcentral gyrus** occurs in parietal lobe.
- **Fissure** that saperated the frontal lobe from temporal lobe is called lateral(Sylvius) fissure.
- **Fissure** that saperated the frontal lobe from parietal lobe is called central(Rolandic) fissure.
- **Medial surface of cerebral cortex** represents LOWER LIMP .
- **Lateral surface of cerebral cortex** represents FACE , ARMS & HANDS.



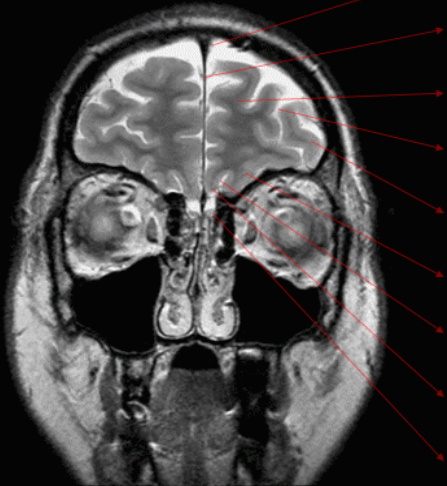
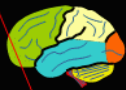
- It's very important to know the structures of cerebral hemispheres and their functions from Anatomy & Physiology.



Notes that will help you in the next pictures:

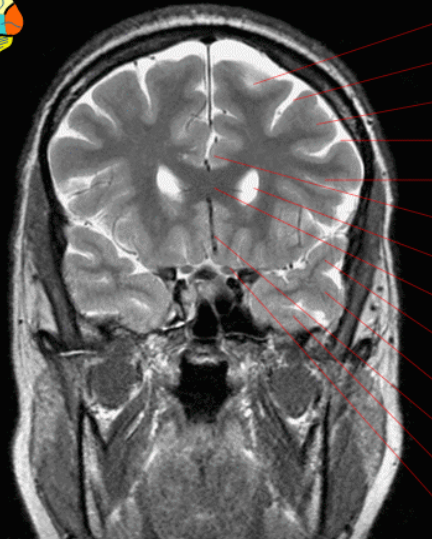
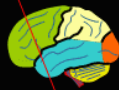
- (T1) gray matter is dark , white matter is white , Fluid[CSF] is dark .
- (T2) gray matter is bright , white matter is dark , Fluid[CSF] is bright.
- (T1) usually in sagittal section .
- (T2) usually in axial and coronal sections.
- **Central black line** falx cerebri
- **Genu** means ركبة
- **Rupture of vessels** present in dark.
- **Internal capsule** has anterior and posteroir parts : anterior part for motor , posterior part for sensory.
- **External capsule** located between insula & lentiform nucleus.
- **Septum lucidum** is saperated from 2 lateral ventricles.
- **Anterior cerebral** artery gives anterior communicating artery.
- **Pituitary gland** present in white colour because it contains fat.

Brain
Coronal T2



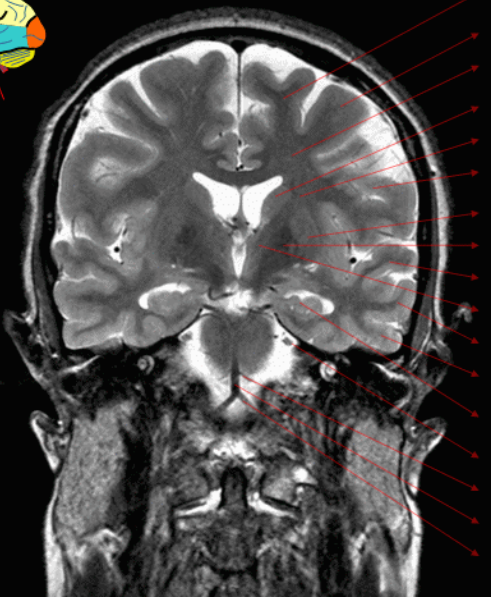
- Superior sagittal sinus
- Interhemispheric fissure
- Superior frontal gyrus
- Superior frontal sulcus
- Middle frontal gyrus
- Medial orbital gyrus
- Olfactory sulcus
- Olfactory bulb

Brain
Coronal T2



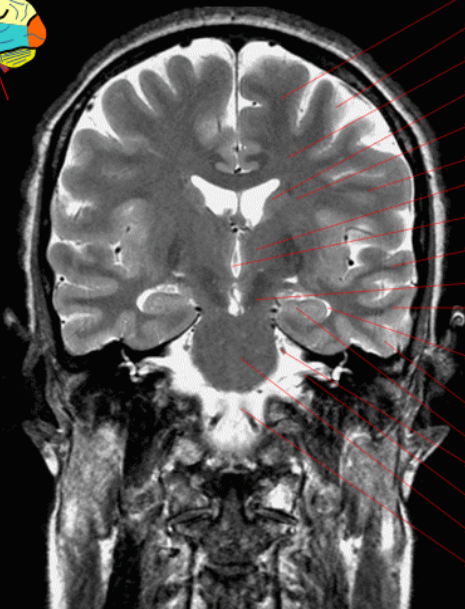
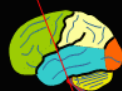
- Superior frontal gyrus
- Superior frontal sulcus
- Middle frontal gyrus
- Inferior frontal sulcus
- Inferior frontal gyrus
- Cingulate gyrus
- Lateral ventricle (frontal horn)
- Corpus callosum (genu)
- Superior temporal gyrus
- Middle temporal gyrus
- Anterior cerebral artery
- Inferior temporal gyrus

Brain
Coronal T2



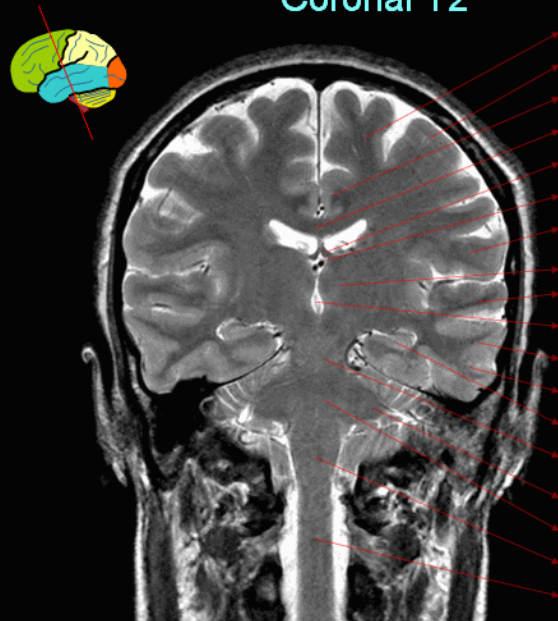
- Superior frontal gyrus
- Middle frontal gyrus
- Caudate nucleus
- Corona radiata
- Inferior frontal gyrus
- Putamen
- Globus pallidus
- Superior temporal gyrus
- Internal capsule
- Middle temporal gyrus
- Inferior temporal gyrus
- Hippocampus
- Superior cerebellar artery
- Basilar artery
- Vertebral artery

Brain
Coronal T2



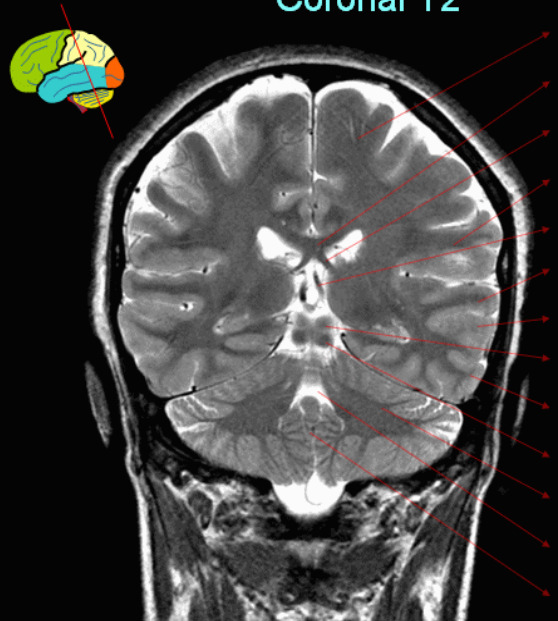
- Superior frontal gyrus
- Middle frontal gyrus
- Centrum semiovale
- Caudate nucleus
- Corona radiata
- Inferior frontal gyrus
- Thalamus
- Third ventricle
- Superior temporal gyrus
- Mid brain
- Middle temporal gyrus
- Lateral ventricle (temporal horn)
- Inferior temporal gyrus
- Hippocampus
- Trigeminal nerve (V)
- CN VII and VIII
- Pons
- Vertebral artery

Brain
Coronal T2



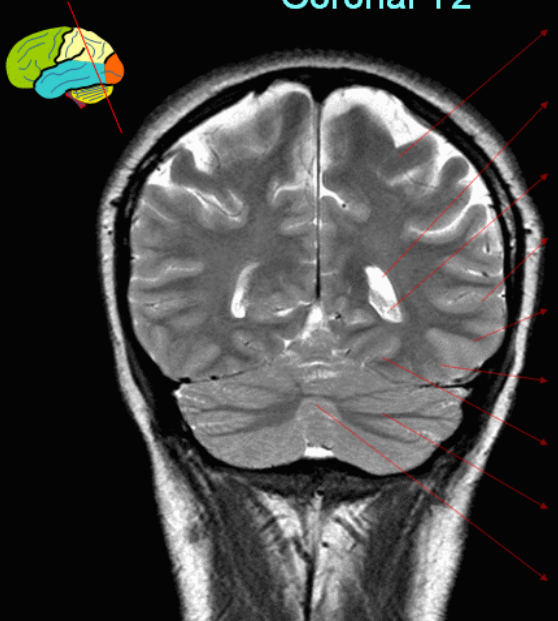
- Superior frontal gyrus
- Middle frontal gyrus
- Cingulate gyrus
- Corpus callosum (body)
- Fornix
- Internal cerebral vein
- Precentral gyrus
- Thalamus
- Superior temporal gyrus
- Third ventricle
- Middle temporal gyrus
- Inferior temporal gyrus
- Hippocampus
- Mid brain
- Middle cerebellar peduncle
- Pons
- Medulla oblongata
- Spinal cord

Brain
Coronal T2



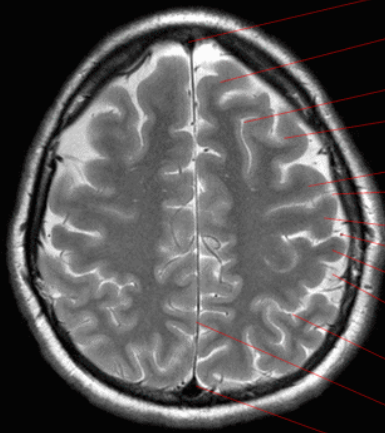
- Postcentral gyrus
- Corpus callosum (body)
- Fornix
- Supramarginal gyrus
- Internal cerebral vein
- Superior temporal gyrus
- Middle temporal gyrus
- Superior colliculus
- Inferior temporal gyrus
- Inferior colliculus
- Cerebellum
- Fourth ventricle
- Vermis

Brain
Coronal T2



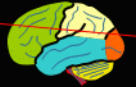
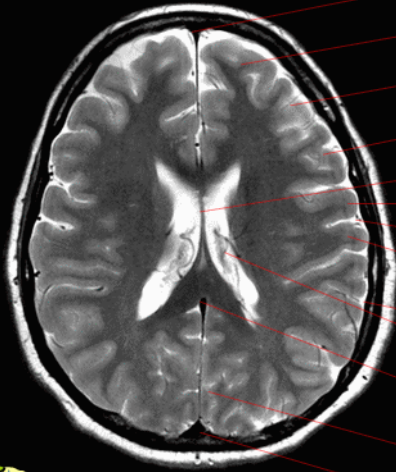
- Supramarginal gyrus
- Lateral ventricle (occipital horn)
- Choroid plexus
- Middle temporal gyrus
- Inferior temporal gyrus
- Lingual gyrus
- Cerebellum
- Vermis

Brain
Axial T2



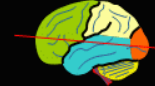
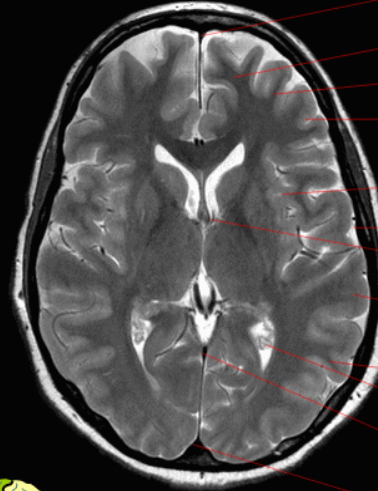
- Superior sagittal sinus
- Superior frontal gyrus
- Superior frontal sulcus
- Middle frontal gyrus
- Inferior frontal gyrus
- Precentral sulcus
- Precentral gyrus
- Central sulcus
- Postcentral gyrus
- Postcentral sulcus
- Intraparietal sulcus
- Interhemispheric fissure
- Superior sagittal sinus

Brain
Axial T2



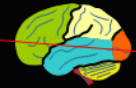
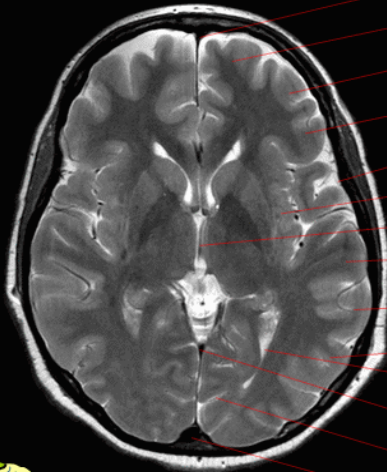
- Superior sagittal sinus
- Superior frontal gyrus
- Middle frontal gyrus
- Inferior frontal gyrus
- Septum pellucidum
- Precentral gyrus
- Central sulcus
- Postcentral gyrus
- Lateral sulcus
- Choroid plexus
- Inferior sagittal sinus
- Parietooccipital sulcus
- Superior sagittal sinus

Brain
Axial T2



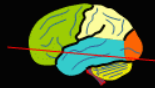
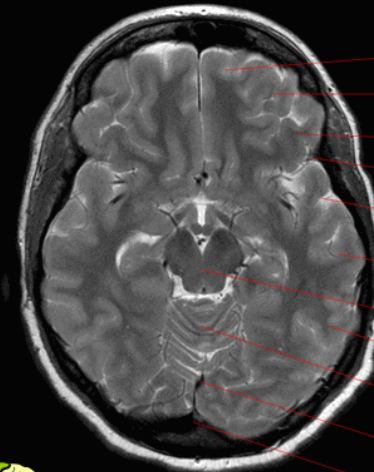
- Superior sagittal sinus
- Superior frontal gyrus
- Middle frontal gyrus
- Inferior frontal gyrus
- Insula
- Lateral sulcus
- Foramen of Monro
- Superior temporal gyrus
- Middle temporal gyrus
- Choroid plexus
- Superior sagittal sinus

Brain
Axial T2



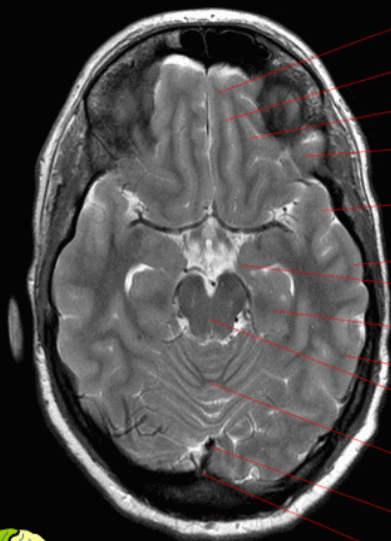
- Superior sagittal sinus
- Superior frontal gyrus
- Middle frontal gyrus
- Inferior frontal gyrus
- Lateral sulcus
- Insula
- Third ventricle
- Superior temporal gyrus
- Middle temporal gyrus
- Inferior temporal gyrus
- Occipital horn of lateral ventricle
- Straight sinus
- Calcarine sulcus
- Superior sagittal sinus

Brain
Axial T2

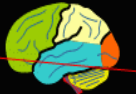


- Superior frontal gyrus
- Middle frontal gyrus
- Inferior frontal gyrus
- Lateral sulcus
- Superior temporal gyrus
- Middle temporal gyrus
- Midbrain
- Inferior temporal gyrus
- Vermis
- Superior sagittal sinus

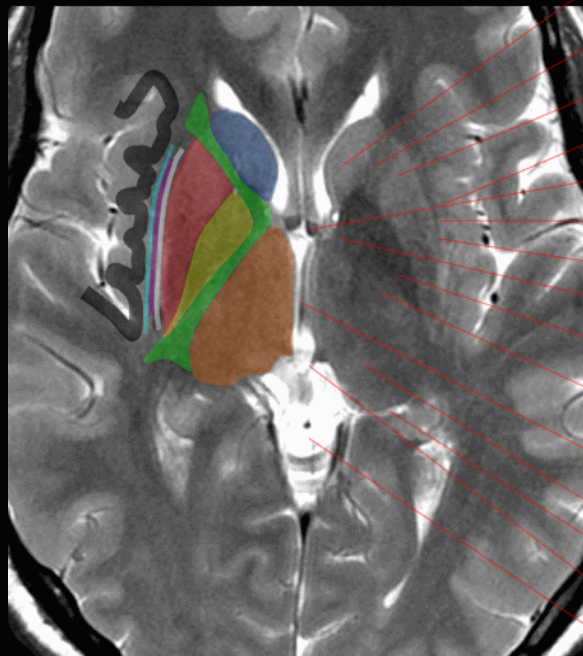
Brain
Axial T2



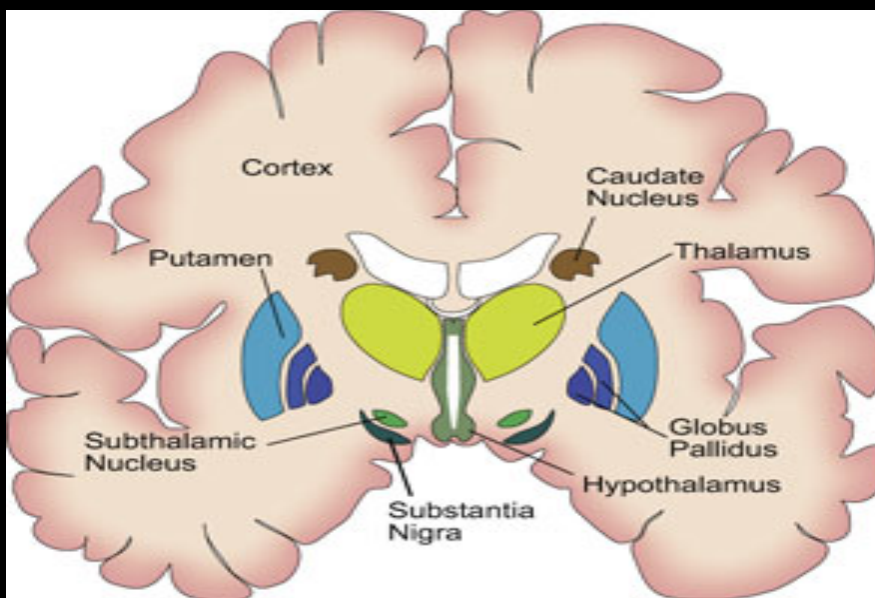
- Olfactory sulcus
- Inferior frontal gyrus
- Superior temporal gyrus
- Middle temporal gyrus
- Uncus
- Parahippocampal gyrus
- Inferior temporal gyrus
- Midbrain
- Vermis
- Superior sagittal sinus



Brain
Axial T2



- Caudate nucleus
- Internal capsule (anterior limb)
- Putamen
- Extreme capsule
- Column of fornix
- Clastrum
- External capsule
- Internal capsule (genu)
- Globus pallidus
- Internal capsule (posterior limb)
- Third ventricle
- Thalamus
- Posterior commissure



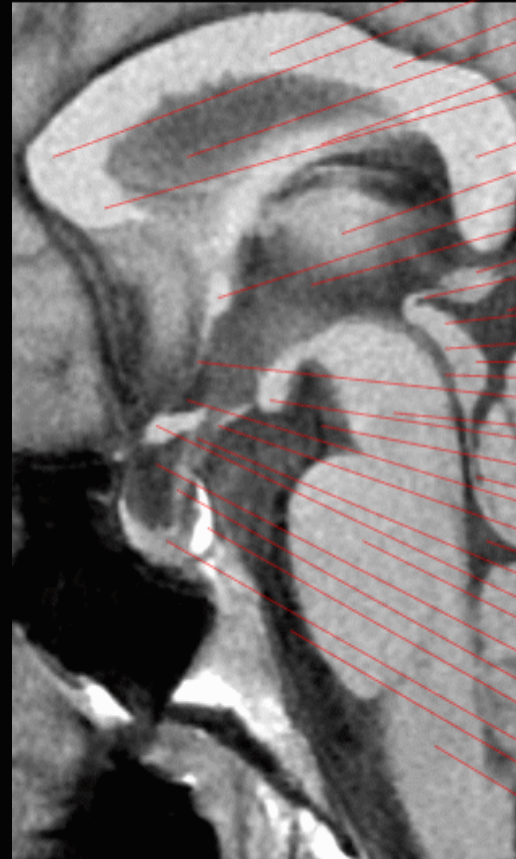


Brain Sagittal T1



- Superior sagittal sinus
- Frontal lobe
- Parietal lobe
- Corpus callosum
- Parieto-occipital fissure
- Calcarine sulcus
- Cerebellum
- Brainstem
- Spinal cord

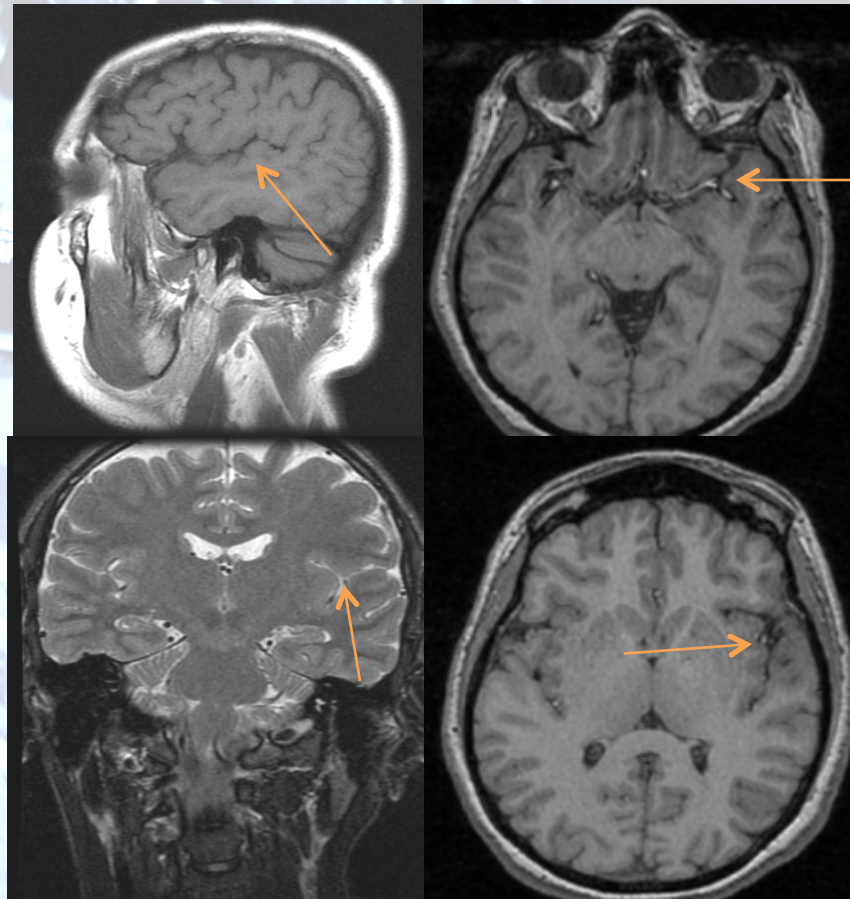
Brain Sagittal T1



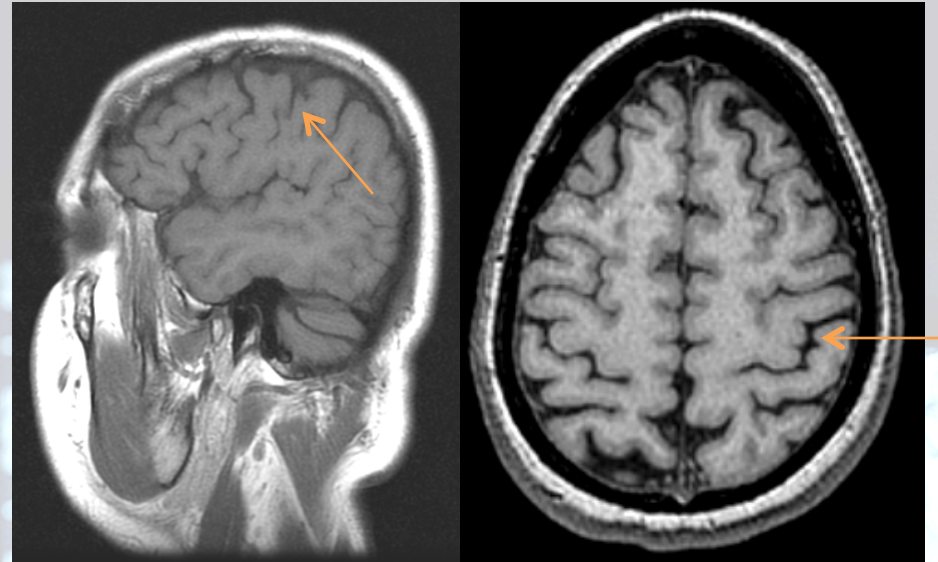
- Corpus callosum (body)
- Corpus callosum (genu)
- Corpus callosum (isthmus)
- Septum pellucidum
- Fornix
- Corpus callosum (rostrum)
- Corpus callosum (splenium)
- Thalamus
- Anterior commissure
- Third ventricle
- Pineal gland
- Posterior commissure
- Quadrigeminal cistern
- Superior colliculus
- Quadrigeminal plate
- Inferior colliculus
- Cerebral aqueduct
- Lamina terminalis
- Midbrain
- Mamillary body
- Interpeduncular cistern
- Superior medullary velum
- Supraoptic recess
- Tuber cinereum
- Fourth ventricle
- Infundibular recess
- Optic chiasm
- Pons
- Suprasellar cistern
- Infundibulum
- Neurohypophysis
- Adenohypophysis
- Prepontine cistern
- Medulla oblongata

Multiplane correlation

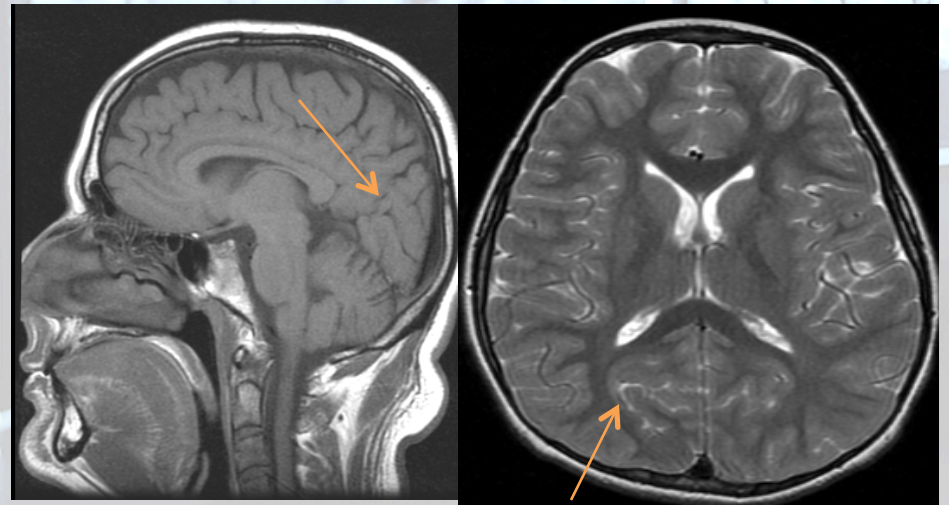
Sylvian fissure



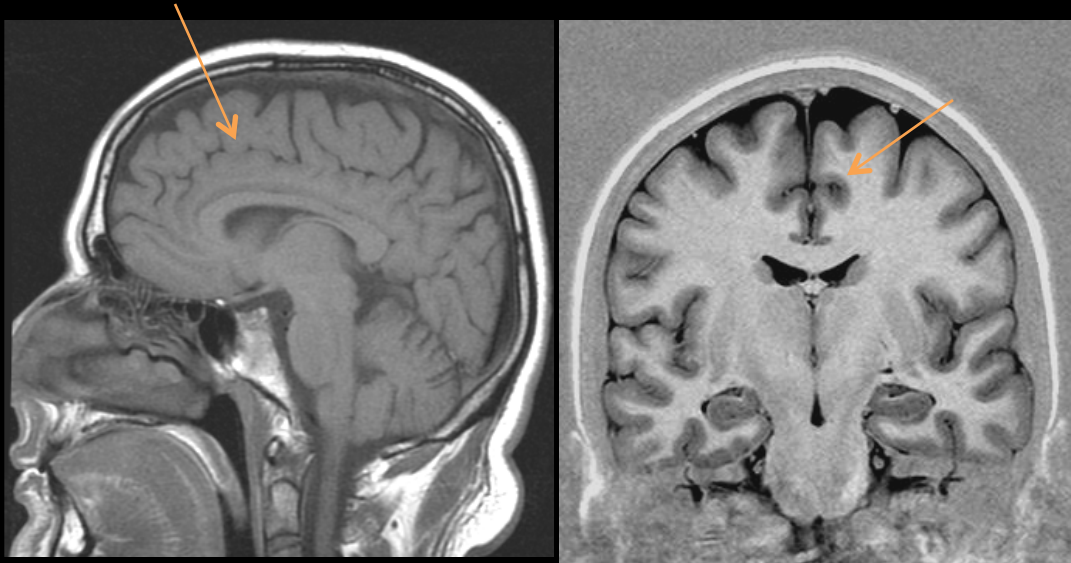
Central (Rolandic) fissure



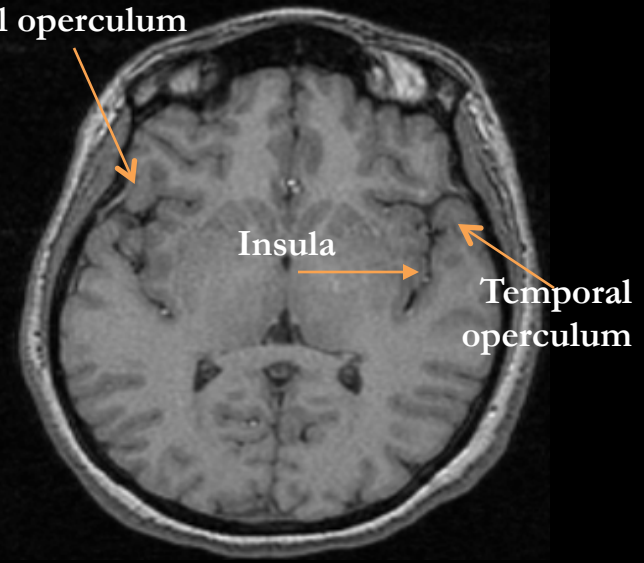
Parieto-occipital fissure



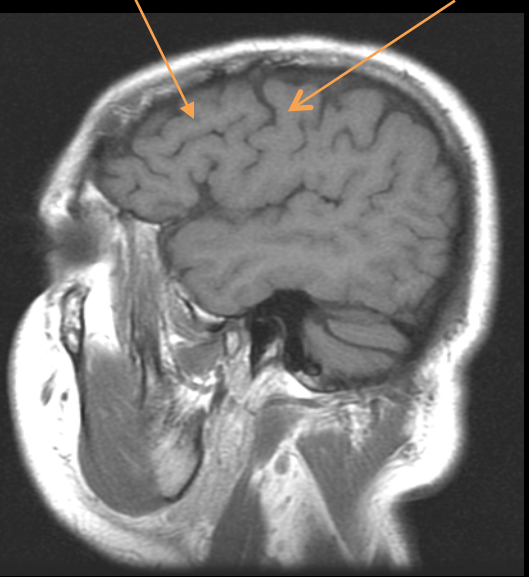
Cingulate Sulcus



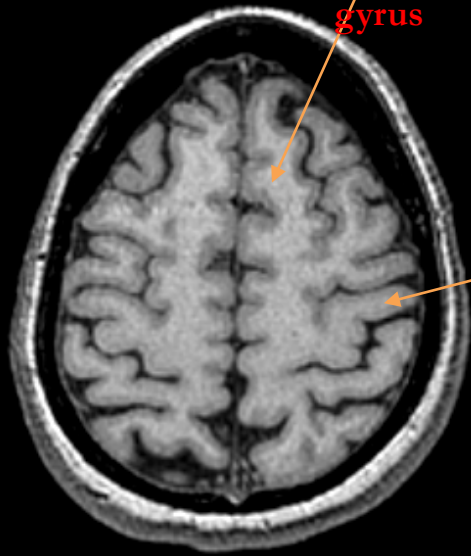
frontal operculum



Superior frontal gyrus (SuFrG)
Pre central gyrus

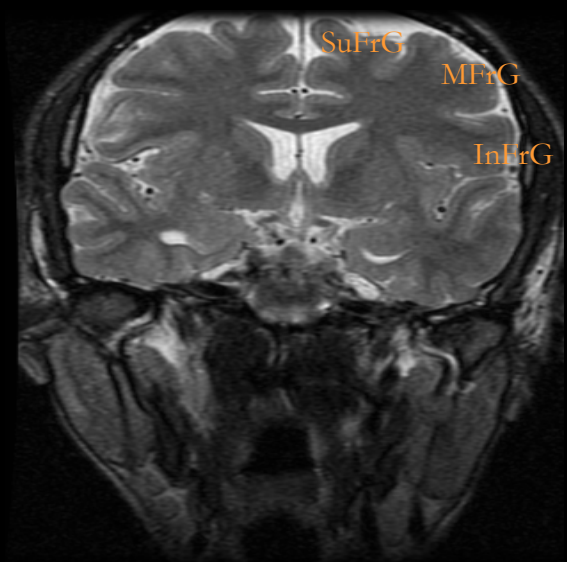


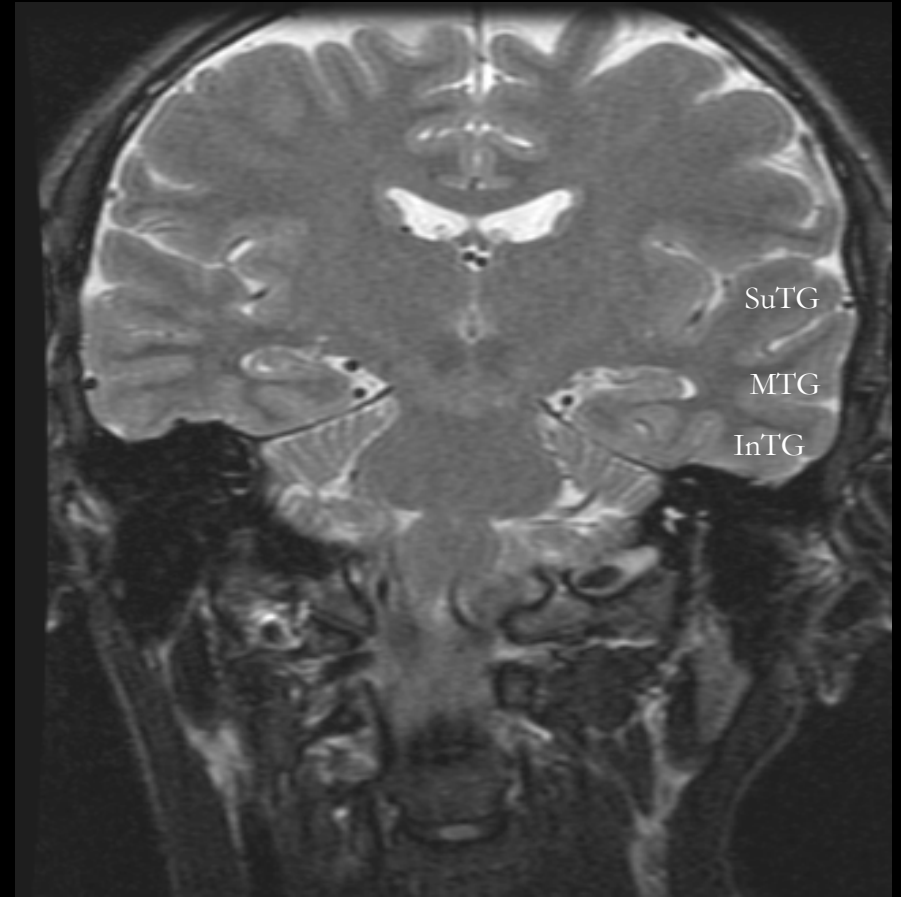
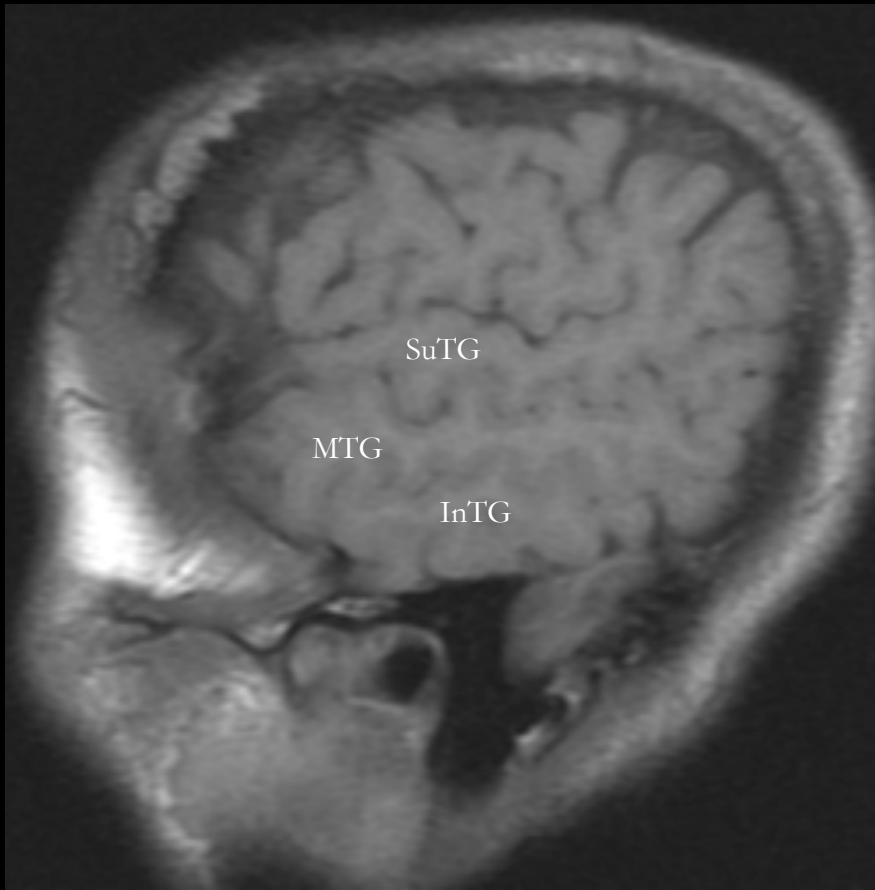
Superior frontal gyrus



Pre central gyrus

Frontal operculum has speech area (barc's & wenrkins)



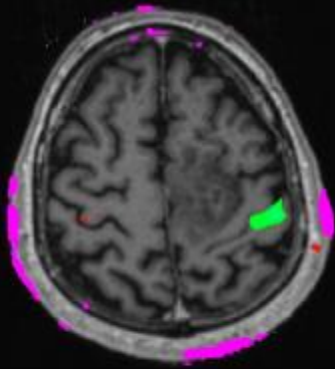


SuTG : superior temporal gyrus

MTG : middle temporal gyrus

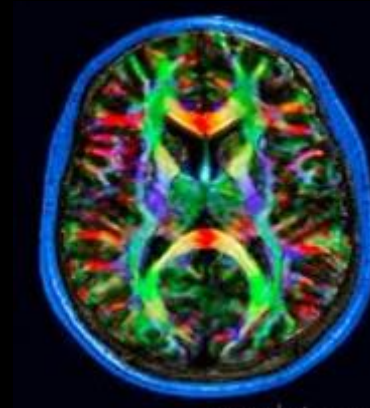
InTG: inferior temporal gyrus

Functional MRI



Diffusion Tensor Imaging DTI

- Images the fluid\H2o movement
- Different colors identify their directions
- Functional data

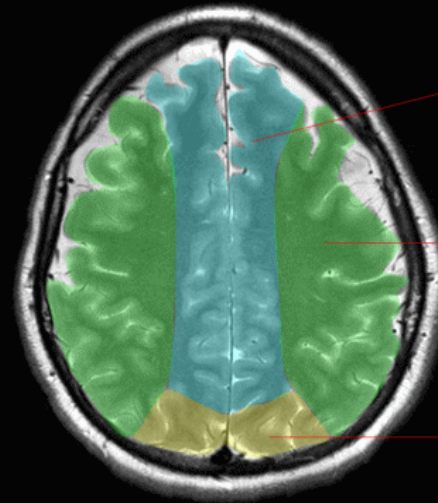


Brain (Arterial territories) Axial T2

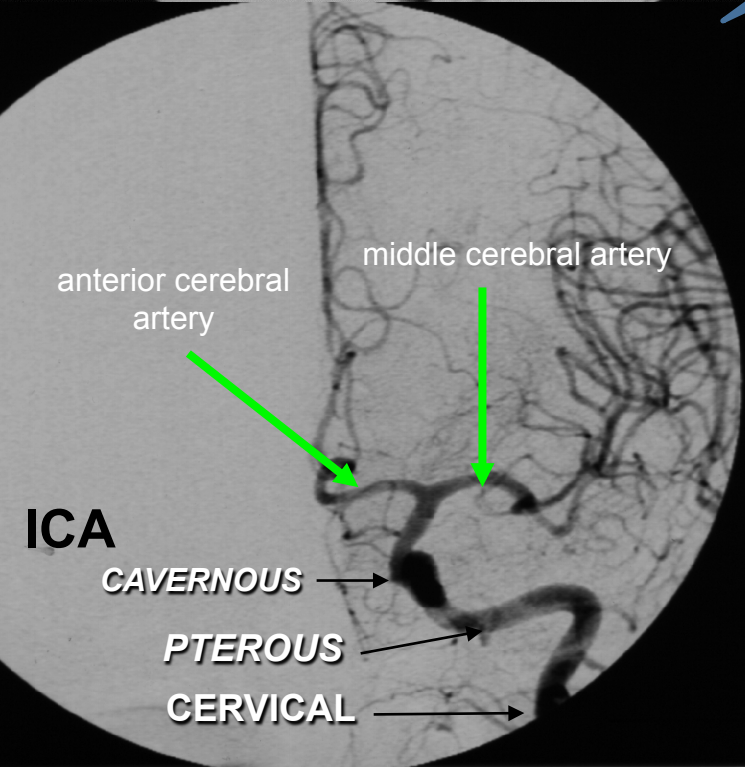
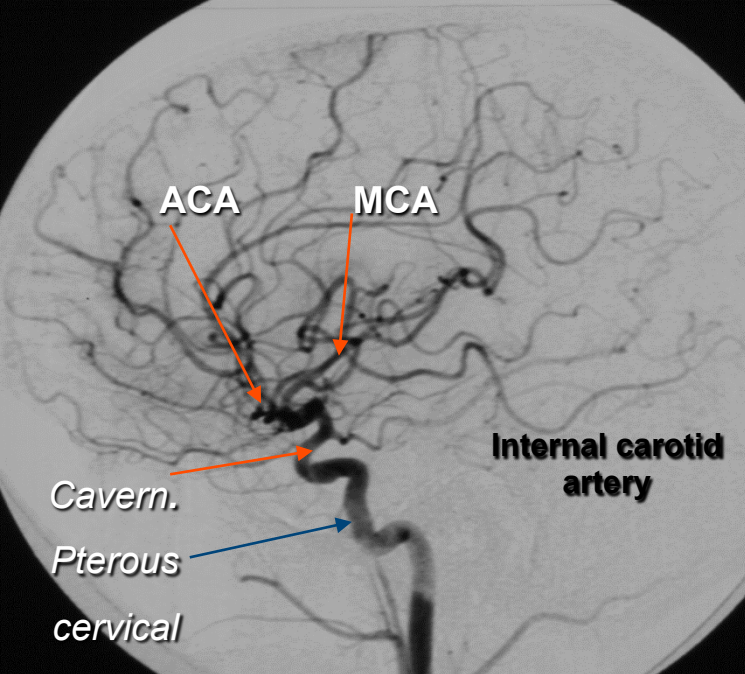


- Anterior cerebral artery
- Anterior choroidal artery
- Middle cerebral artery
- Basilar perforating arteries
- Superior cerebellar artery
- Posterior cerebral artery

Brain (Arterial territories) Axial T2

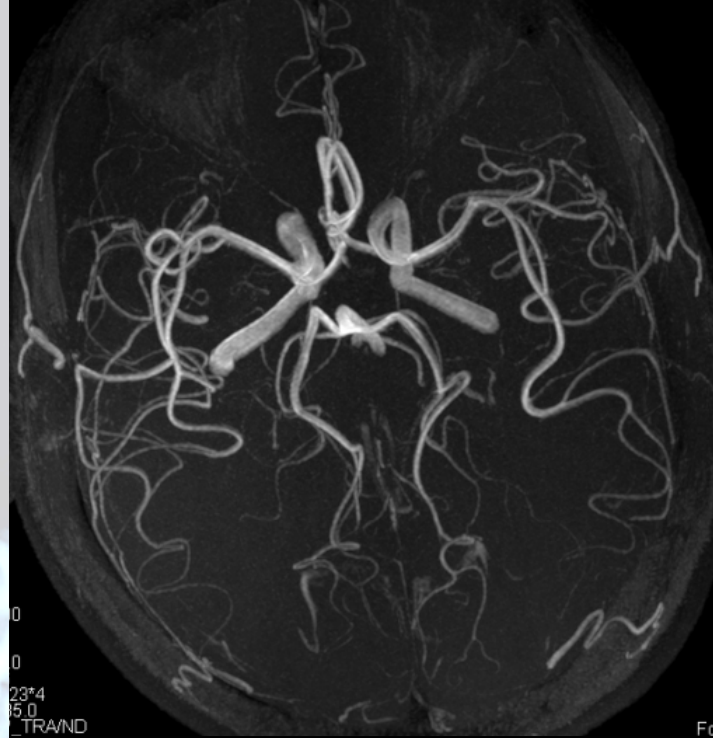


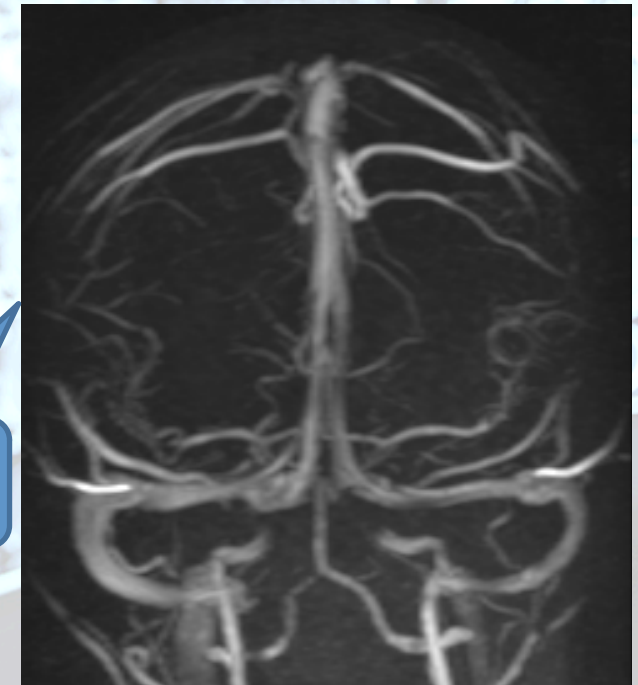
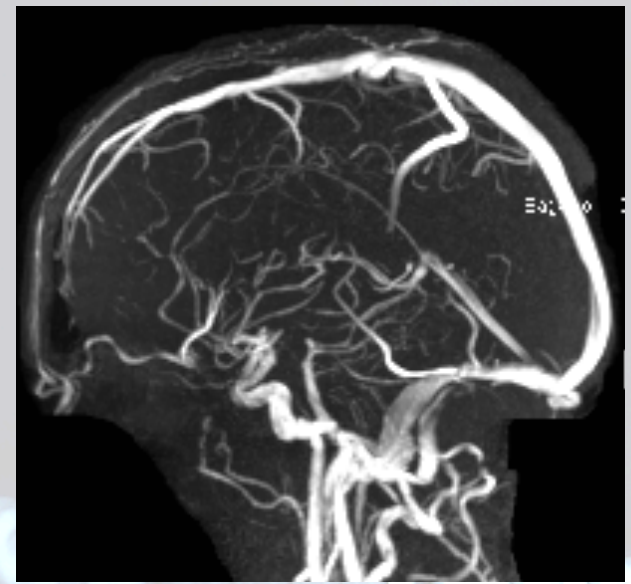
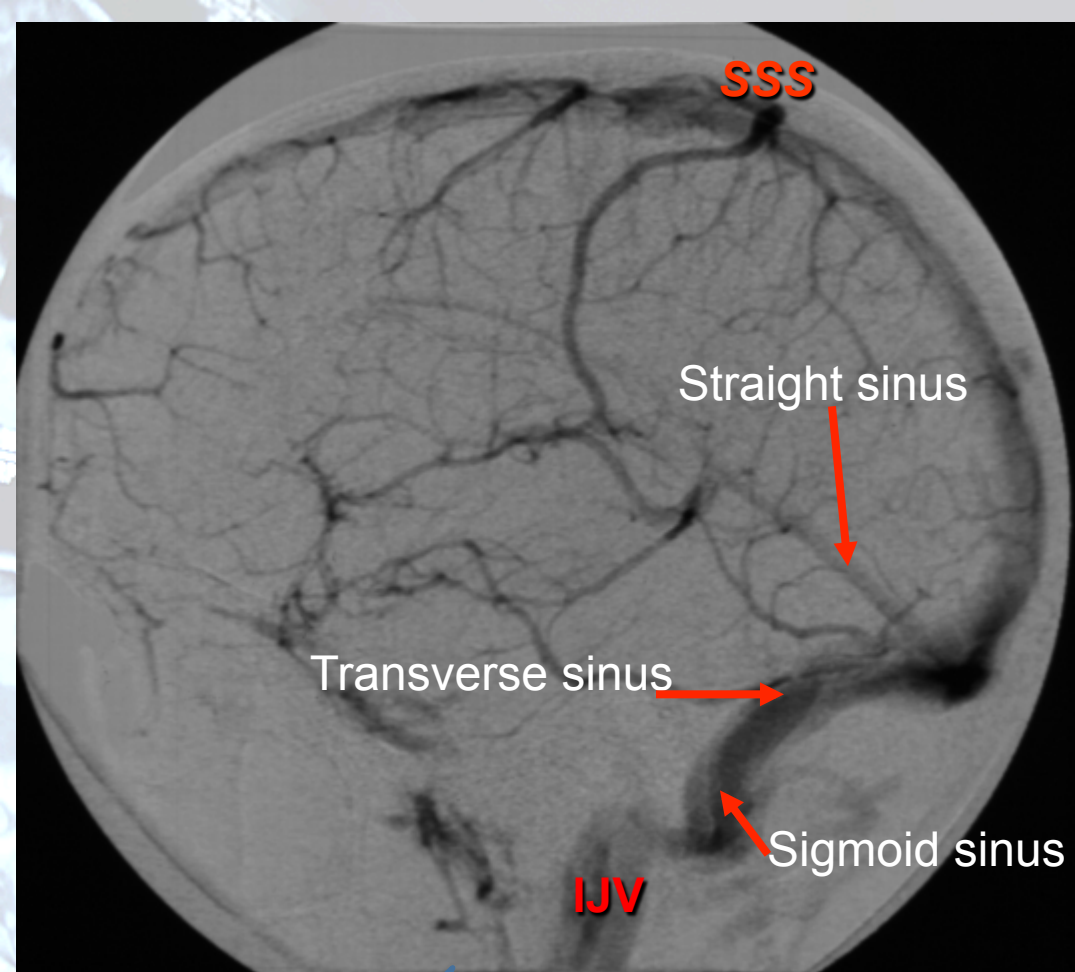
- Anterior cerebral artery
- Middle cerebral artery
- Posterior cerebral artery



Catheter
Angiogram

MR
Angiogram

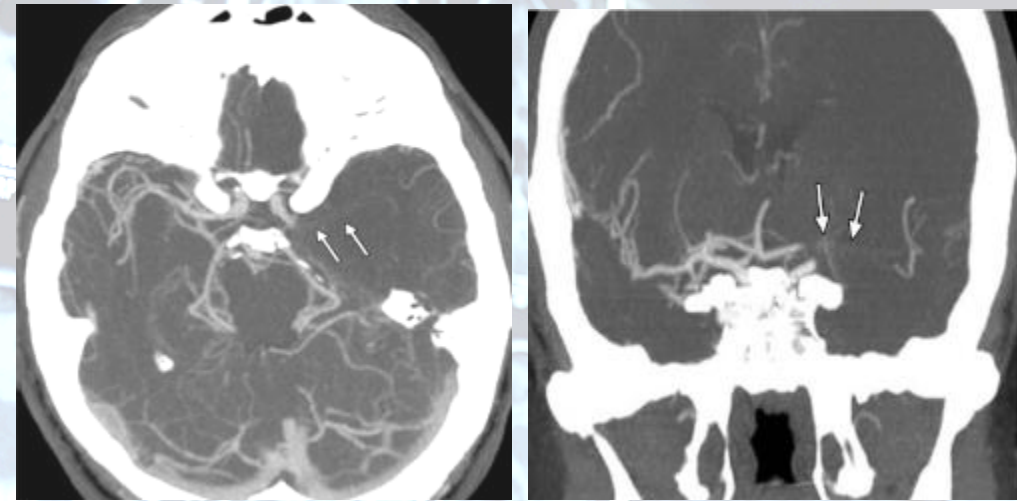




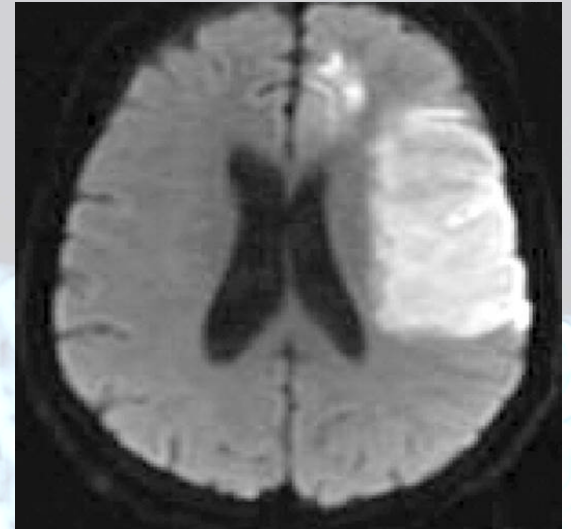
Catheter
Angiogram

MR
Angiogram

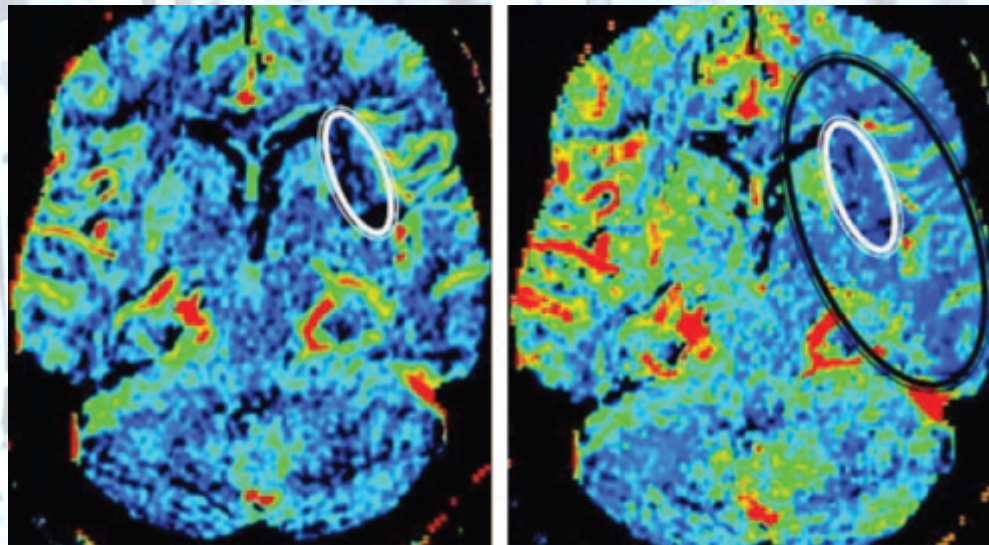
CT angiogram



MRI (diffusion scan)



MRI (perfusion scan)



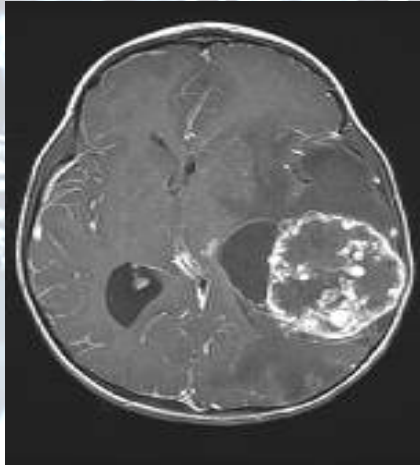
- Beyond anatomy

Damage to:

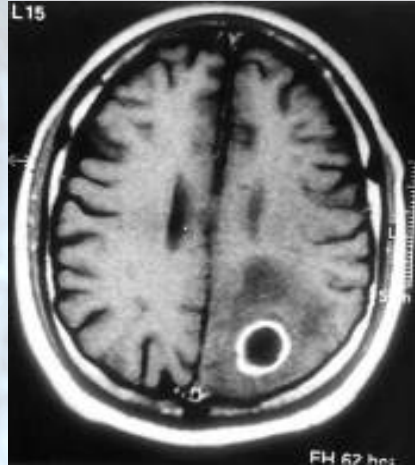
Internal capsule: paralysis in both body and head

Pyramidal tract : paralysis to contralateral side of body

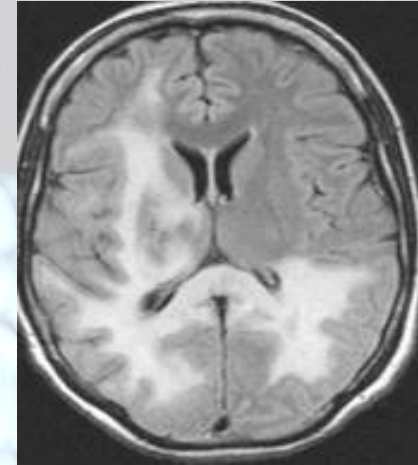
Tumor



Abscess



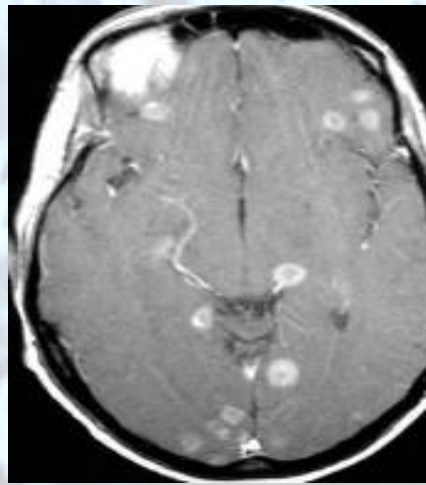
Infection



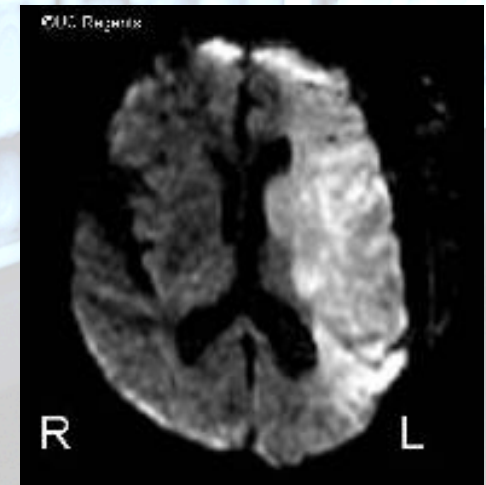
Malformation



Metastasis



Infarction



Questions :

Q1: Ionizing Radiation, Quick (2-3min), Low resolution, Single plane features of

1. MRI
2. CT SCAN
3. X-RAY
4. NON

Q2- No ionizing radiation, Lengthy (15-20min), High resolution, Multiple planes FEATURES OF :

1. MRI
2. CT SCAN
3. X-RAY
4. NON

Q3- Sylvian fissure is between :

1. temporal & frontal
2. temporal & occipital
3. frontal & parietal
4. parietal & occipital

Q4- Central (Rolandic) fissure is between :

1. temporal & frontal
2. temporal & occipital
3. frontal & parietal
4. parietal & occipital

Q5- Parieto-occipital fissure is between :

1. temporal & frontal
2. temporal & occipital
3. frontal & parietal
4. parietal & occipital

Q6: MRI the color of the bone is

1. Black
2. White
3. Grey
4. Non

Q 7: CT scan the color of bone is :

1. black
2. White
3. Grey
4. Non

Ans: Q1:2 Q2:1 Q3:1 Q4:3 Q5:4 Q6:1 Q7:2

Practical :

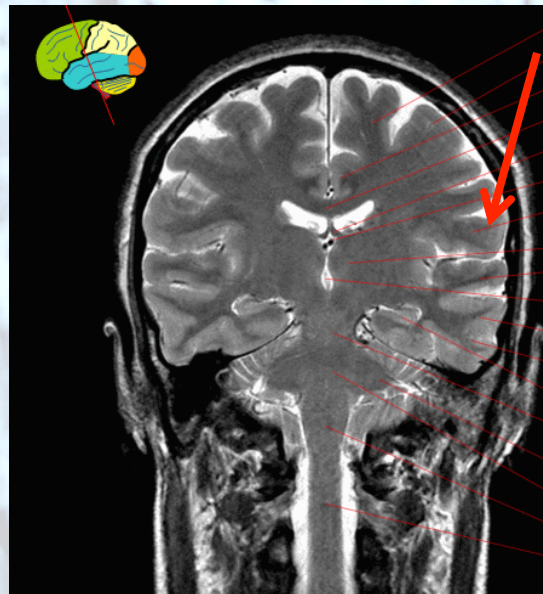
Q8: Lesion in this area could mostly affect :

1. Sensation in the face.
2. Motor activity in the trunk and part of lower limb.



Q9: In case of lesion in precentral gyrus in this area :

1. Face is spared.
2. Lower limb is spared.



Ans: Q8:2 Q9:2

We really hope that we made it easy and informative ,,

Done By :

Faisal S. AlGhamdi

Falwah AlHarthi

Barah AlQarni

Afnan AlMutawa

Munira AlMehsen

Basmah AlDoghaither

Alanoud AlBogami

Revised By :

Faisal S. AlGhamdi

Haifa AlOtaibi

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