

# **Introduction to Neuroradiology**

**Batch -28**

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Ragama



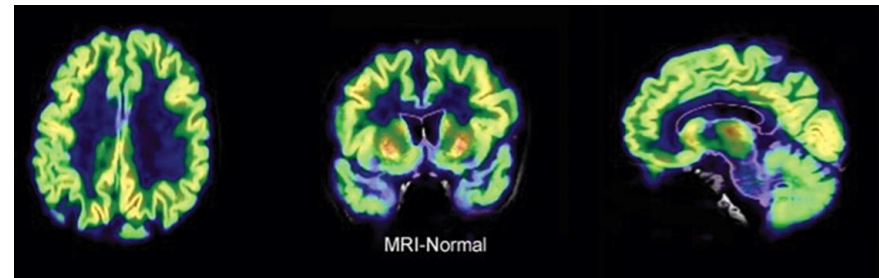
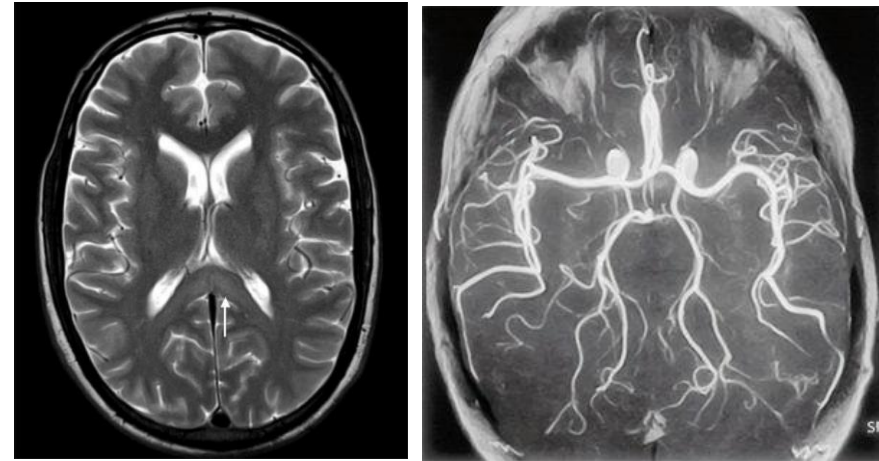
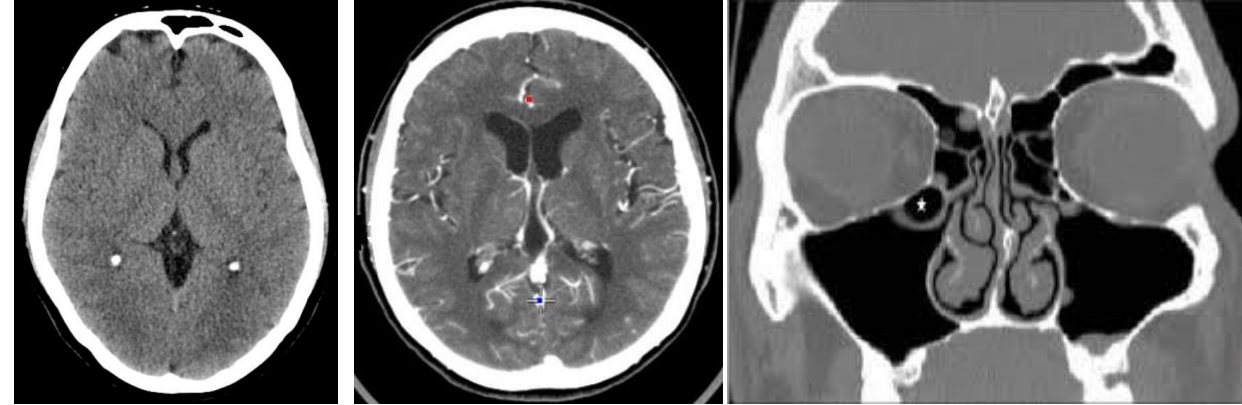
# Radiological modalities in neuroradiology

- Plain radiographs-
  - Skull X ray skull AP/Lat
- Ultrasound brain
  - Useful in infants <12 months  
( Until fontanelles closes)
- Angiogram –Digital subtraction angiogram(DSA)



# Radiological modalities in neuroradiology

- CT brain - contrast ,non contrast CT  
CT angiogram
- MRI brain - contrast ,non contrast, MRI  
angiogram
- Positron emission tomography –PET



# MCQ

- A pregnant mother delivered a baby boy prematurely at 28 /52 of POA. Few hours after baby developed respiratory depression ( Apnoea) and few fitting episodes. An intracranial haemorrhage was suspected.

What is the most appropriate initial radiological modality to detect Intracranial haemorrhage in this patient ?

- A. Skull X Ray lateral view.
- B. Ultrasound brain
- C. CT Brain
- D. MRI brain
- E. PET Scan



# MCQ

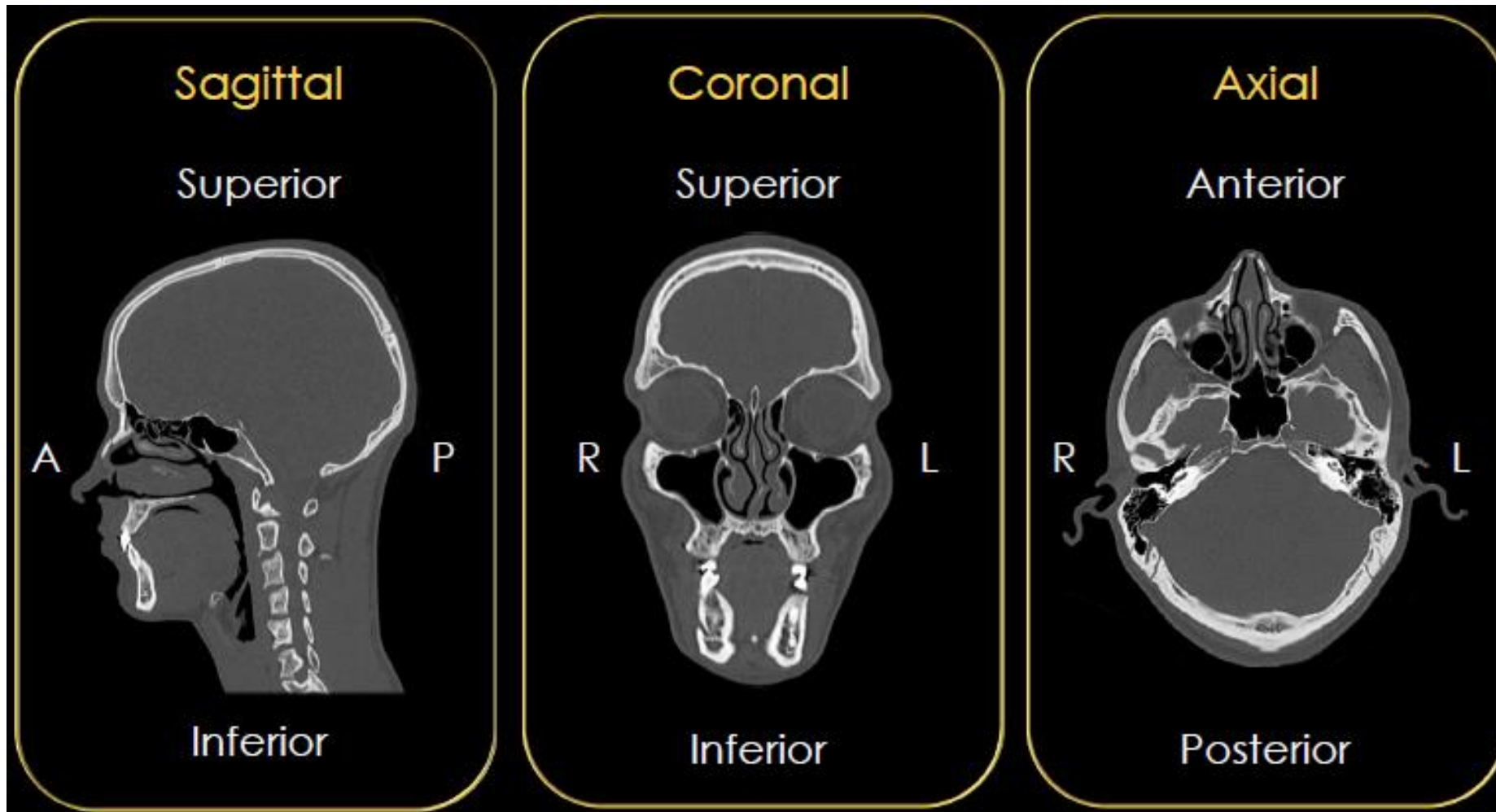
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- Cranial ultrasound provides a **convenient, non-invasive, relatively low-cost screening examination** of the haemodynamically-unstable neonate at the bedside.
- The examination also imparts **no radiation** exposure.
- Sonography is sensitive for the detection of **haemorrhage, periventricular leukomalacia and hydrocephalus**

# Cross sectional views of brain



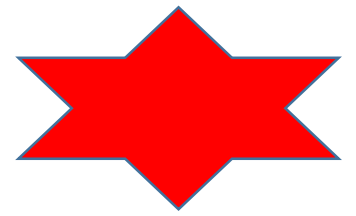
# Introduction to the CT brain -Indications

- **Head injuries-** to see bleeding, brain injury and skull fractures
- Sudden severe **headache** – to see **bleeding** caused by a ruptured or leaking aneurysm
- **CVA (stroke)** - to see infarctions or bleeding within the brain.
- **Brain tumors-** to see extent ,complications
- **Hydrocephalus** - enlarged brain cavities
- **Malformations** of the skull





# Advantages of head CT

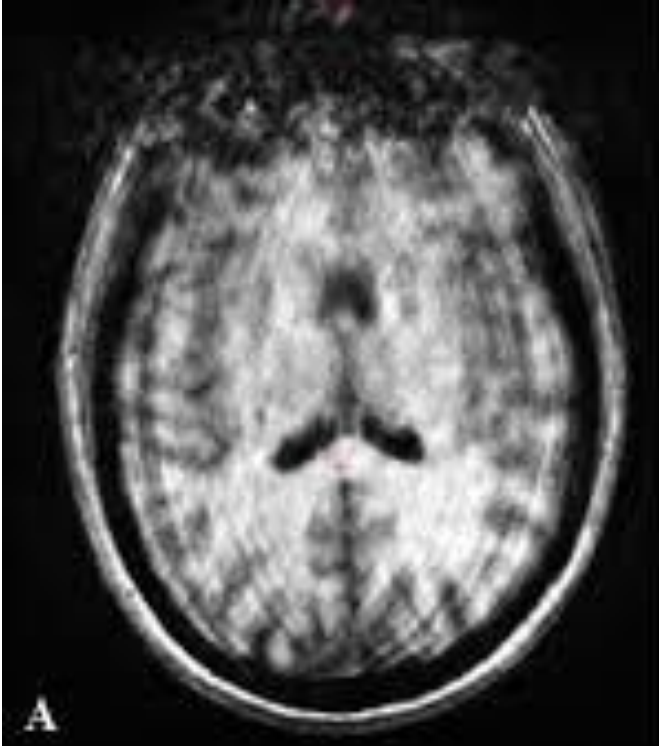


- **CT faster** than MRI -choice in trauma and other acute neurological emergencies
- CT less expensive than MRI
- CT **less sensitive to patient motion** during the examination.( because the imaging can be performed much more rapidly)
- CT may be easier to perform in claustrophobic or very heavy patients
- CT provides detailed evaluation of **cortical bone**
- CT - accurate detection of **calcification and metal foreign** bodies
- CT - implantable **medical devices SAFE** (cardiac pacemakers, ferromagnetic vascular clips, and nerve stimulators)

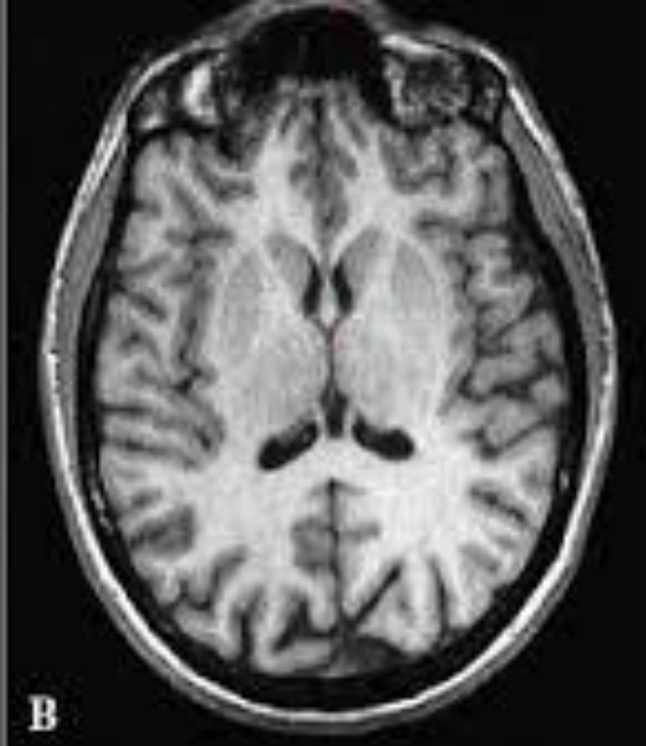




# Motion artifacts



MRI with Motion artifacts



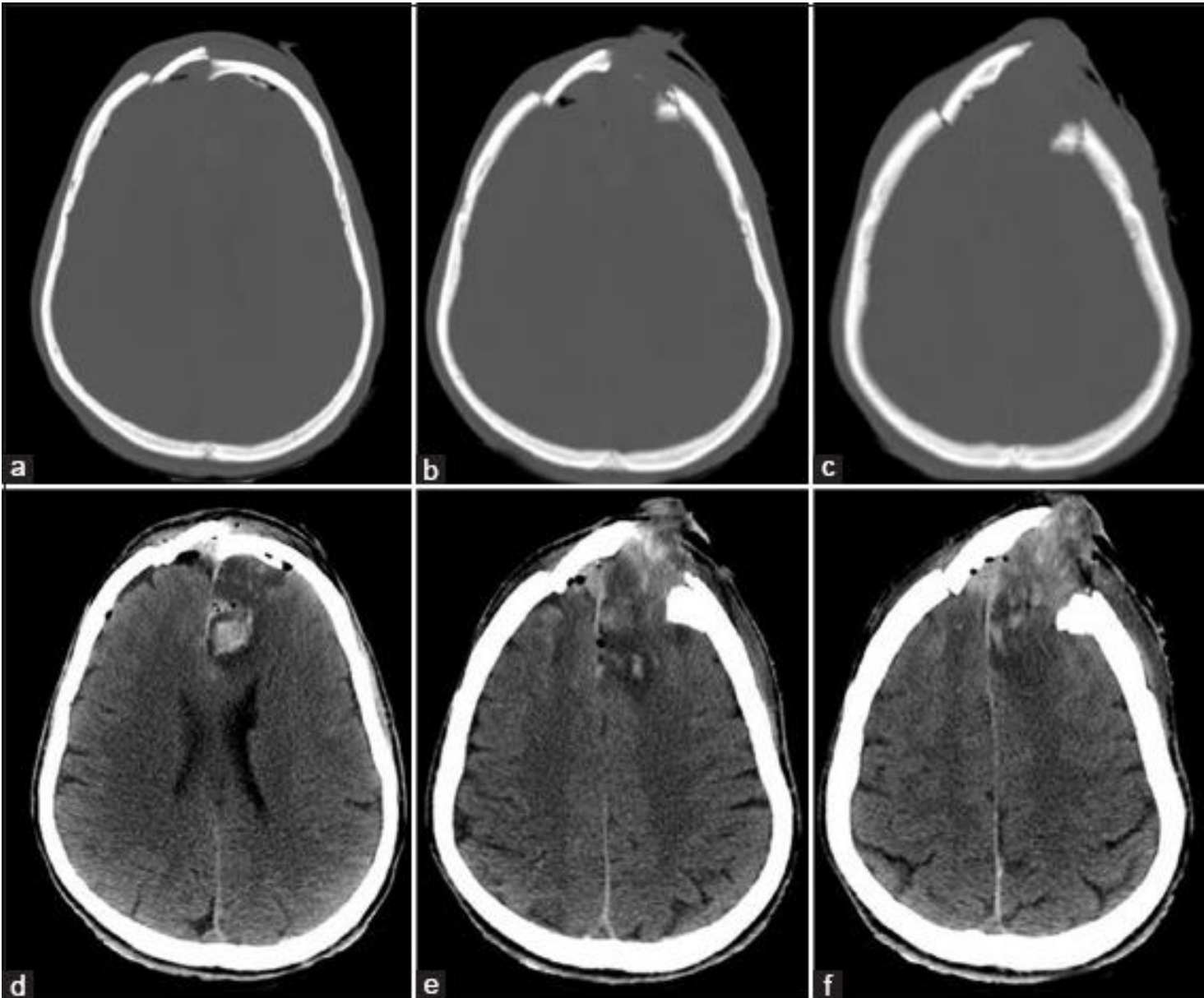
MRI without Motion artifacts



CT with Motion artifacts



# CT Cortical bone

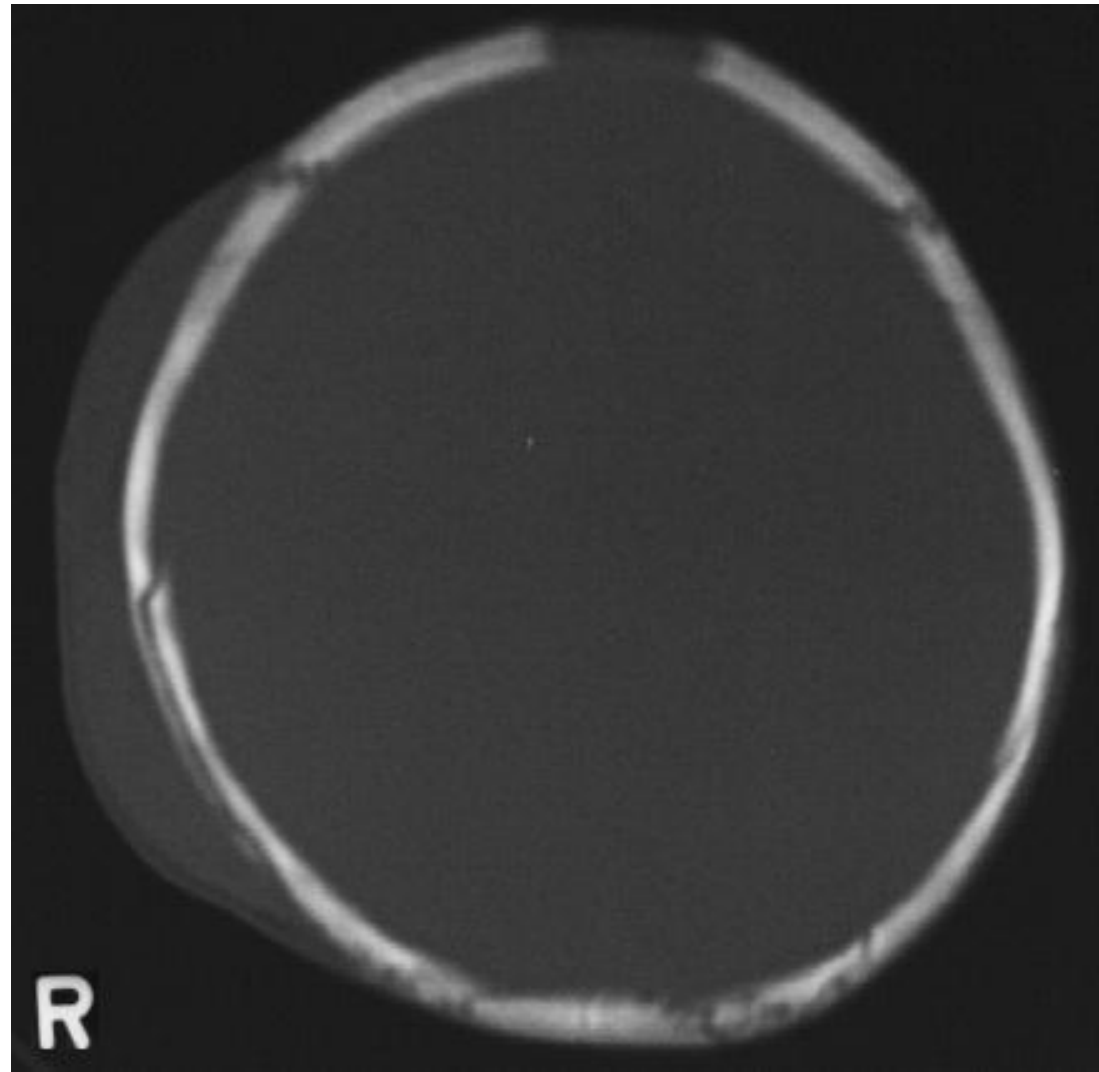
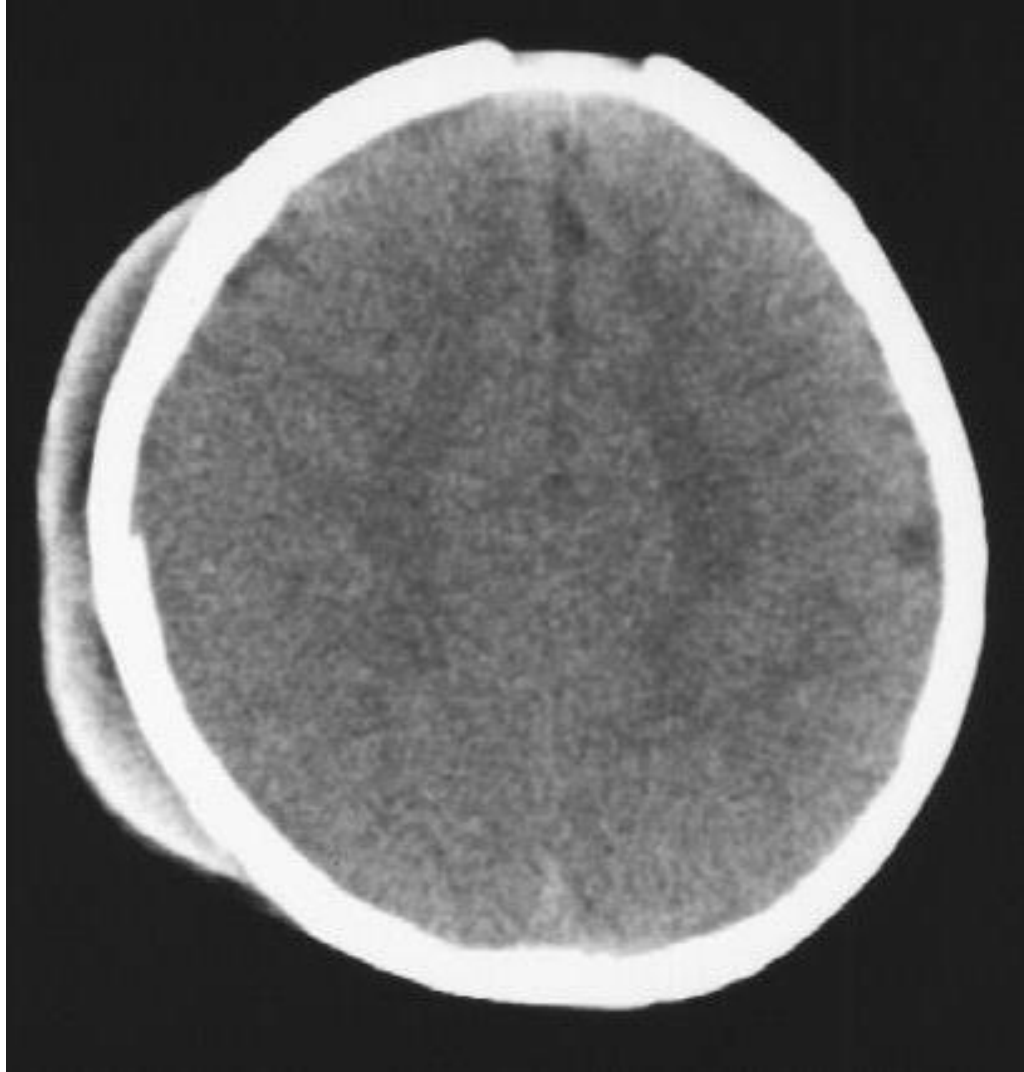


CT Bone window

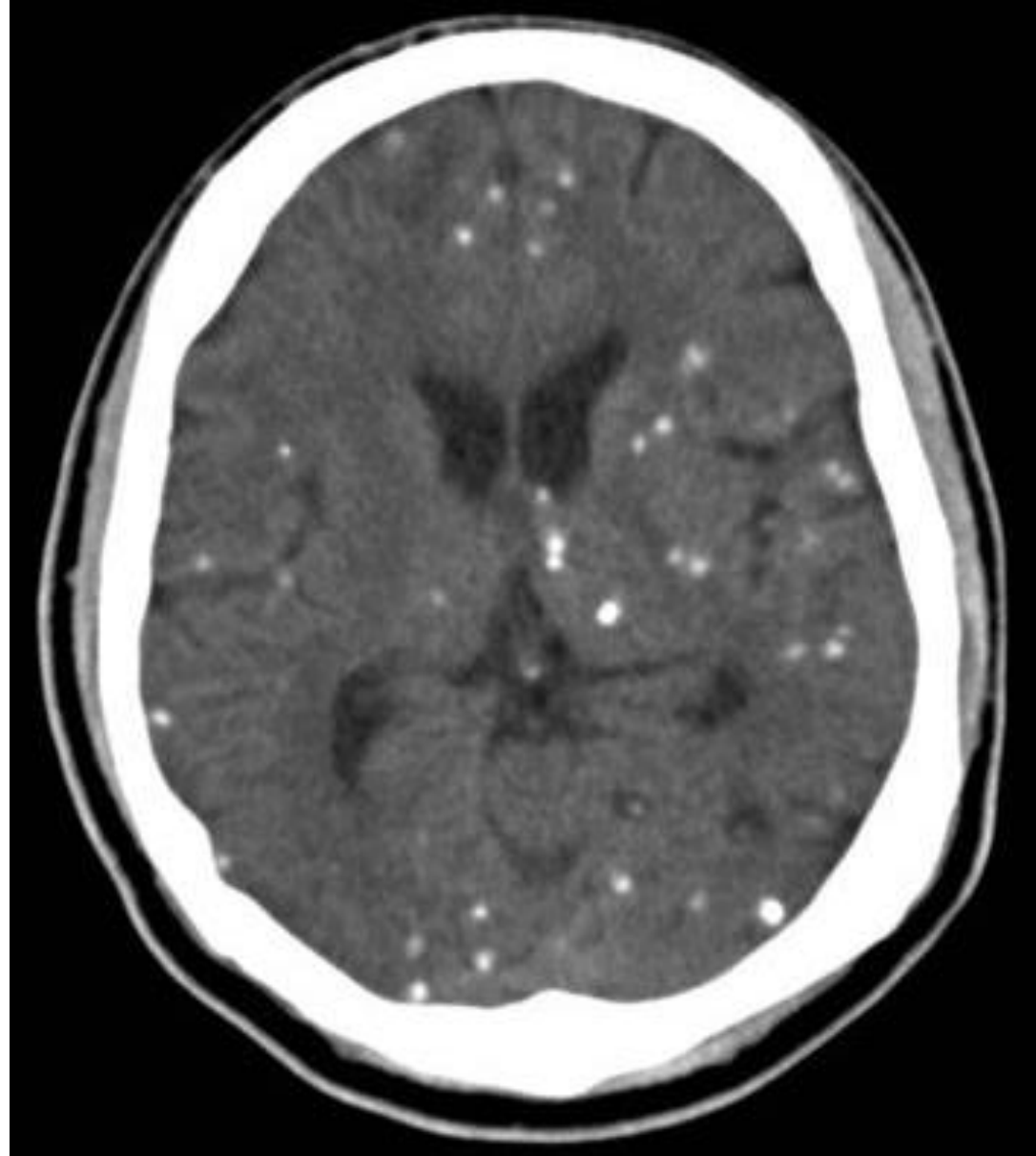
CT soft tissue window



# CT Cortical bone

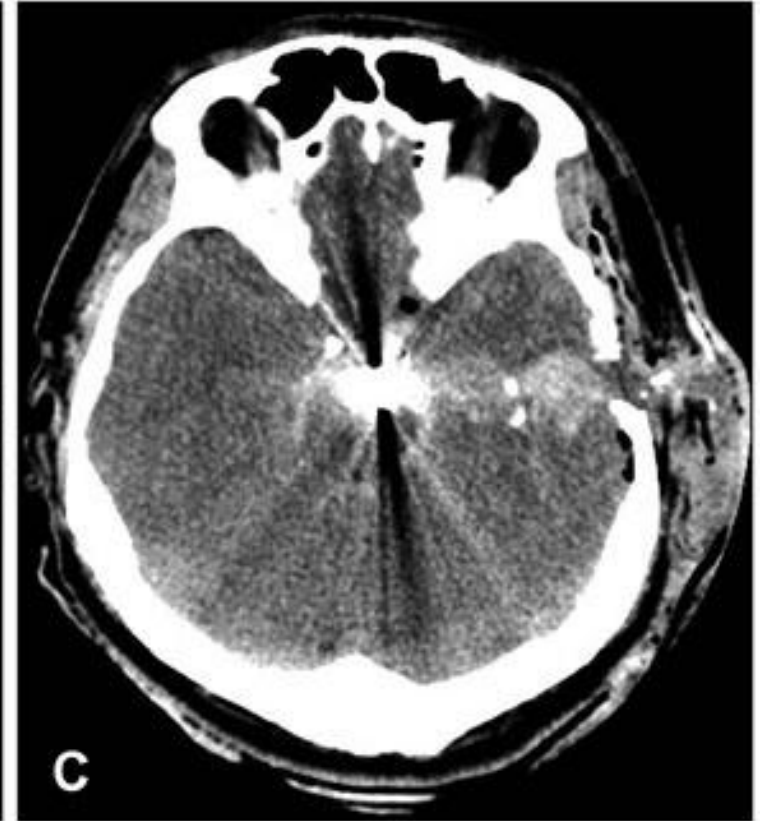
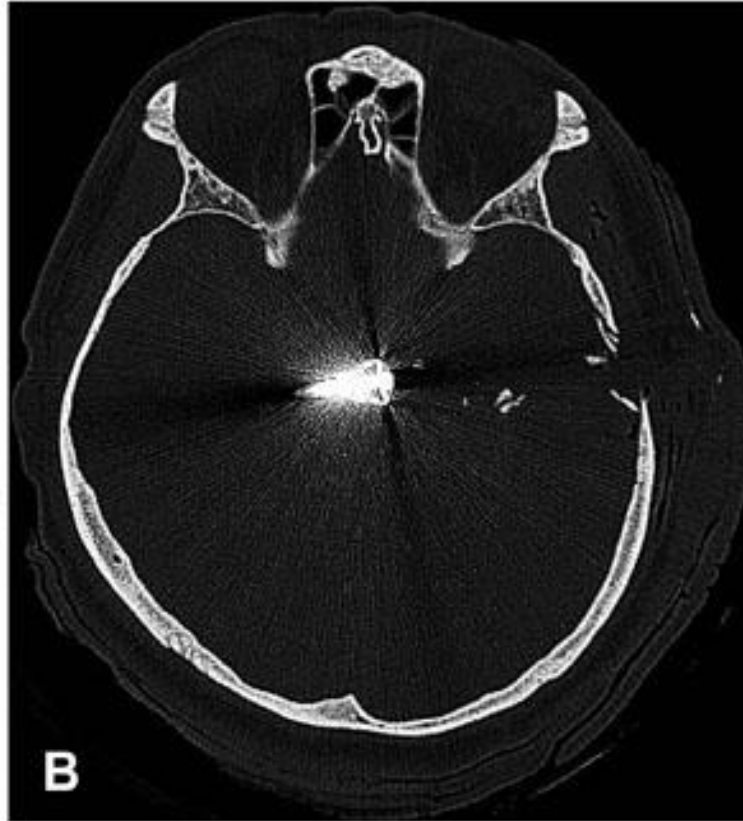
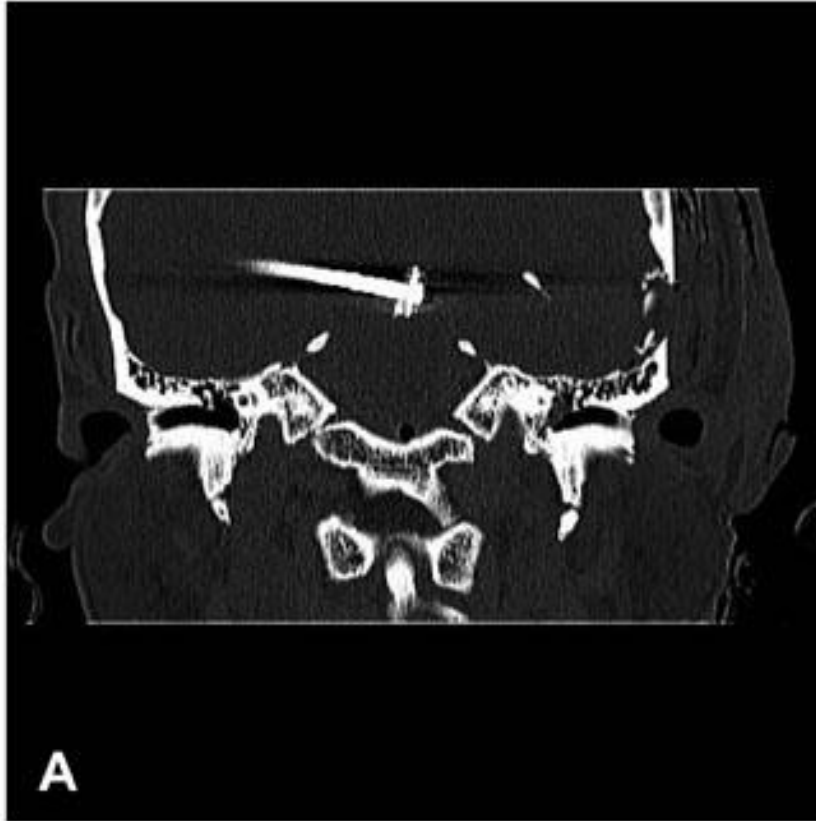


# CT Calcification

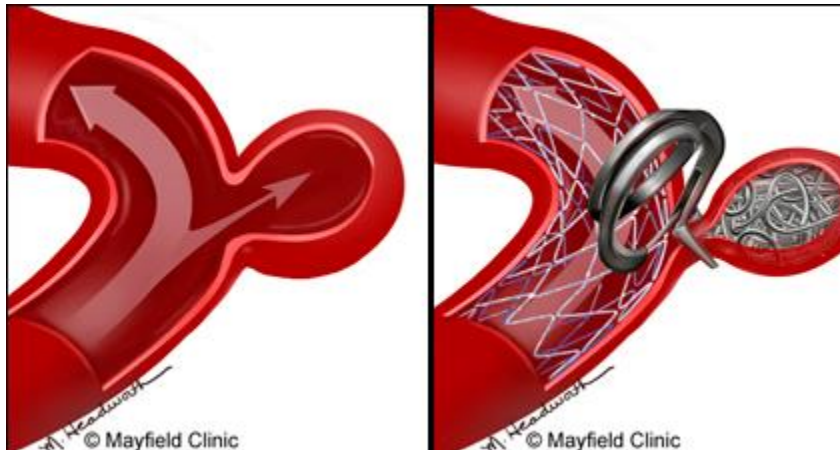
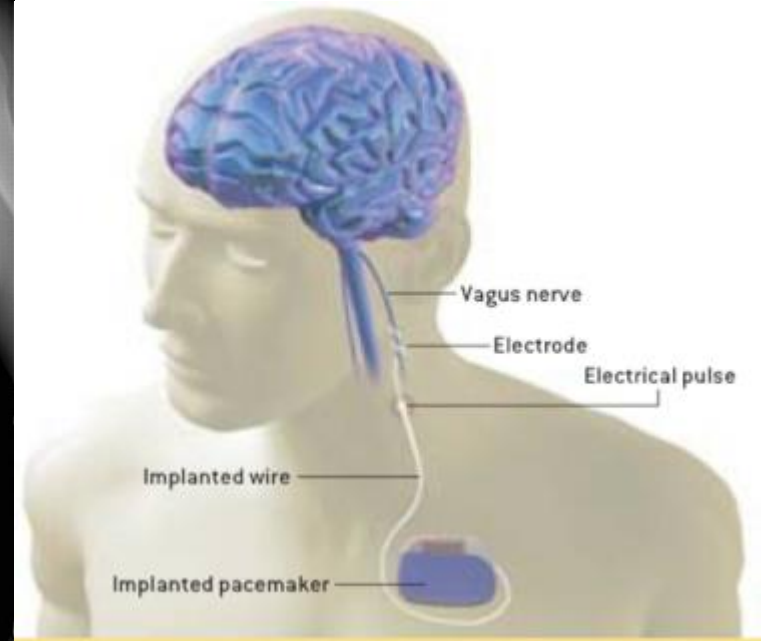
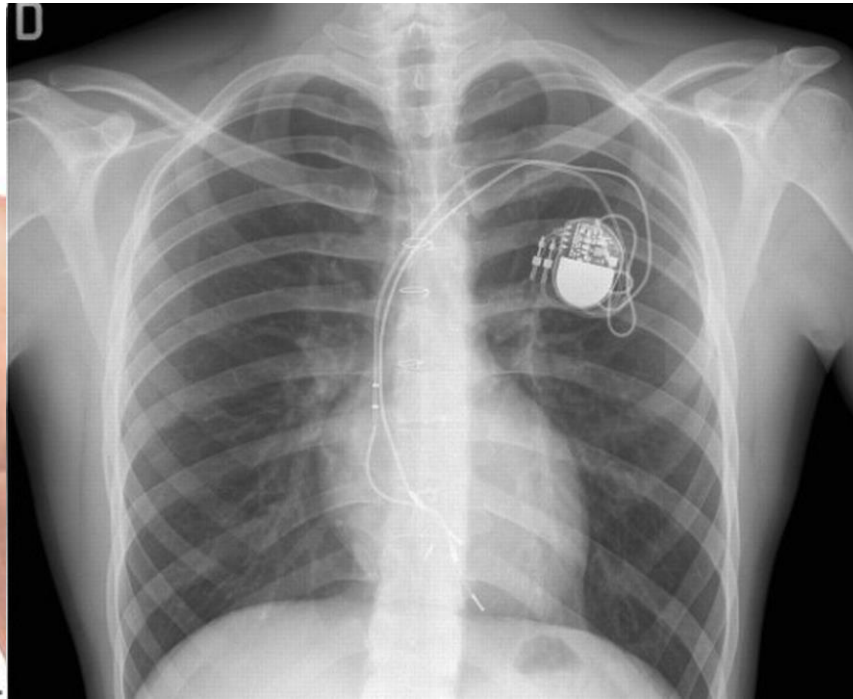
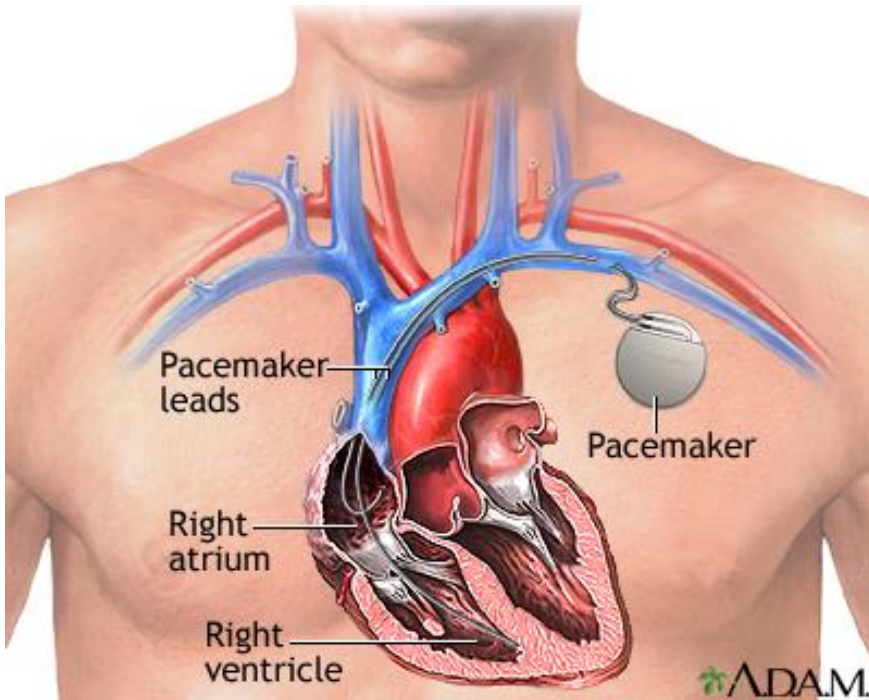




# CT foreign bodies.



# CT – safe with medical devices



# CT Brain- Bright, Dark and Gray rules

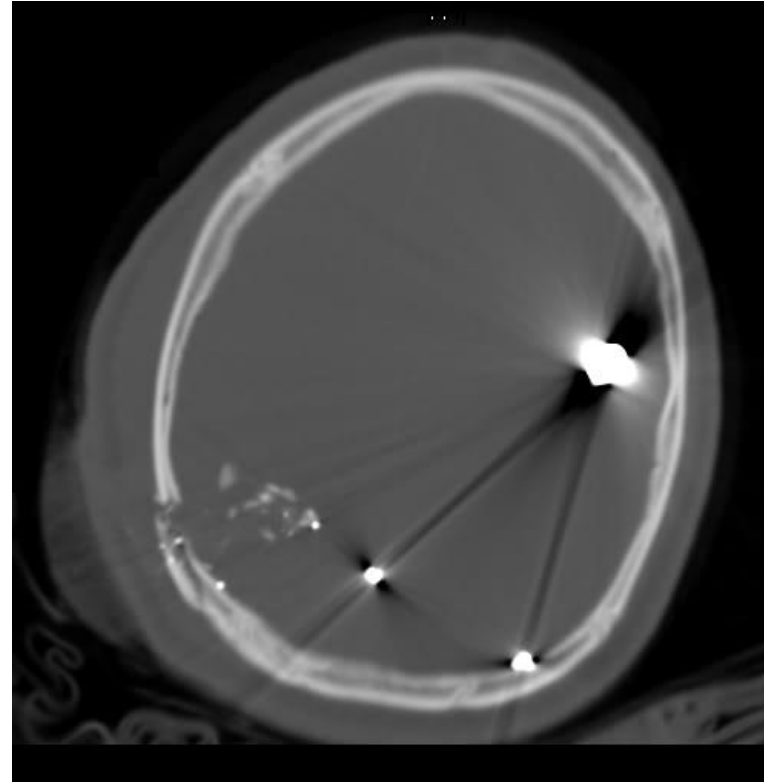
- Bright = High density



**Bone**



**Blood**



**Bullet**



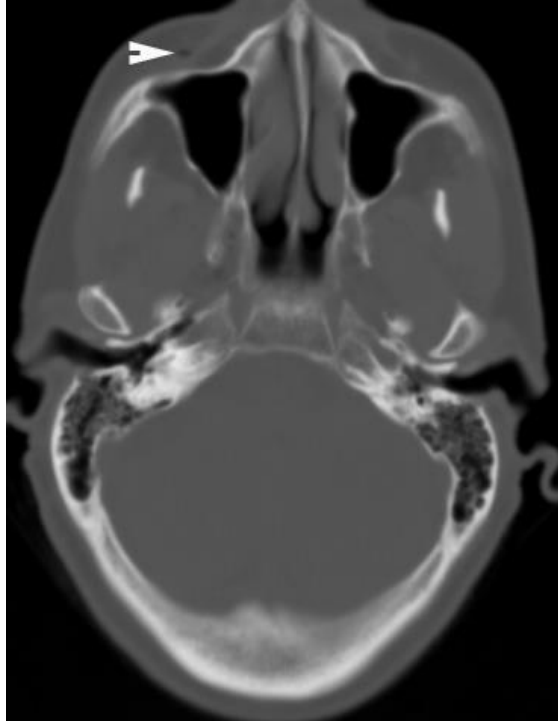


# CT Brain- Bright, Dark and Gray rules

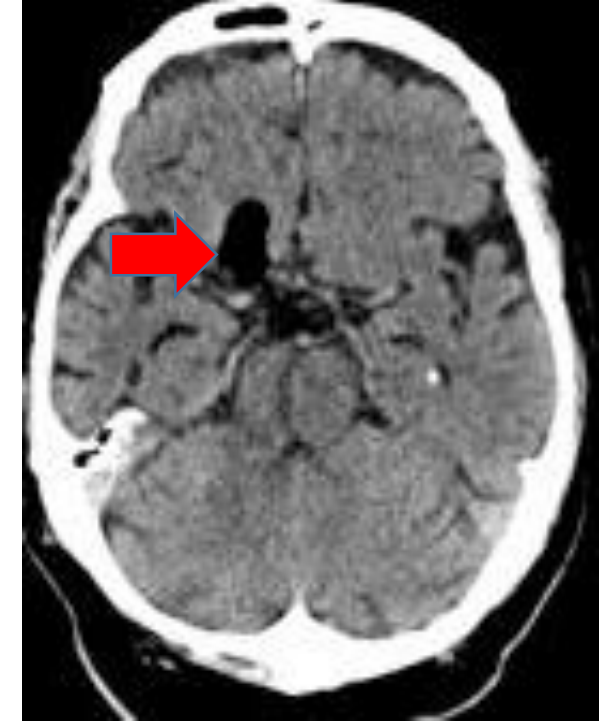
- Dark=Low density



**AIR**



**FLUID**



**FAT**



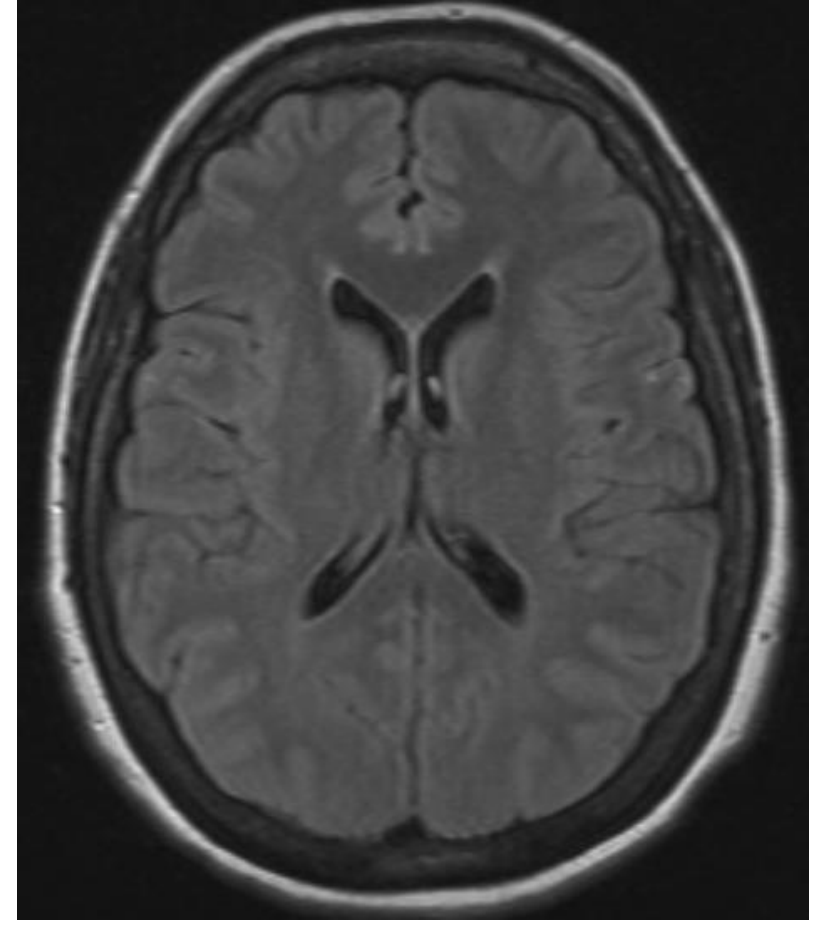
# MRI vs CT : What is MRI ,What is CT



**CT**



**T1 : MRI**



**FLAIR : MRI**

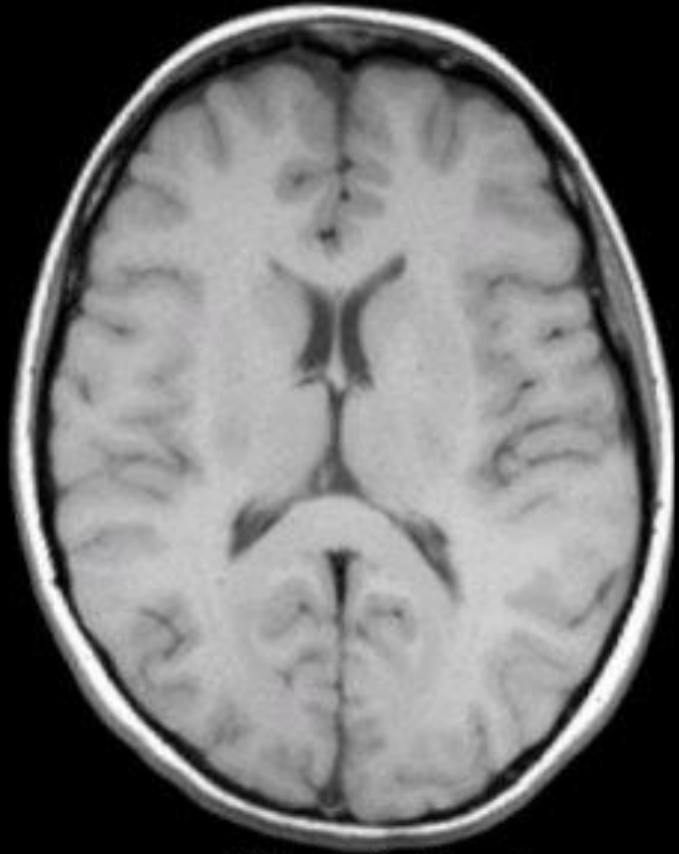


# MRI Brain indications

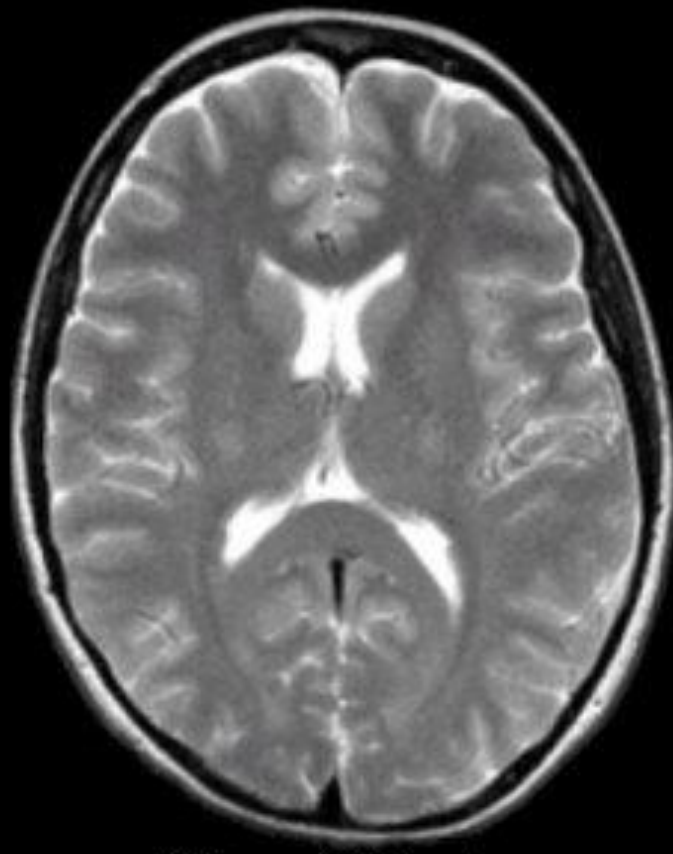
- Brain tumors
- Stroke
- Infections
- Developmental anomalies
- Hydrocephalus — dilatation of fluid spaces within the brain (ventricles)
- Causes of epilepsy (seizure)
- Hemorrhage in selected trauma patients
- Certain chronic conditions, such as multiple sclerosis
- Disorders of the eye and inner ear
- Disorders of pituitary gland
- Vascular problems, such as an aneurysm (a bubble-like expansion of the vessel), arterial occlusion (blockage) or venous thrombosis (a blood clot within a vein)



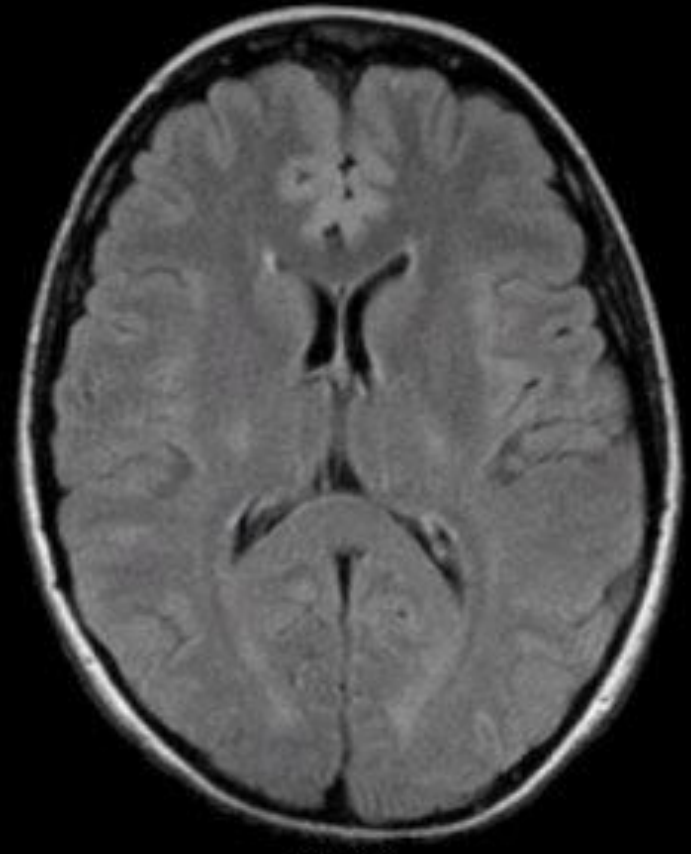
# MRI sequences



T1-weighted



T2-weighted



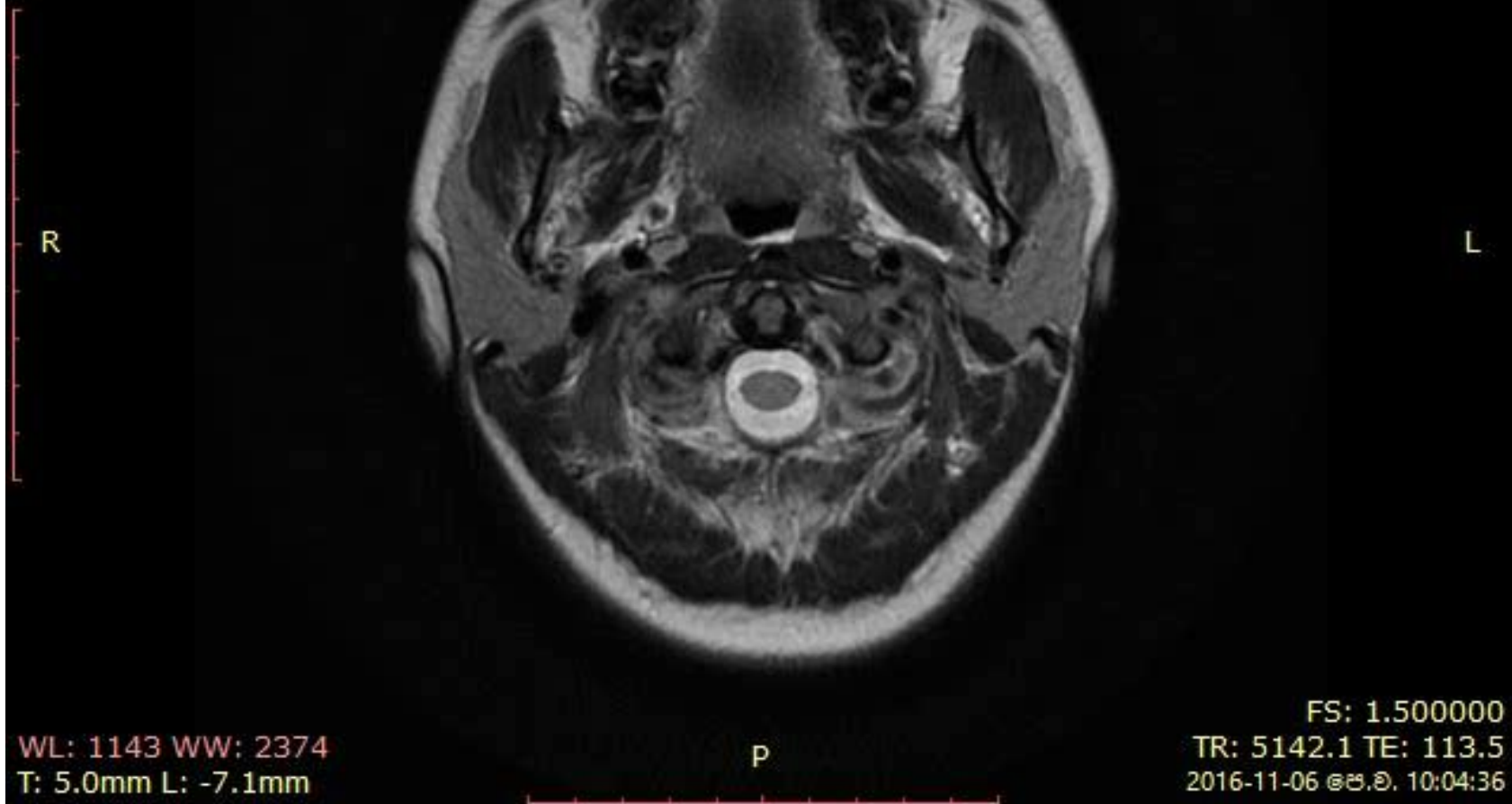
Flair



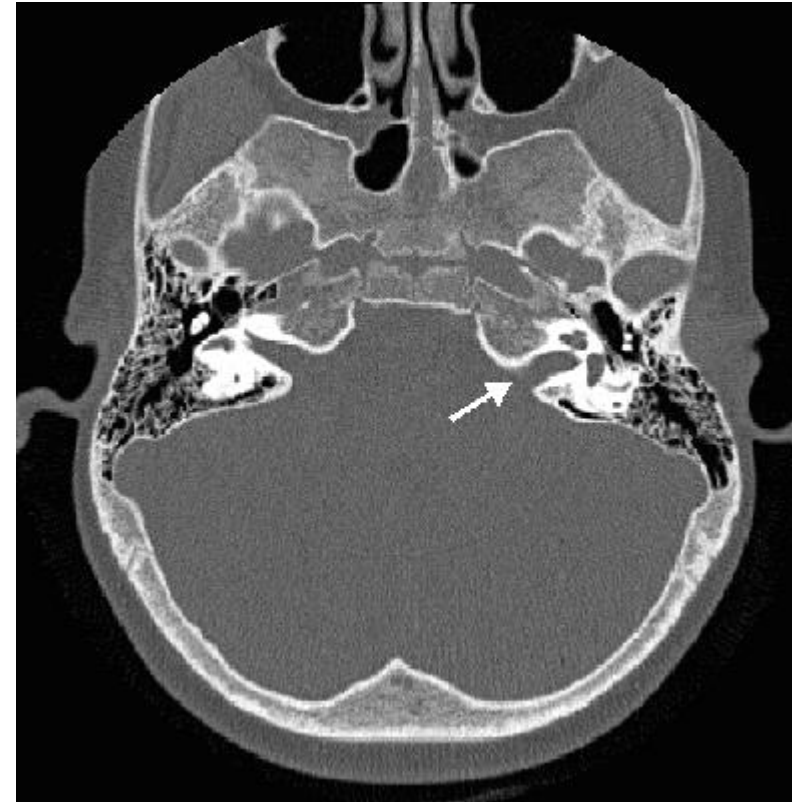
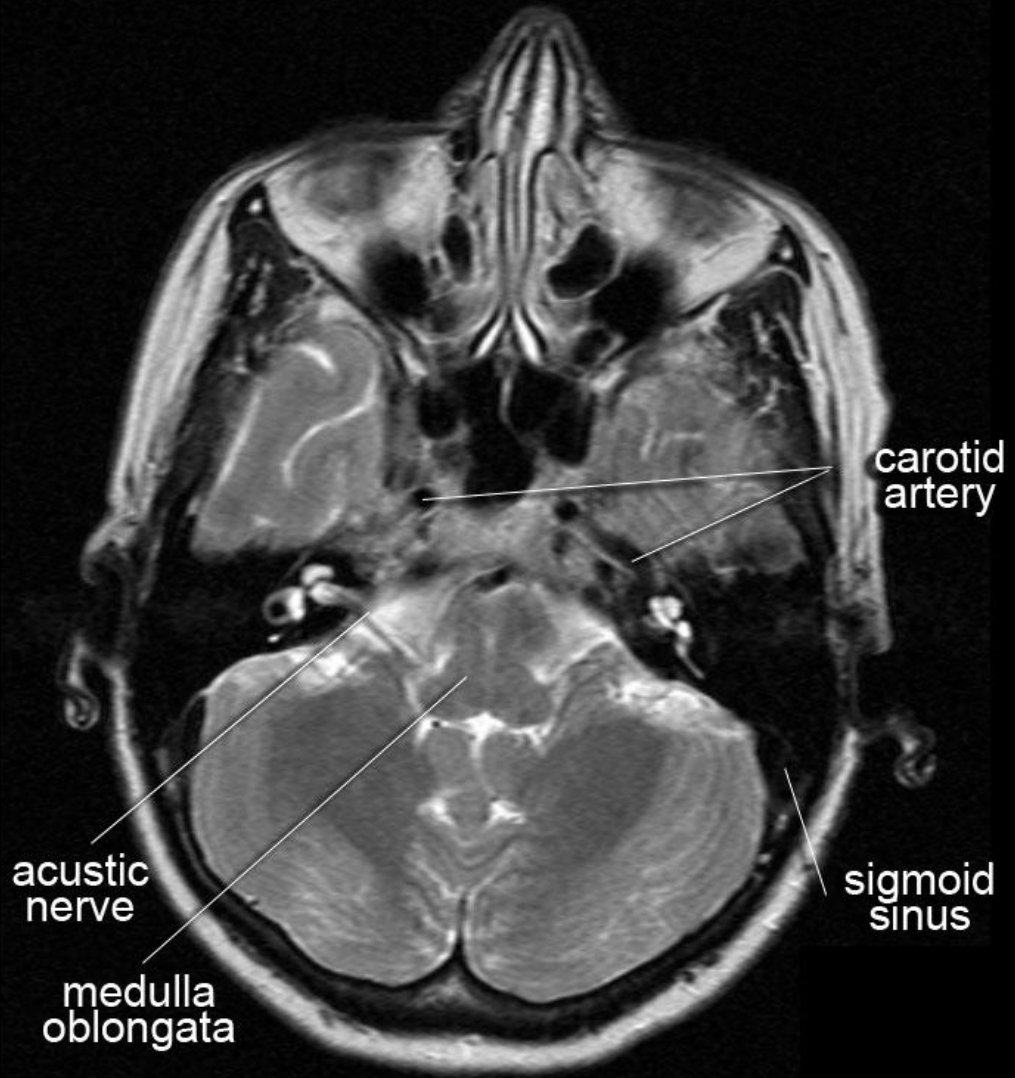


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BROWNS HOSPITAL  
2314  
BRAIN+C  
AXI T2 PROPELLER



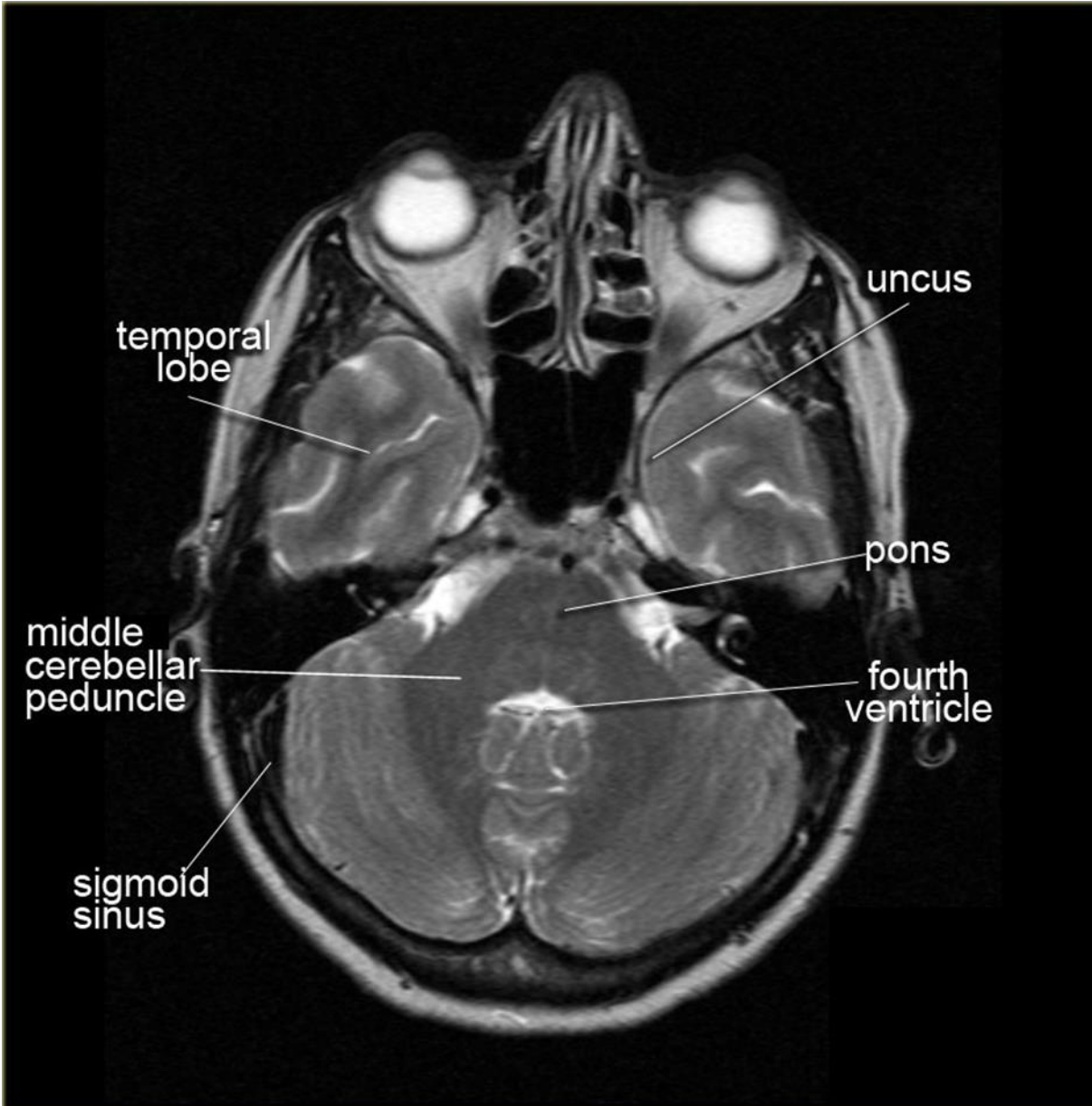
# MRI -Anatomy



CT Bone window IAMs

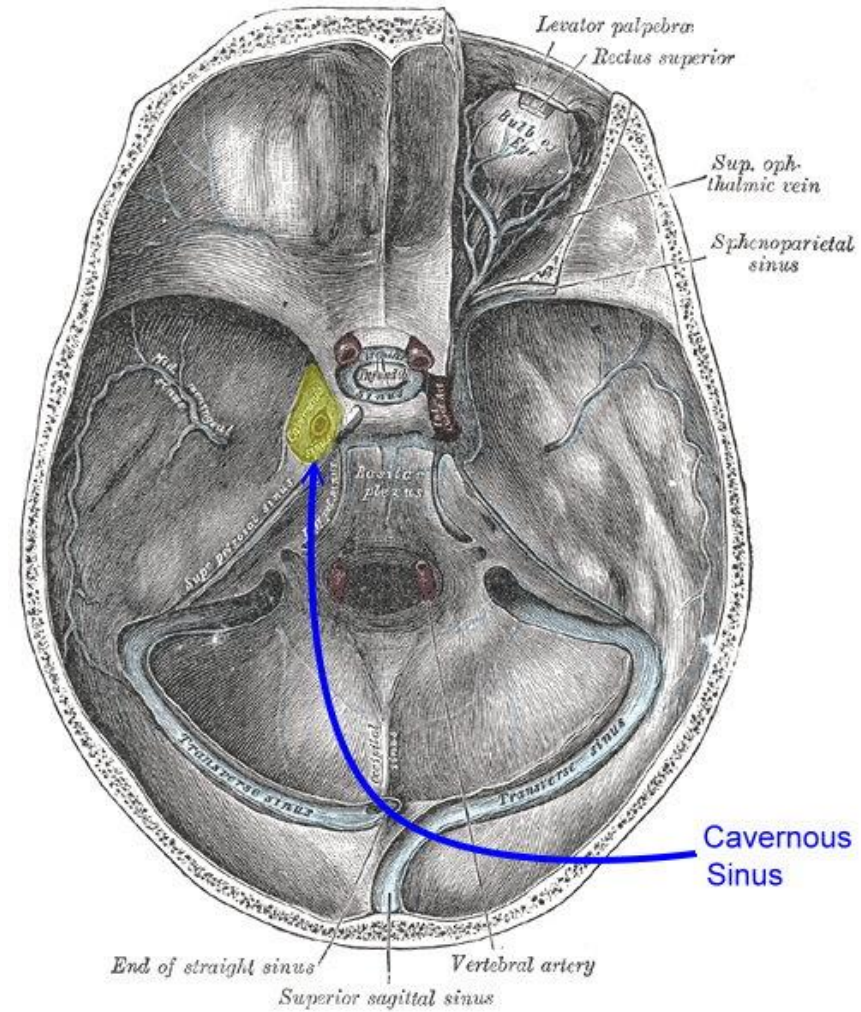
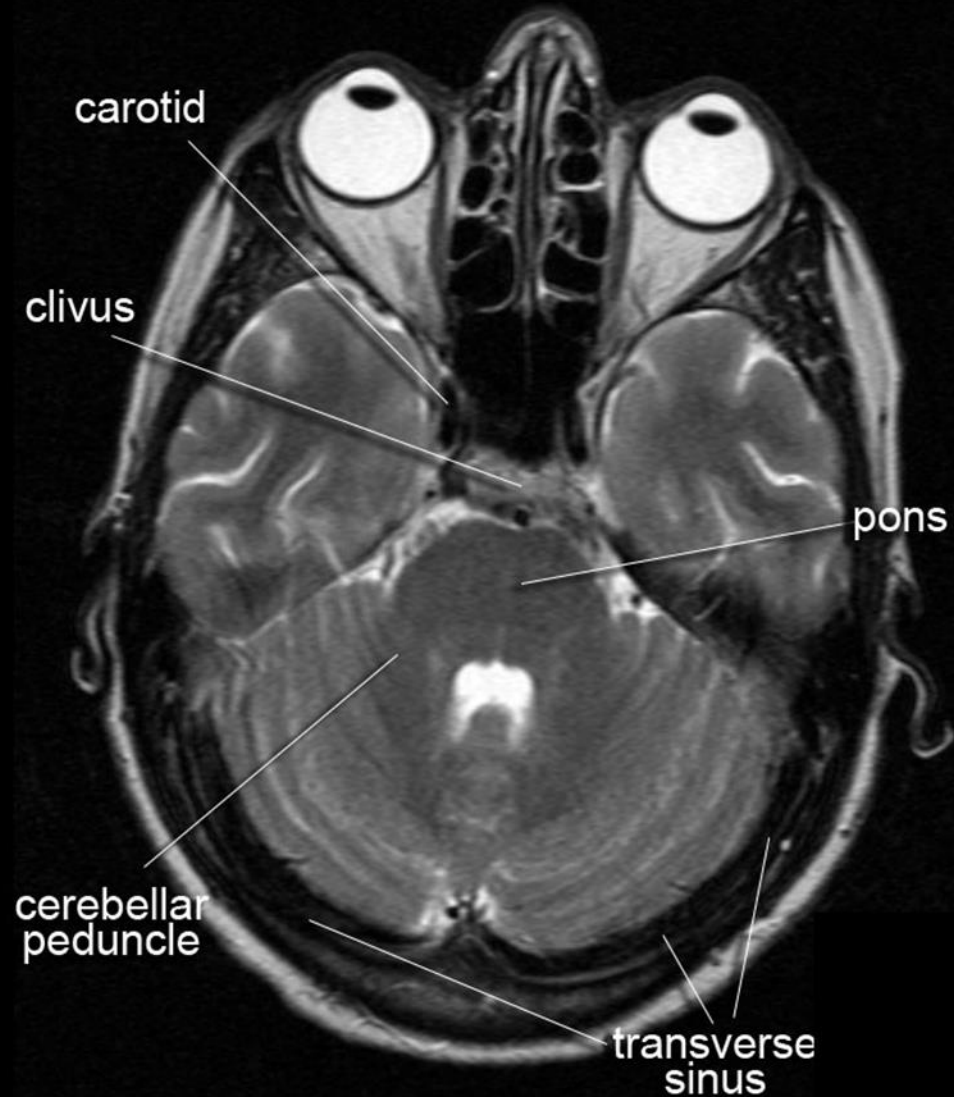


# MRI -Anatomy

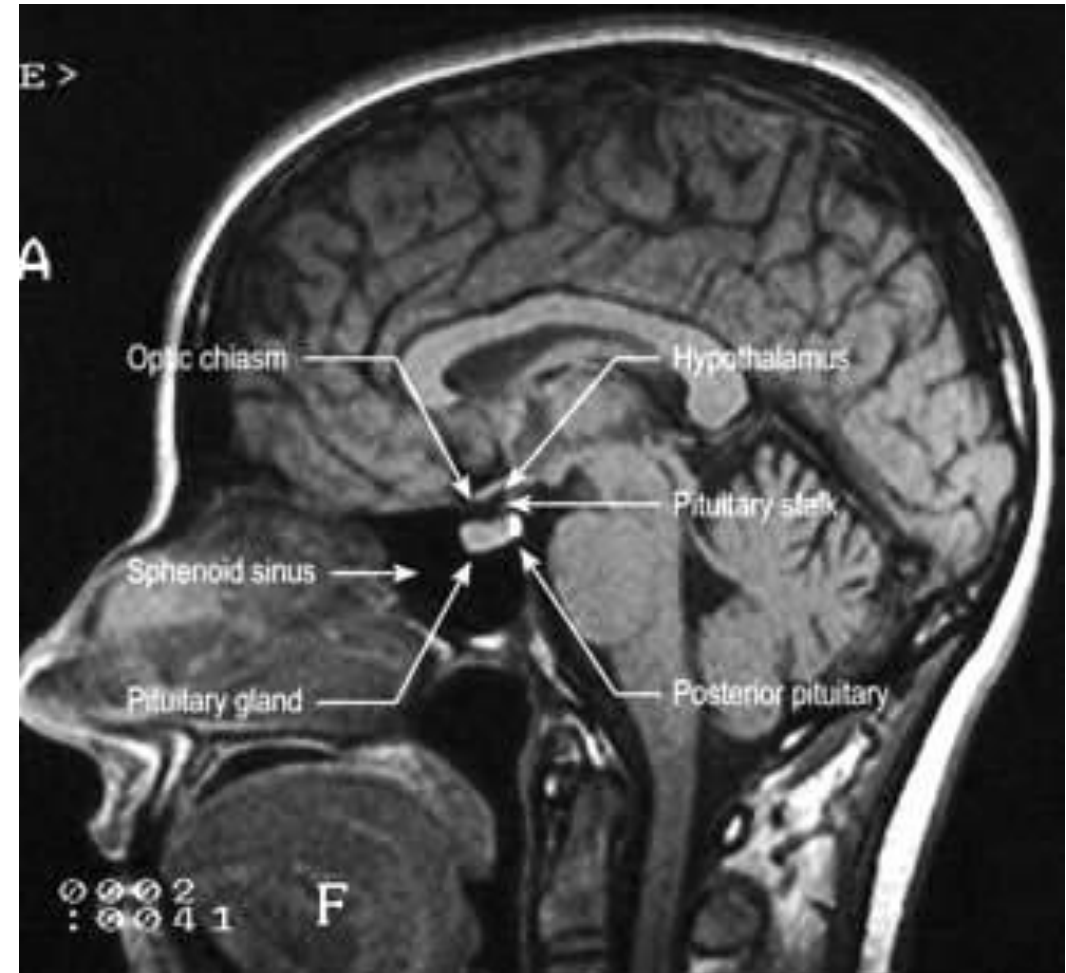
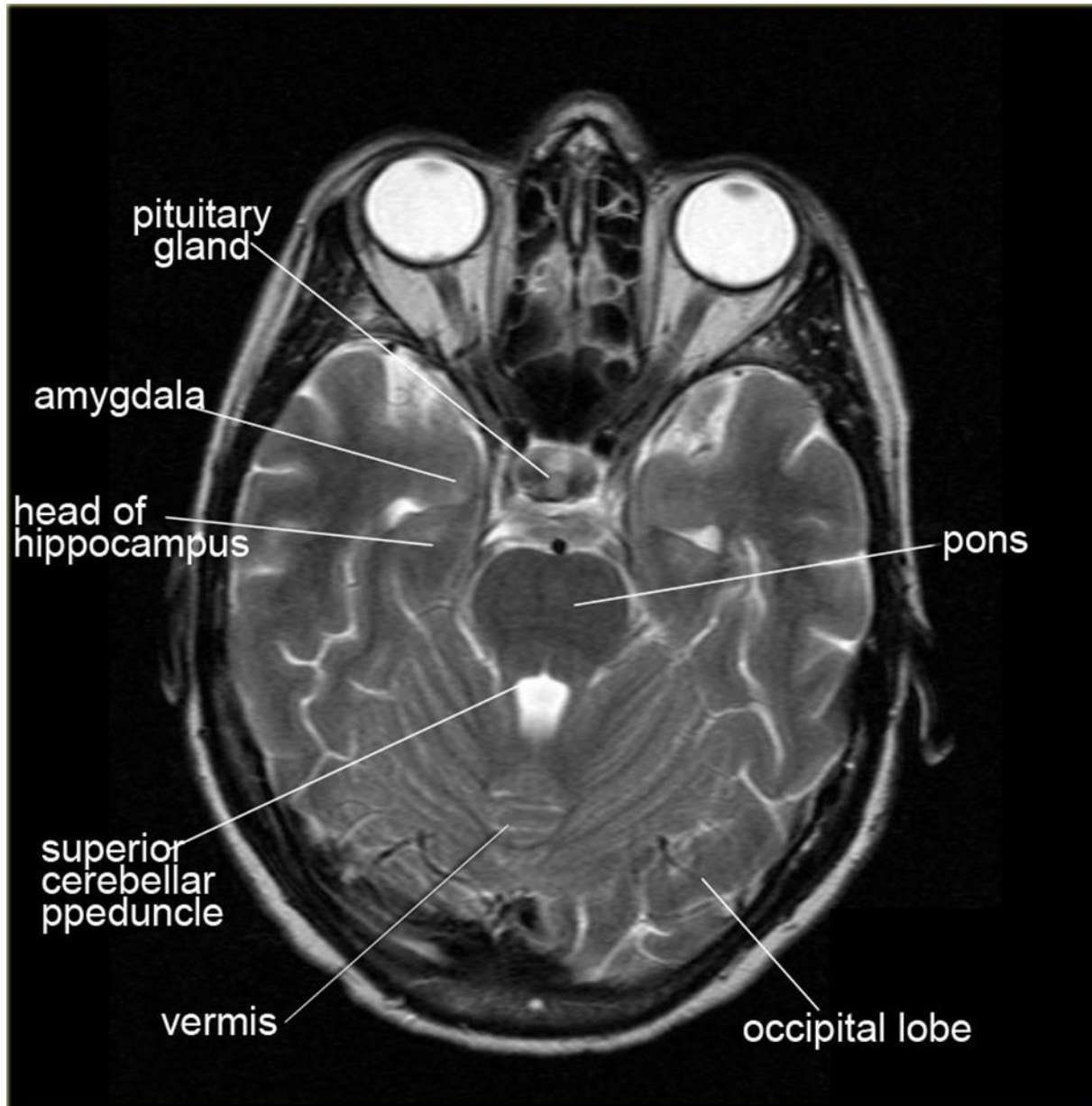




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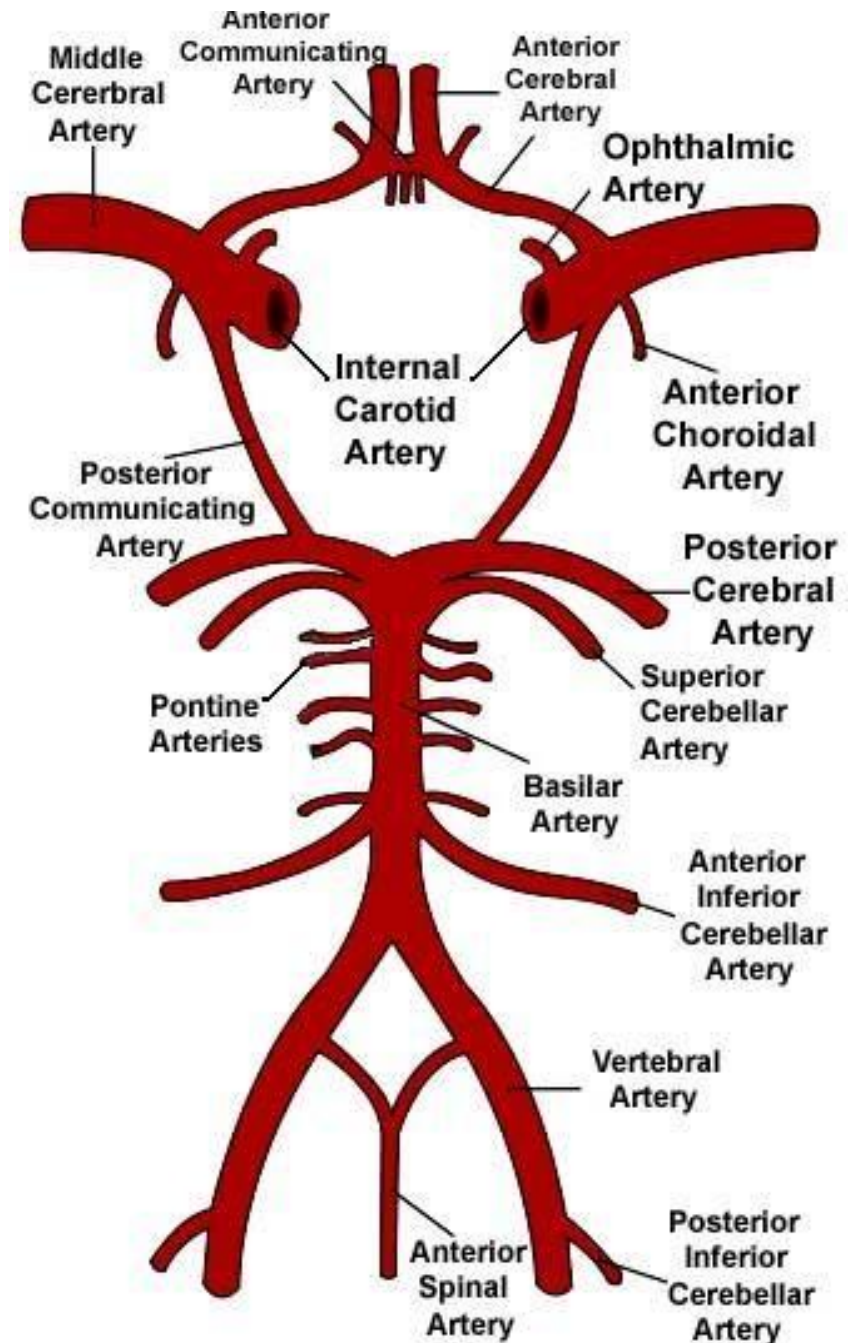
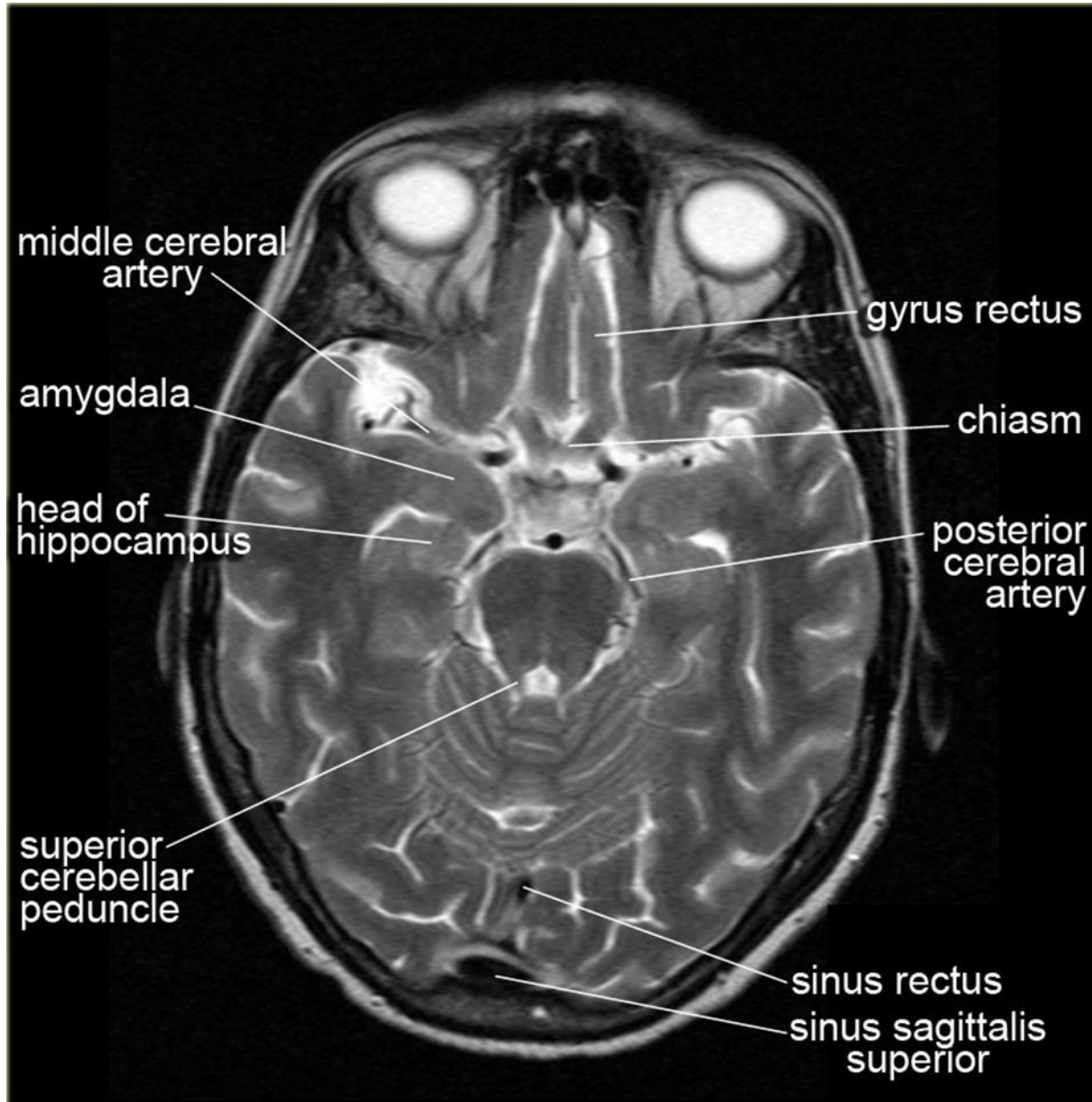


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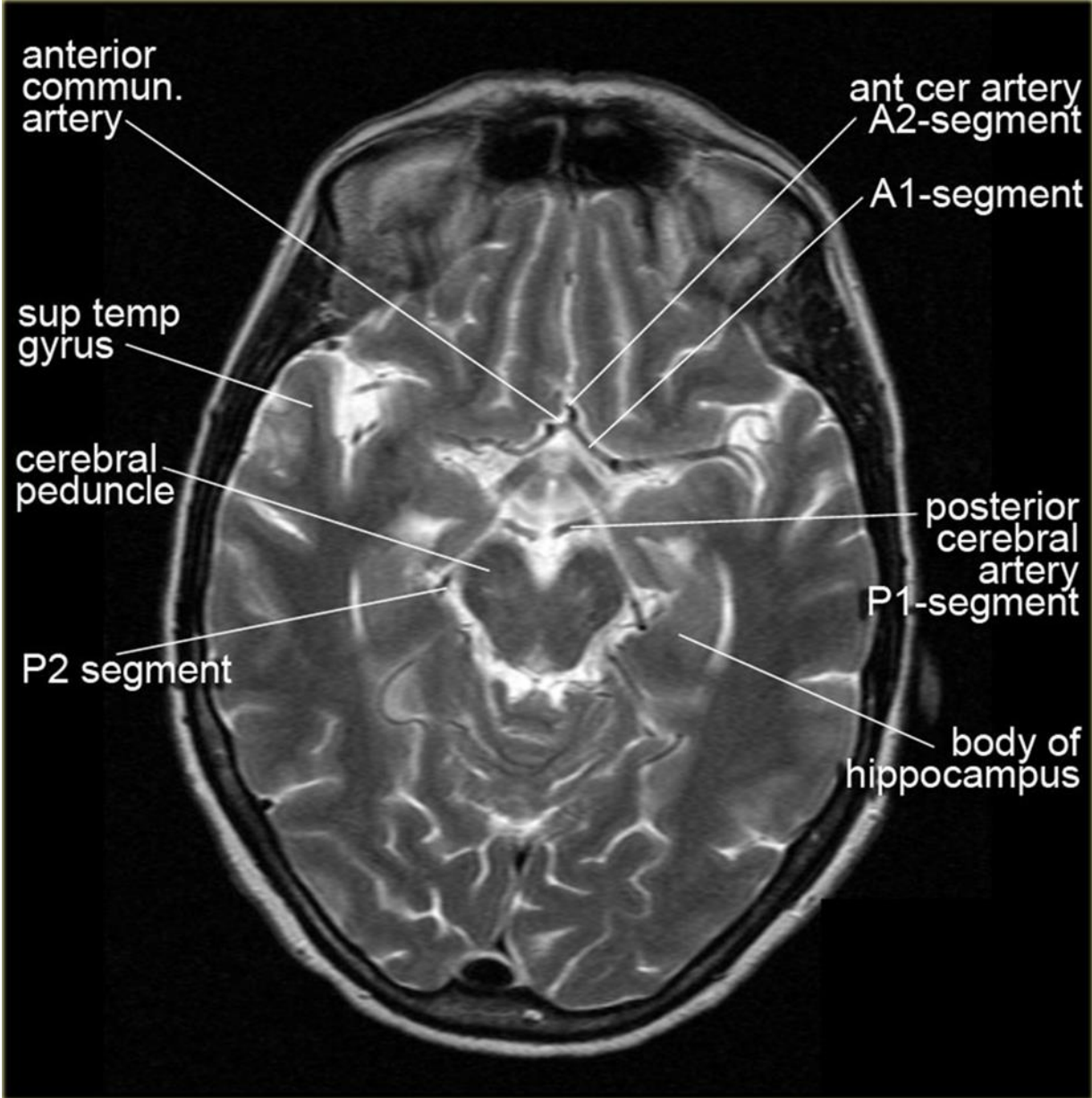




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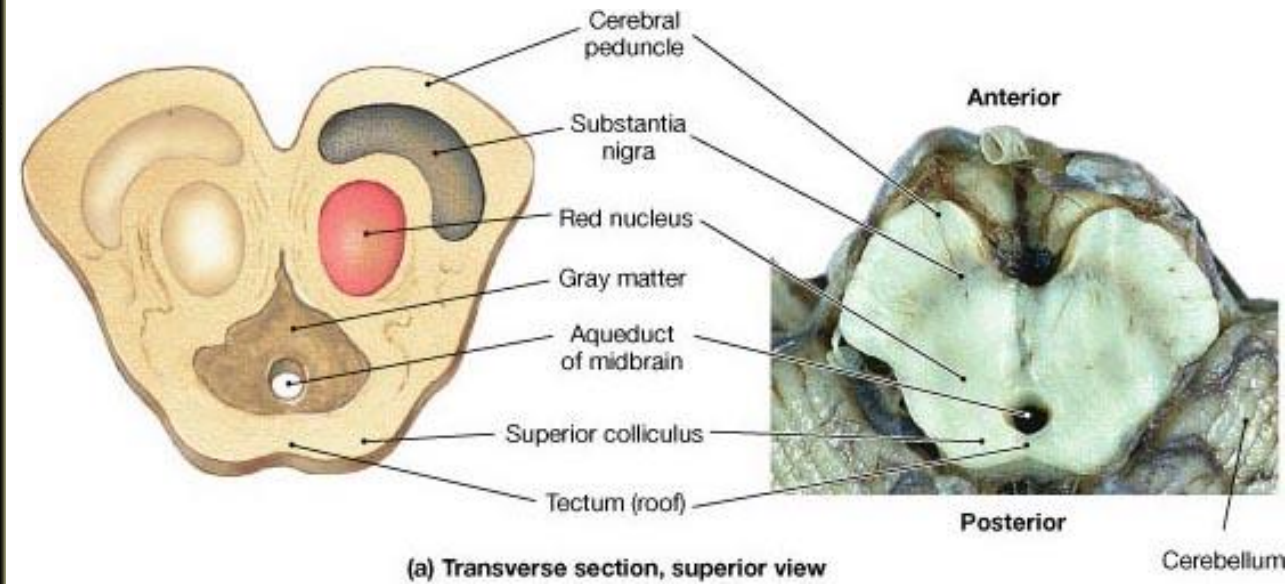
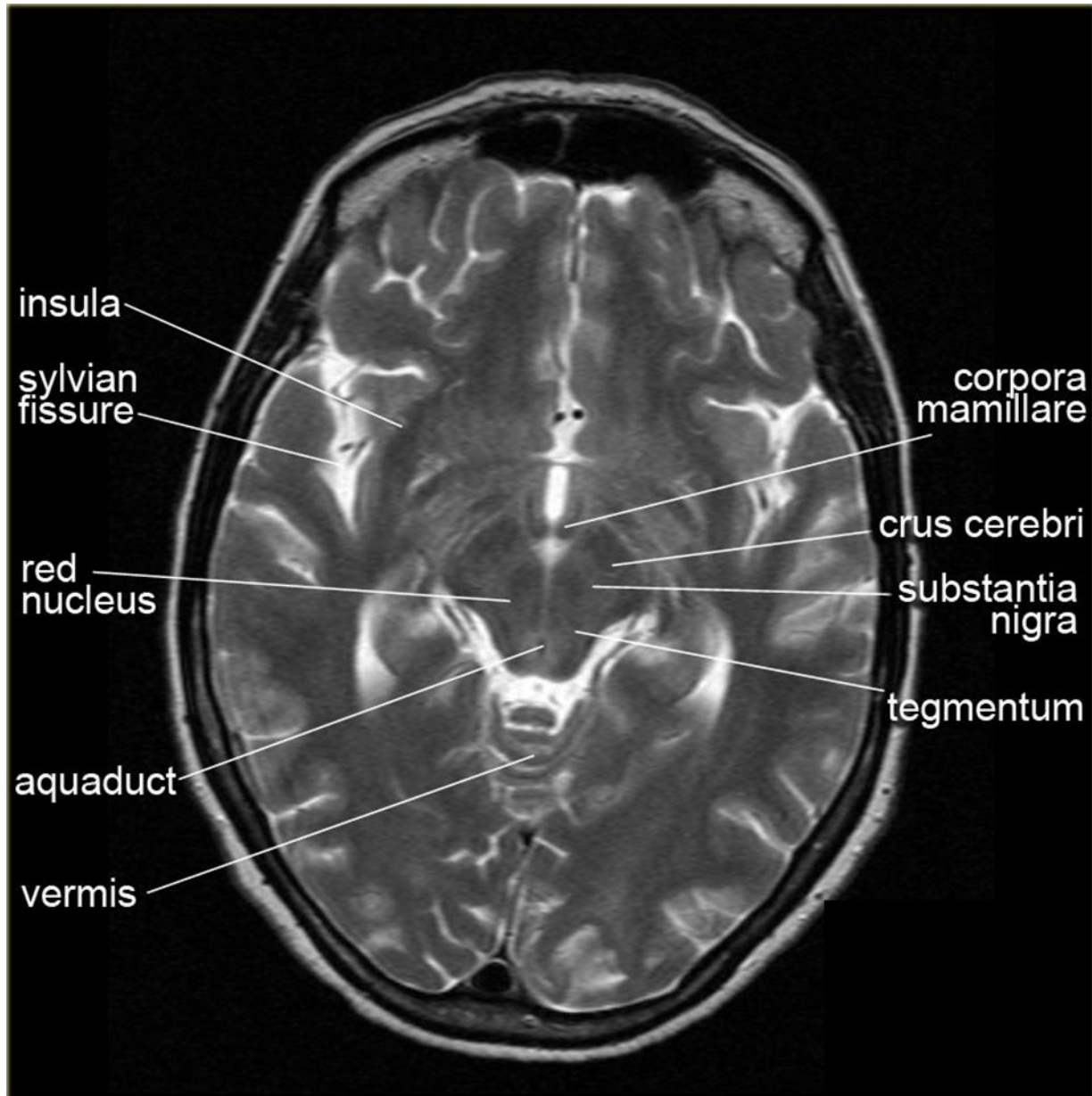


# MRI -Anatomy





# MRI -Anatomy



# MRI -Anatomy

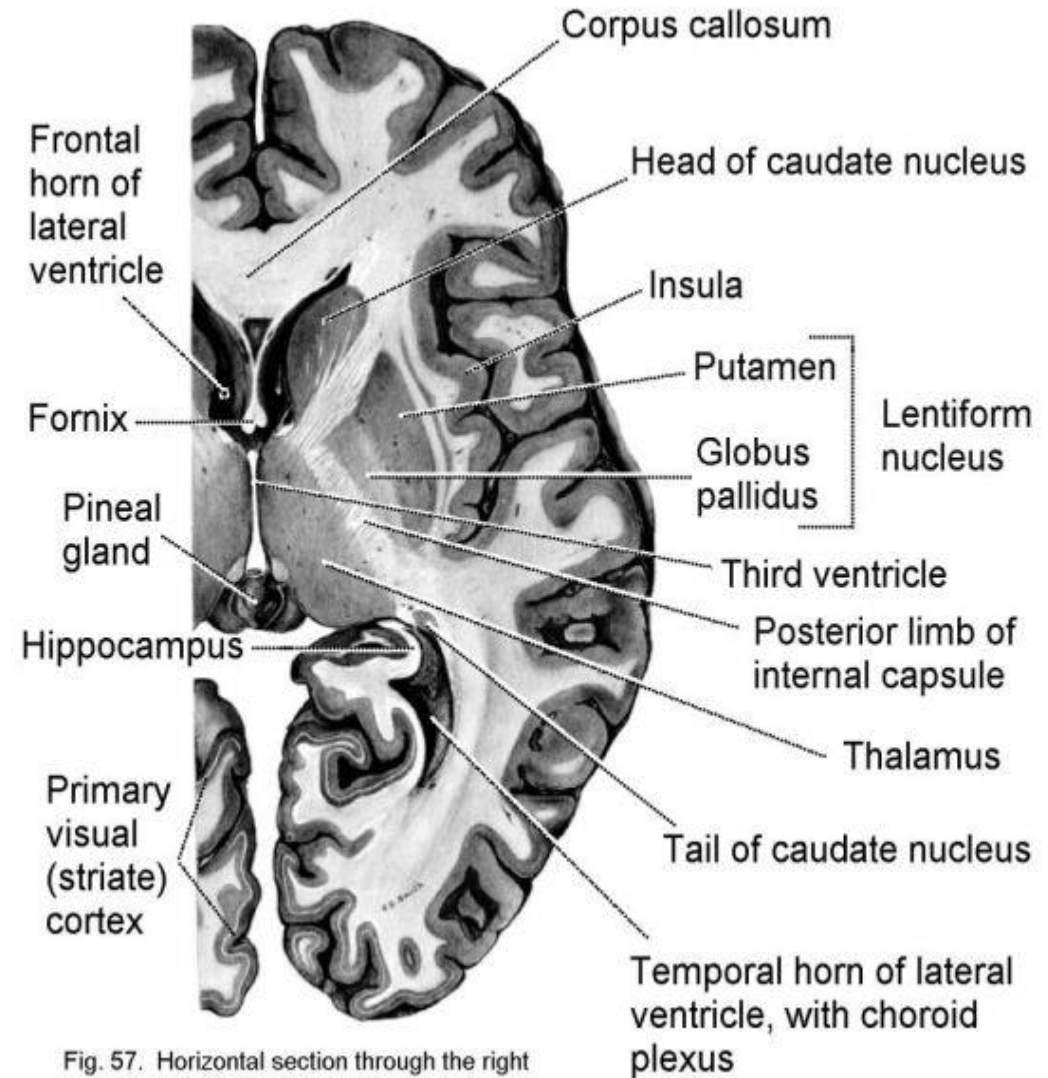
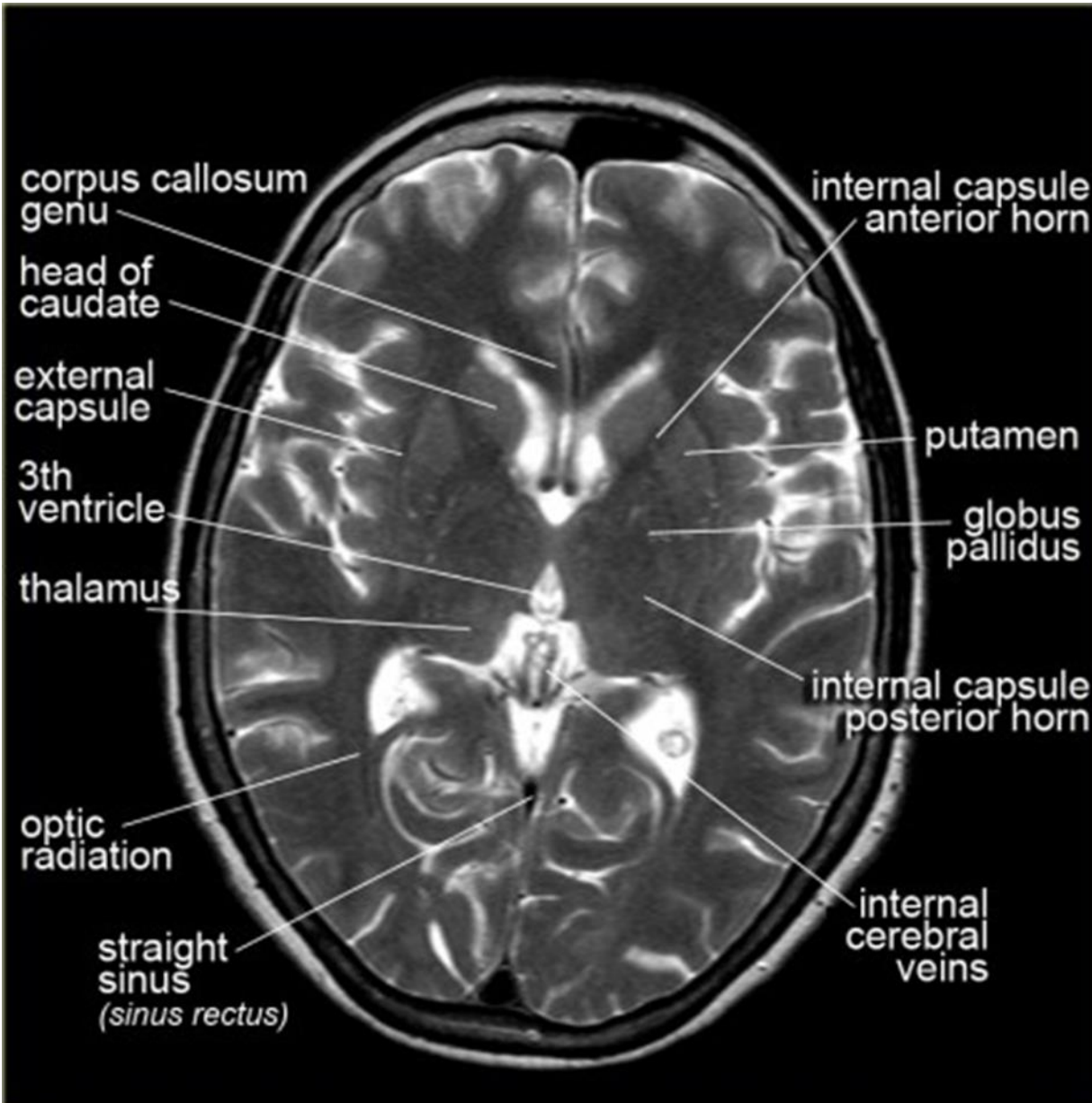
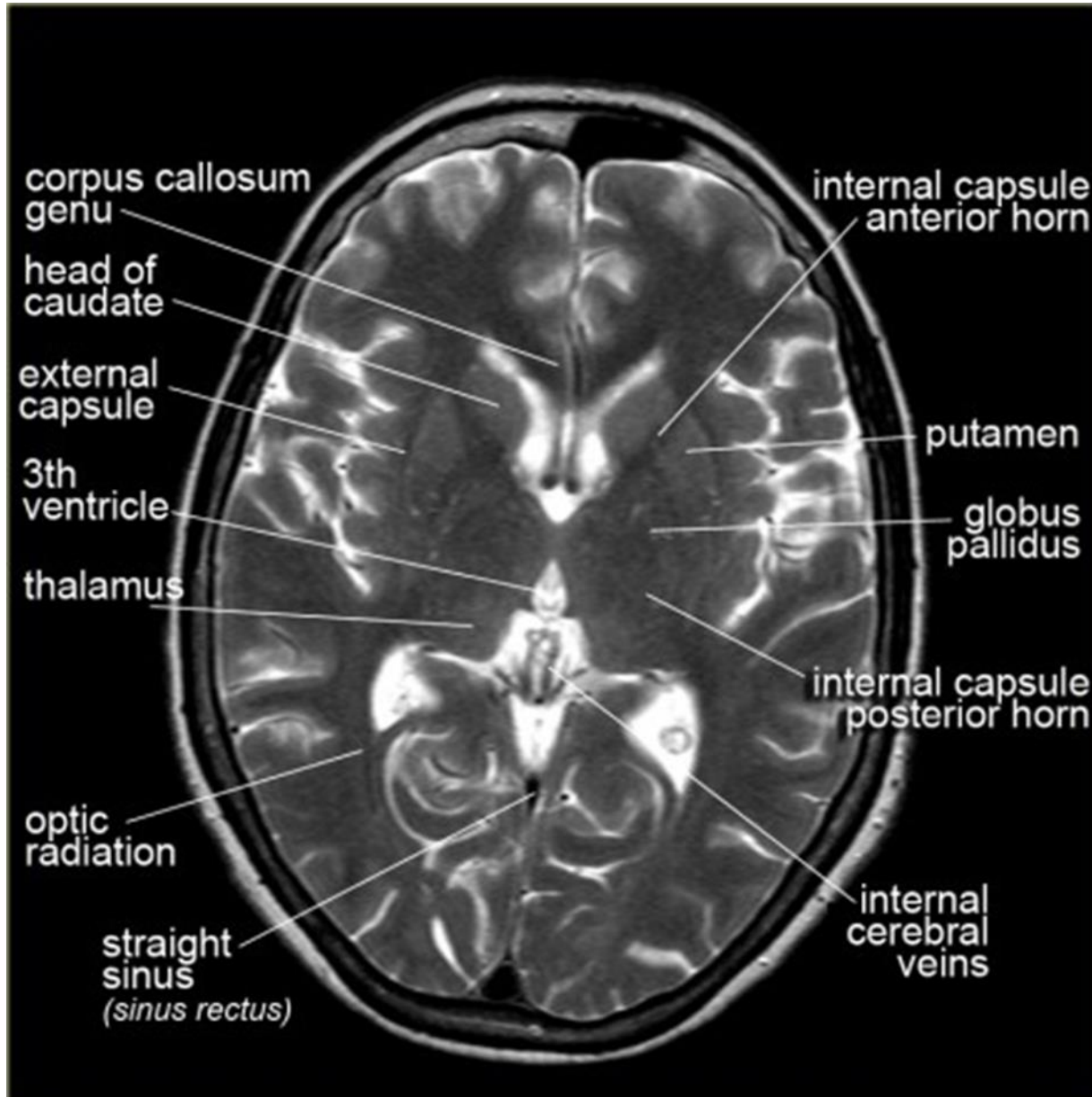


Fig. 57. Horizontal section through the right cerebral hemisphere and midline structures.



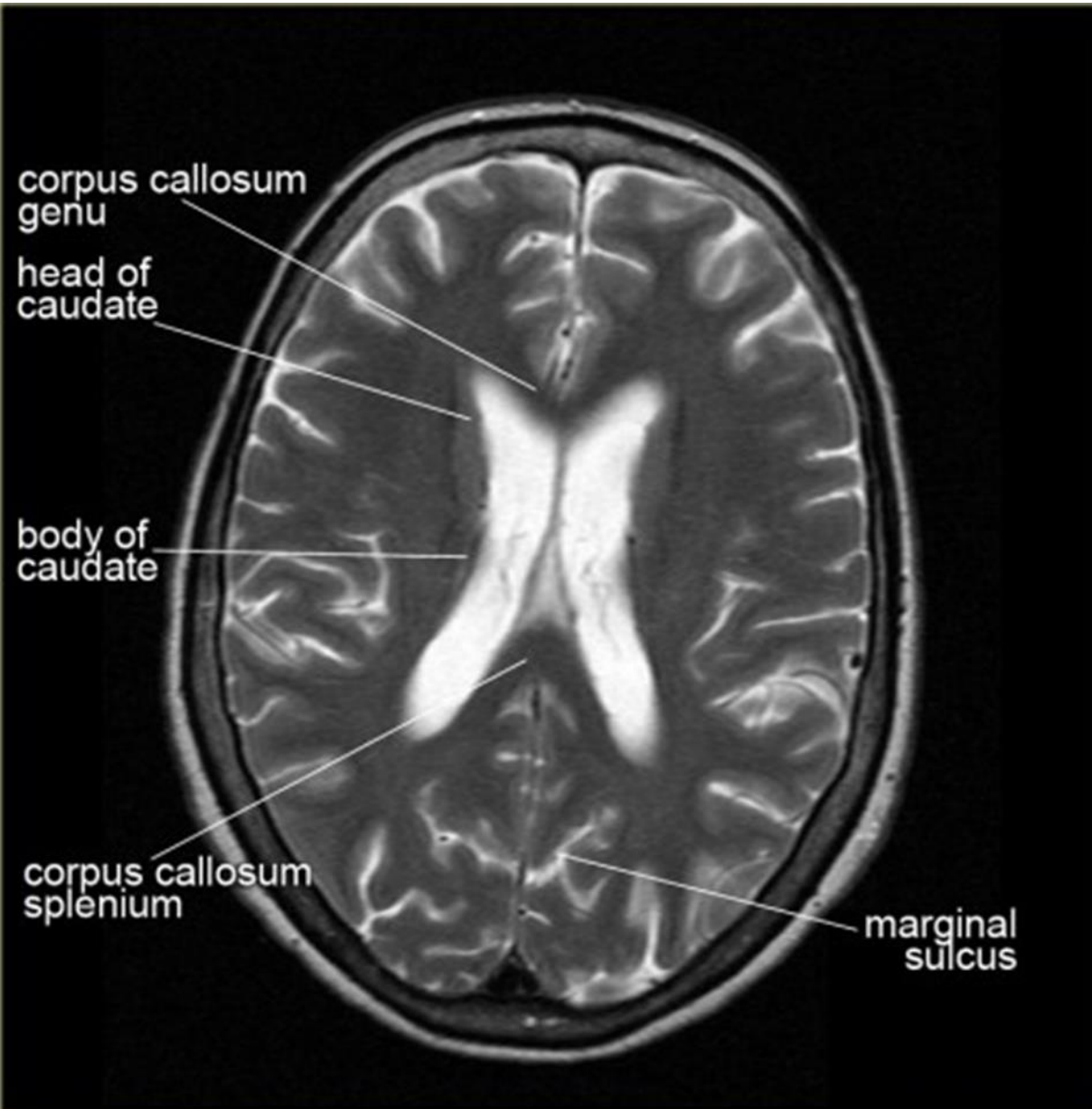


# MRI -Anatomy

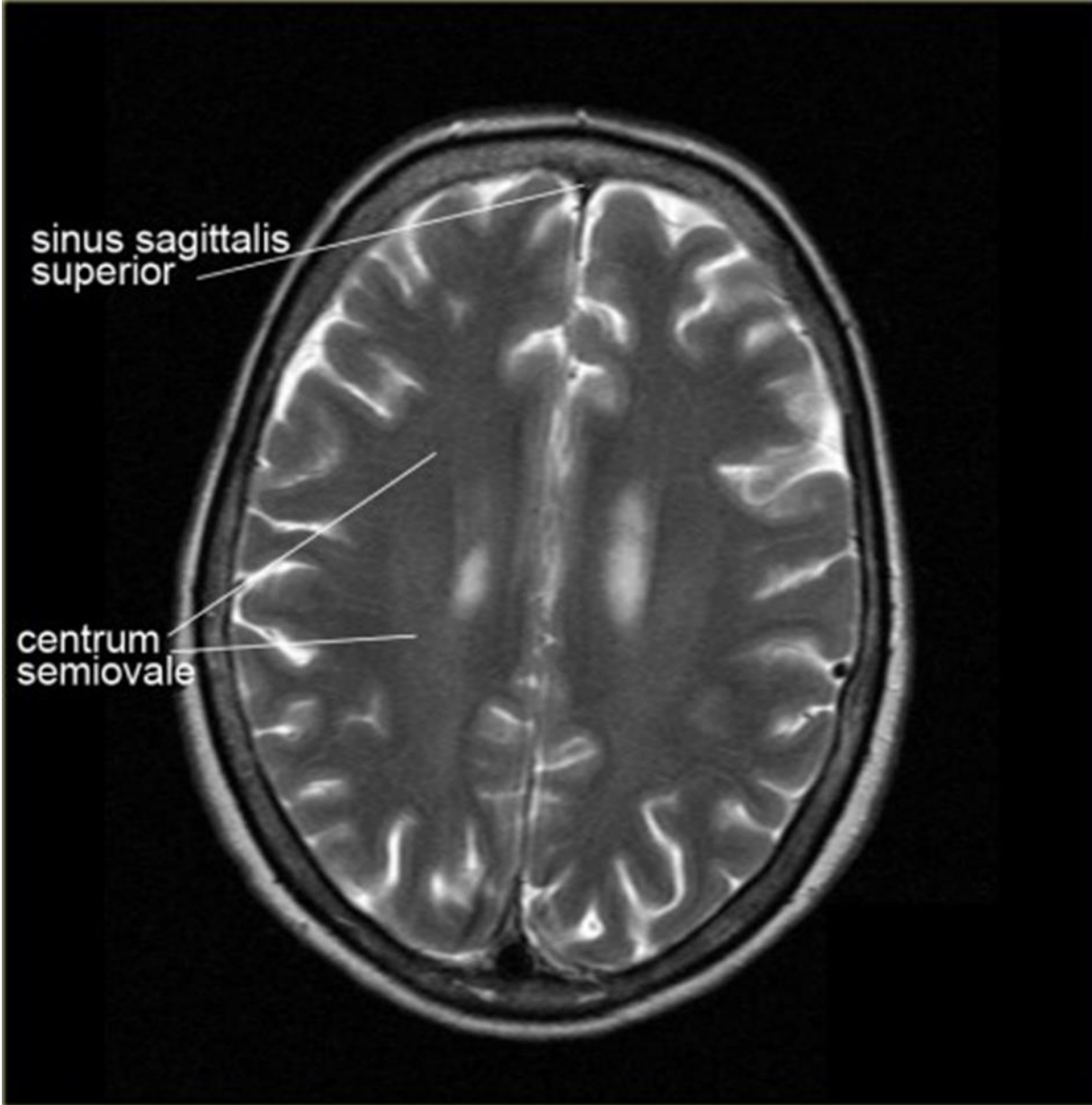




# MRI -Anatomy



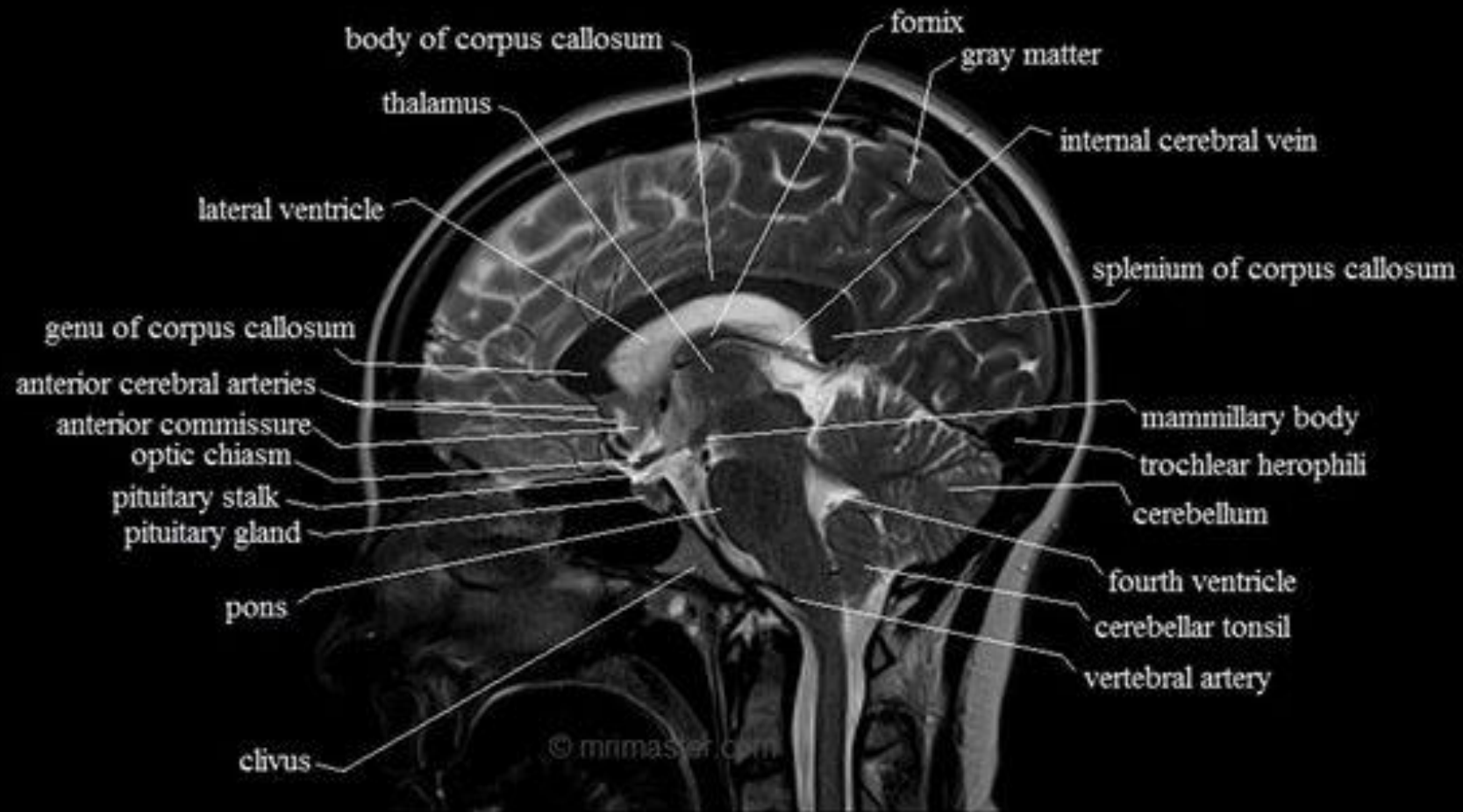
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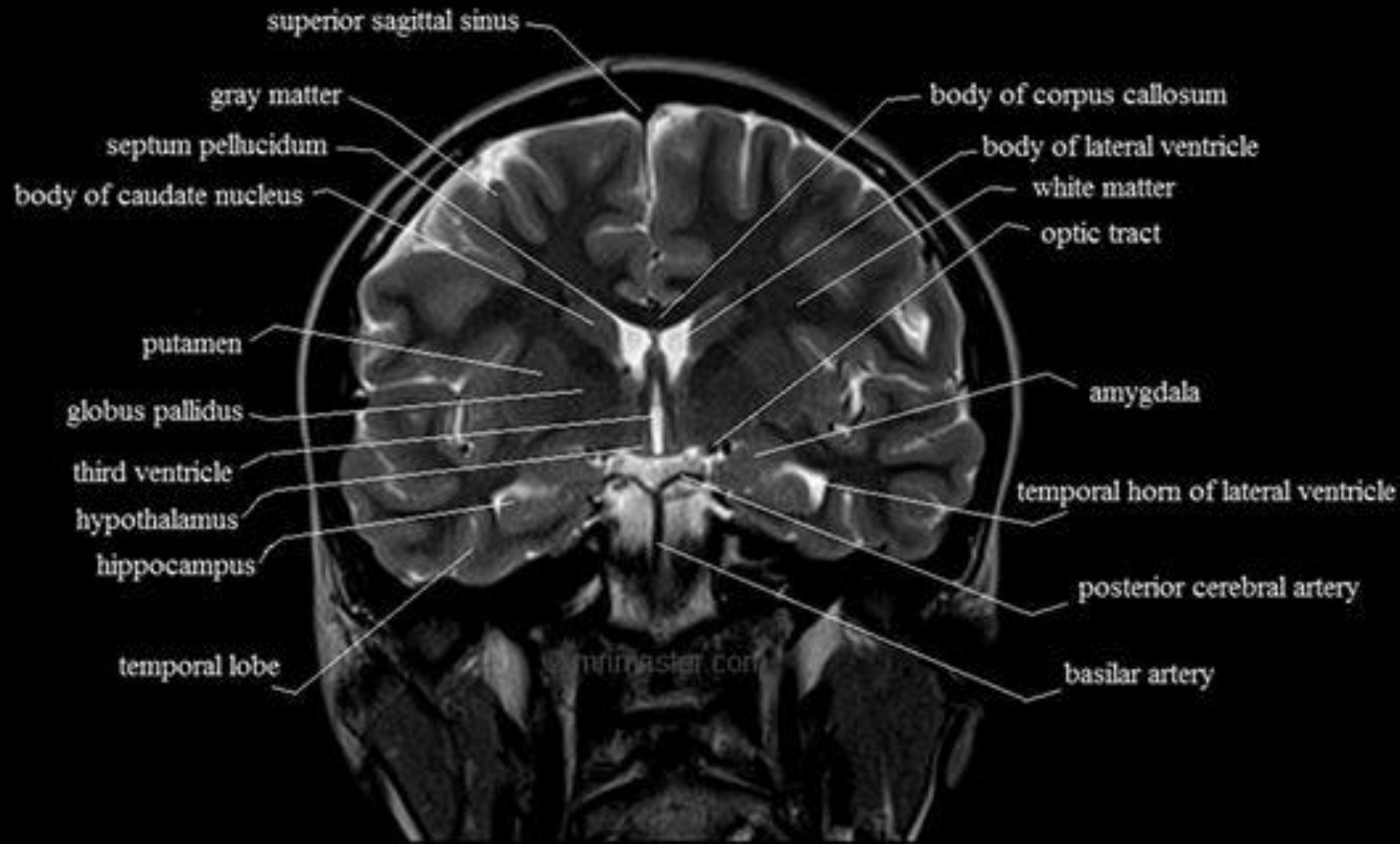


# MRI -Anatomy



# MRI -Anatomy





# MCQ

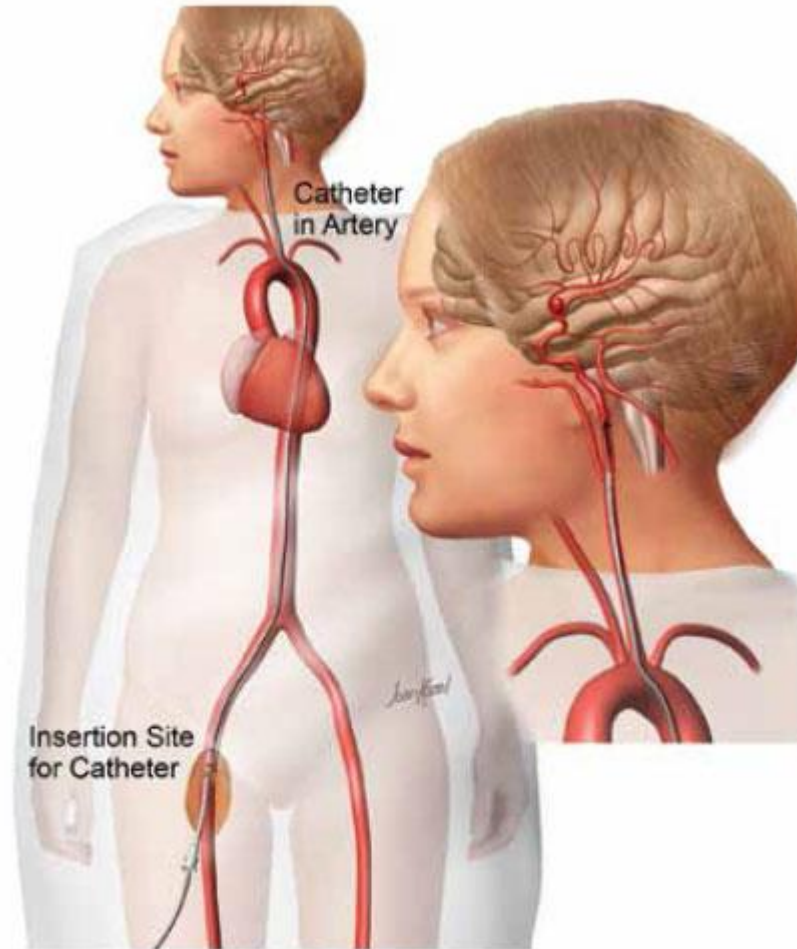
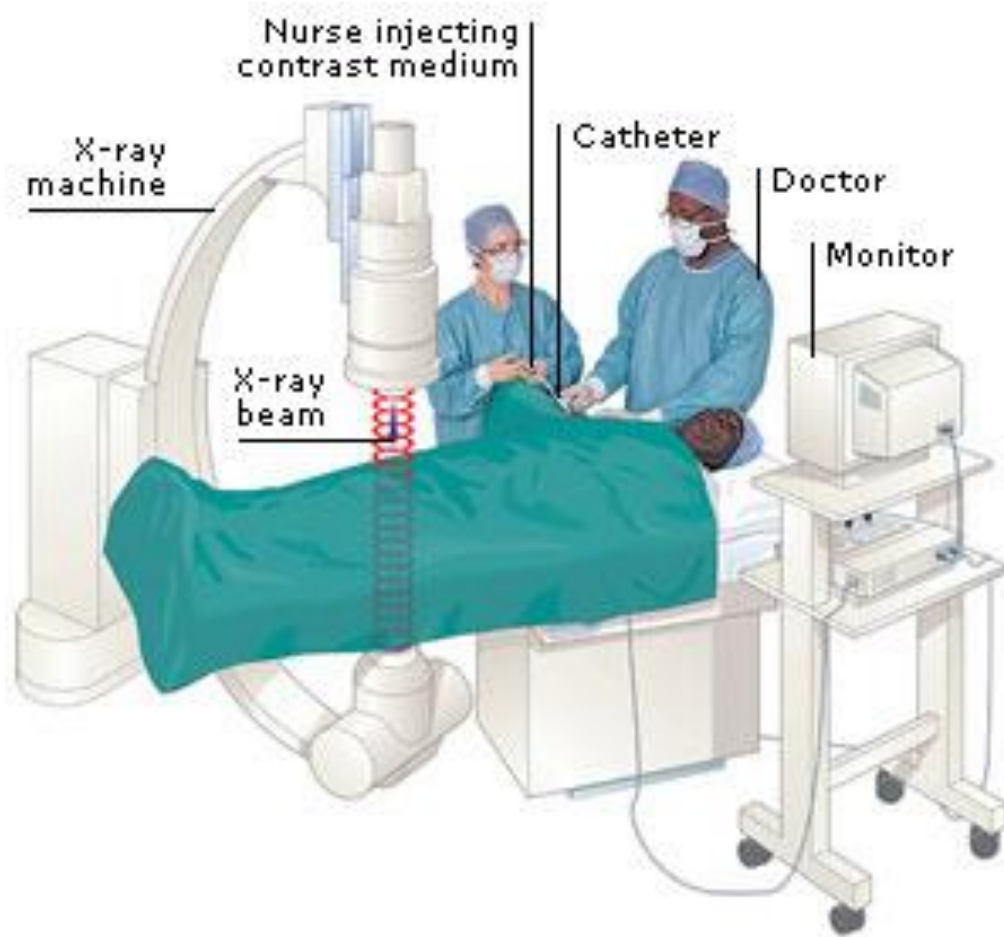
- 57 year old male was admitted to the A & E with a recent history of left side weakness. He is taking treatment for hypertension and diabetes. His past surgical records revealed an insertion of metallic coils for treatment of a middle cerebral artery aneurism.

What is the most suitable initial investigation to evaluate his current illness?

- A. Skull X Ray
- B. CT Brain
- C. MRI Brain
- D. Conventional angiogram
- E. PET Scan

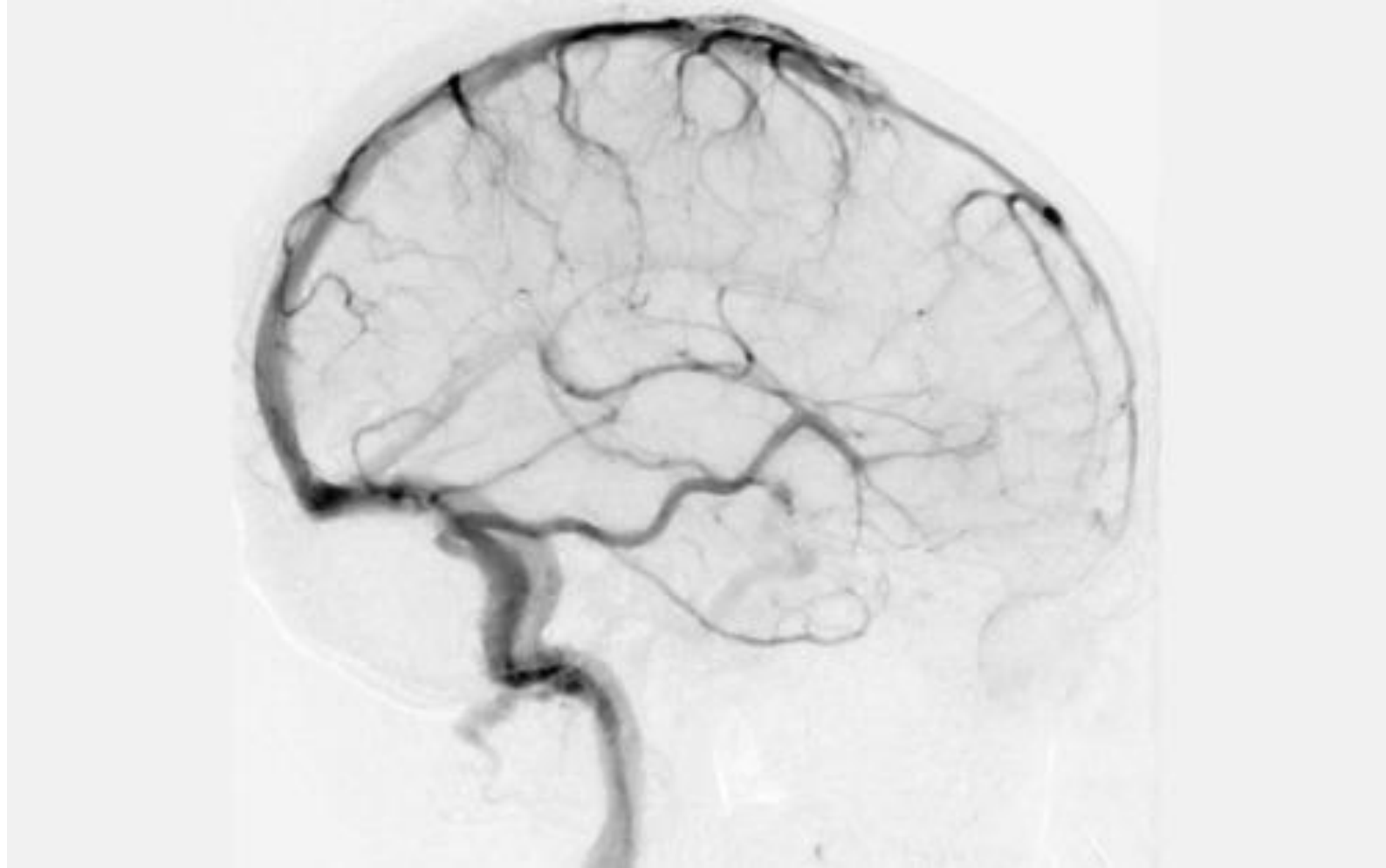
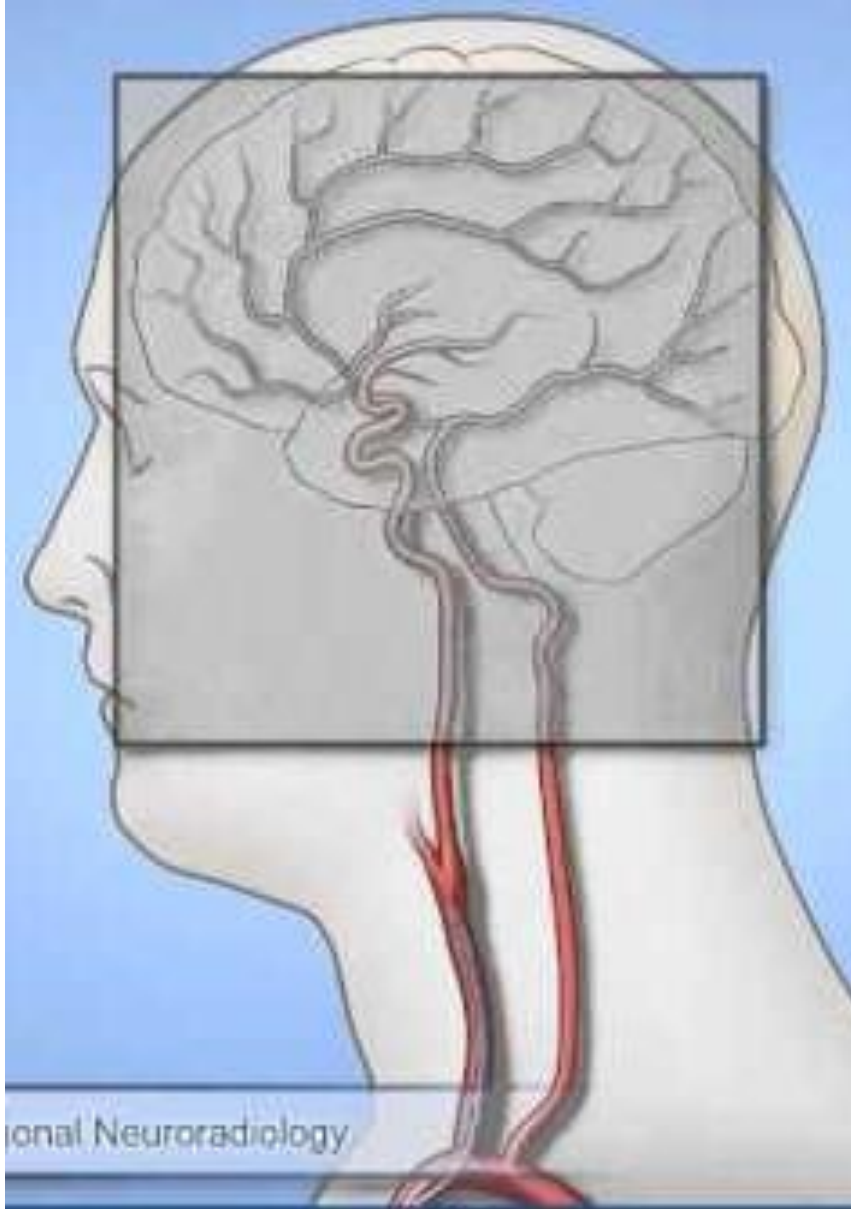


# Angiogram –Conventional

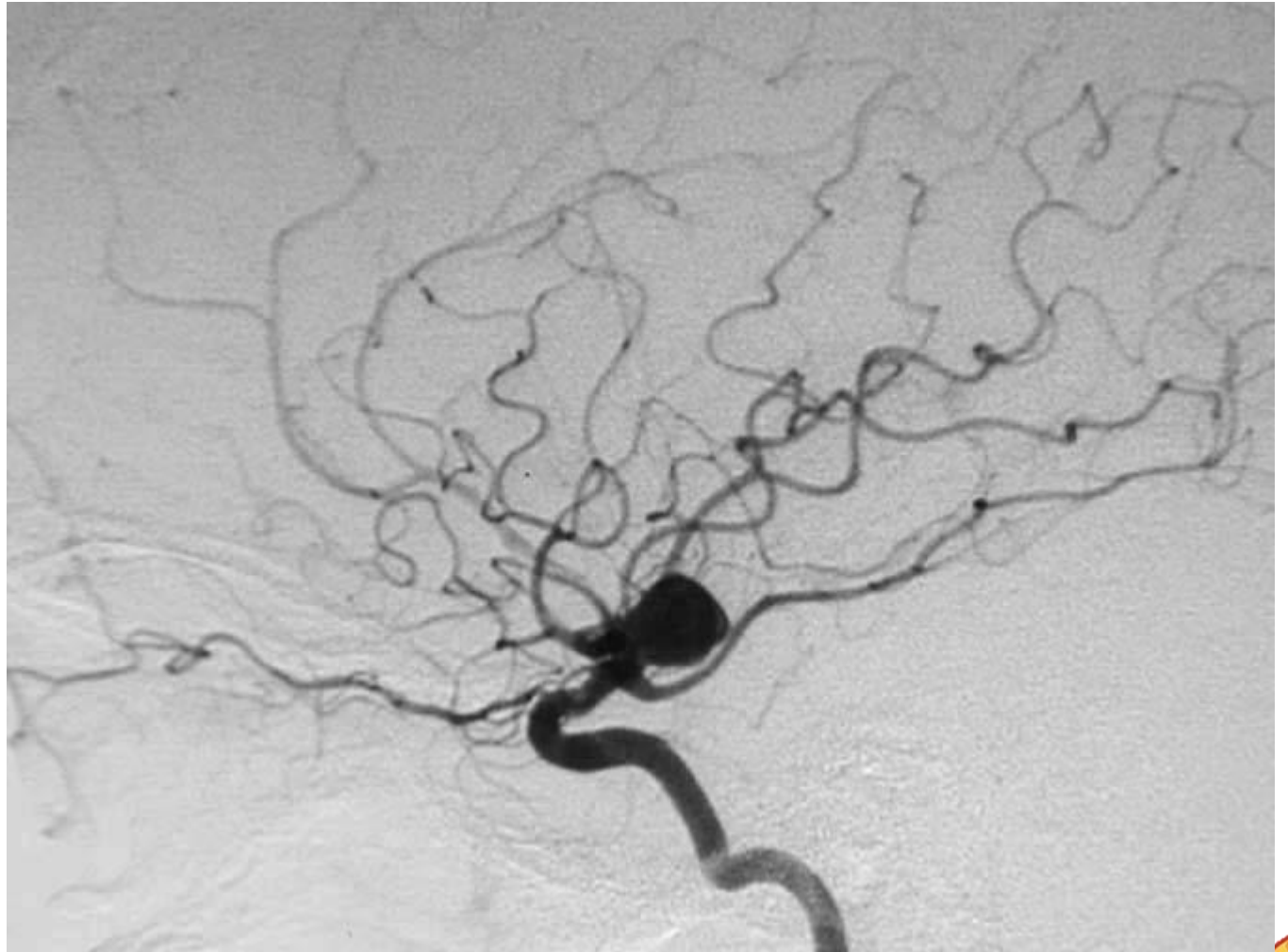
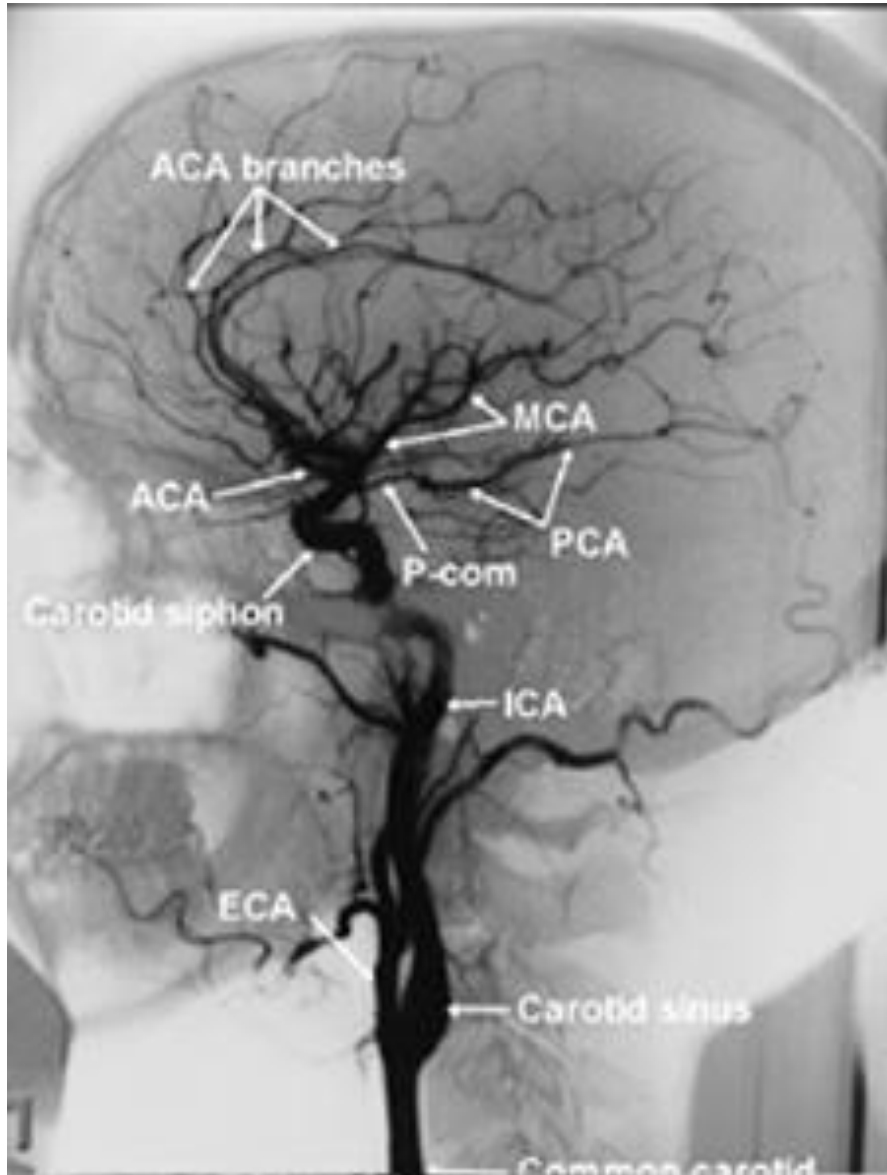




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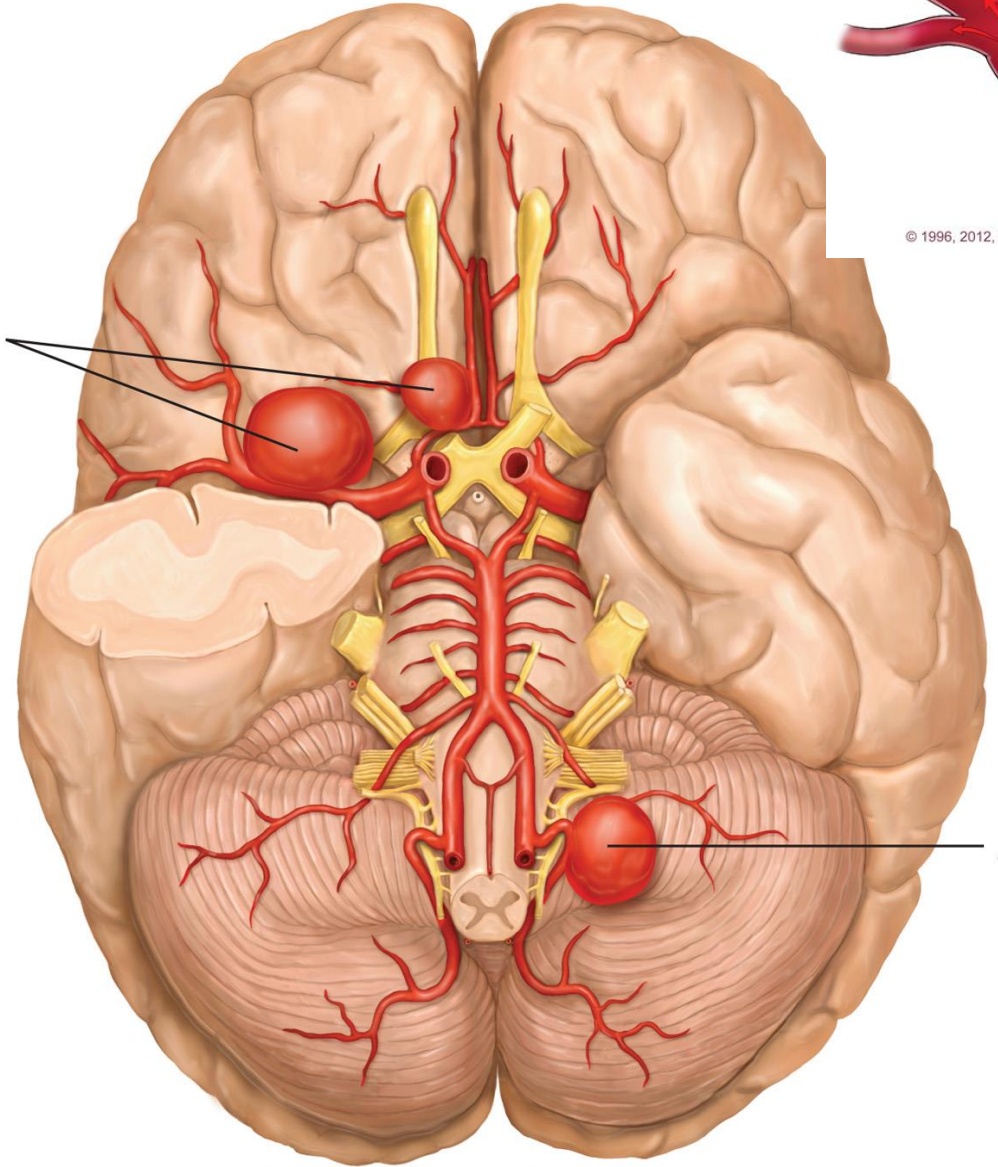
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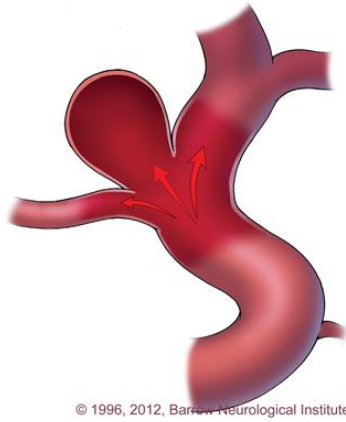
# Angiogram –Conventional



Aneurysms



Aneurysm



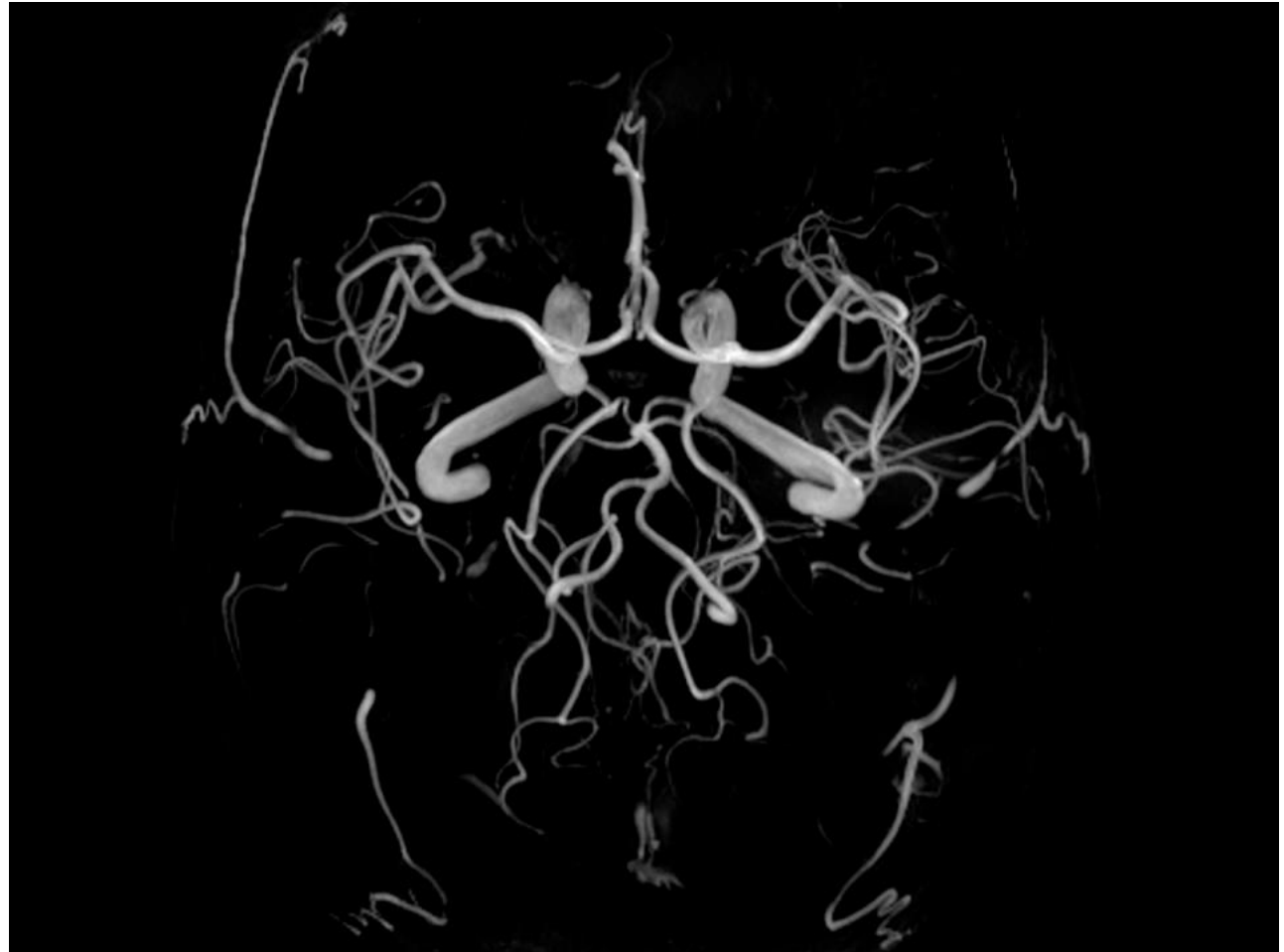


# Angiogram-CT





# Angiogram-MRI





**Thank You !!**

**My Hidden Eye**

Photographer: Krishna Chauhan, Guwahati, Assam

