

NEURORADIOLOGY

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Radiologist .PHH

Neuroradiology

- Neuroradiology is a subspeciality of radiology focusing on the diagnosis and characterization of abnormalities of the nervous system, spine, head and neck.
- The imaging modalities include:
 - **Plain radiography**
 - **CT scan**
 - **MRI**
 - **Angiography:** is being replaced in many instances by MRA
 - **Ultrasound:** is used in limited circumstances.

Neuroradiology / investigation

Plain film

The plain skull film may reveal:

- Calcification
- Pituitary fossa enlargement
- Bone lesion or secondary deposit.
- Fractures

ULTRASOUND

- ❖ The neonatal brain can be scanned through the open anterior fontanelle for:
 - Hydrocephalous
 - Interventricular or intracerebral hemorrhage
 - Suspected intracranial pathology.
- ❖ Doppler studies are used for the diagnosis of carotid artery stenosis.

CT and MRI

- CT is especially valuable in acute head injury (recent brain hemorrhage), stroke, and suspected subarachnoid hemorrhage.
- MRI scan demonstrate the brain using a multiplanar facility in axial, coronal, and sagittal planes, with excellent views for the posterior fossa.

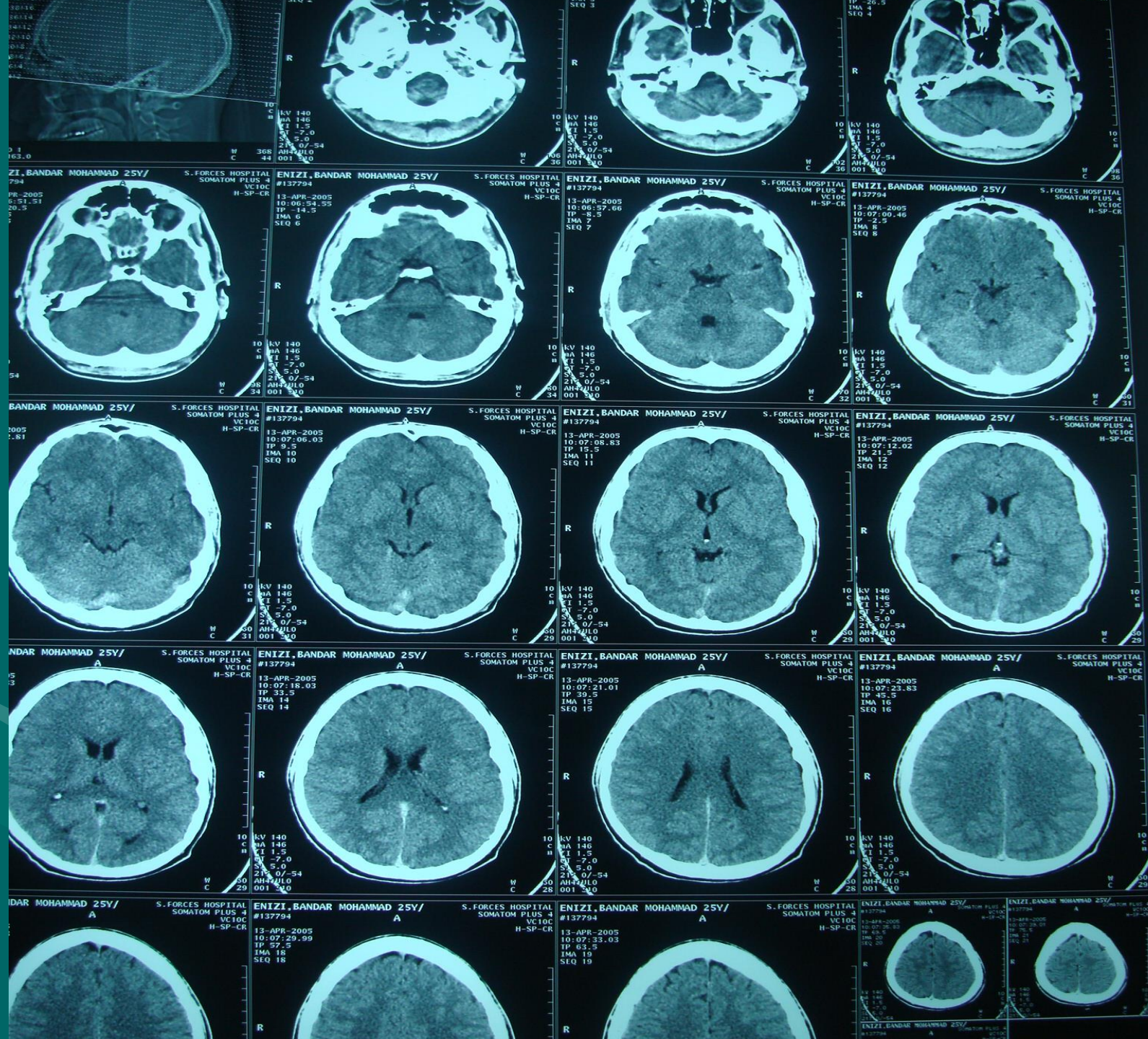
CT and MRI / 2

MRI is superior to CT in:

- Lesions of the pituitary fossa.
- Spinal cord abnormalities.
- White matter disease.
- Demyelinating plaques in multiple sclerosis.
- Differentiation of grey and white matter.

Arteriography

- ❖ Cerebral angiogram is useful in evaluation of aneurysm and arterio-venous malformations.
- ❖ MRA demonstrate cerebral arterial and venous circulation and has replaced conventional angiography in many situations.





BRAIN infarction

- Ischemic infarction of the brain result from interruption of the blood supply to a portion of the brain.
- The main sign of infarction is an area of decreased attenuation (hypodense) within the cerebral substance with effacement of the adjacent sulci.
- ❑ **Hemorrhage** may develop within the infarct, (about 10-15%), and is seen as an area of hyperdensity.

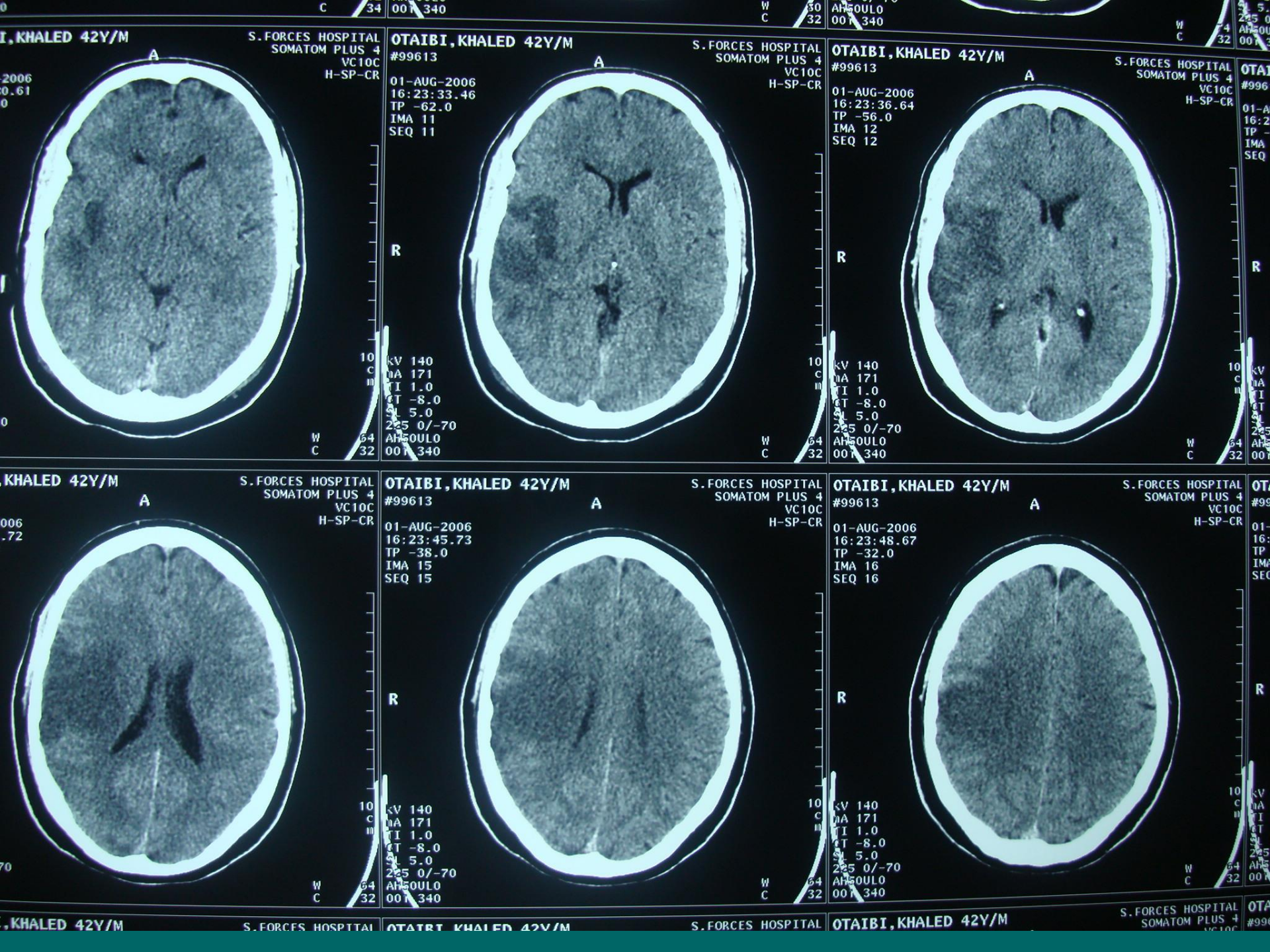
Lacunar infarction

- Lacunar infarcts are small, deep cerebral infarcts, occur as a result of occlusion of small distal intracerebral arteries.
- Lacunar infarcts are usually less than 1cm in diameter and appear in the region of the internal capsule, basal ganglia, thalamus and brainstem.
- Lacunar infarcts are commonly seen in patients older than 60 years with hypertension.

CT and MRI in brain infarction

Why CT is the modality of choice for the initial evaluation of stroke ?

- CT is superior to MRI in detecting recent brain hemorrhage, and the role of CT is to exclude the presence of intracerebral hemorrhage, because the treatment of an infarct will differ depending on whether hemorrhage is present or not.
- MRI is superior and more sensitive than CT in the evaluation of any kind of edema and for the detection of acute infarction.



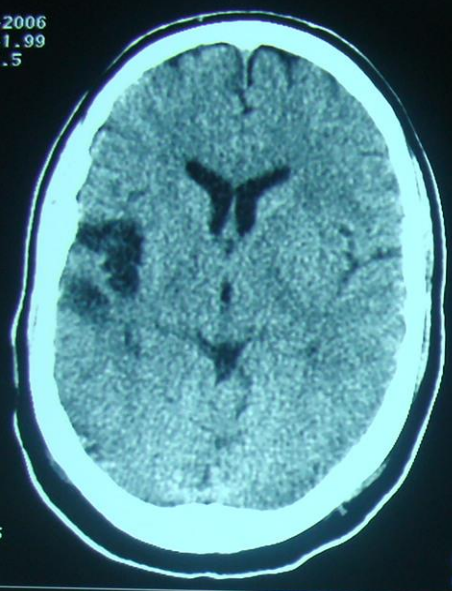
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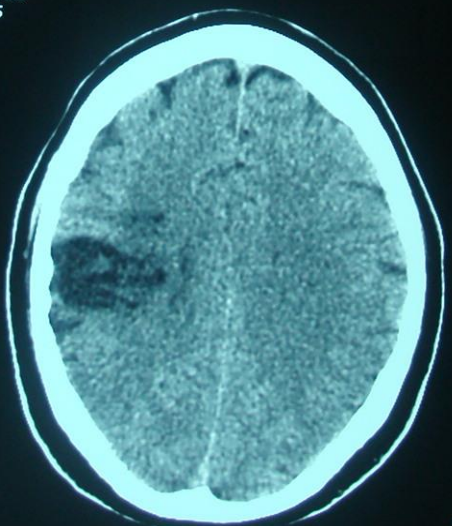
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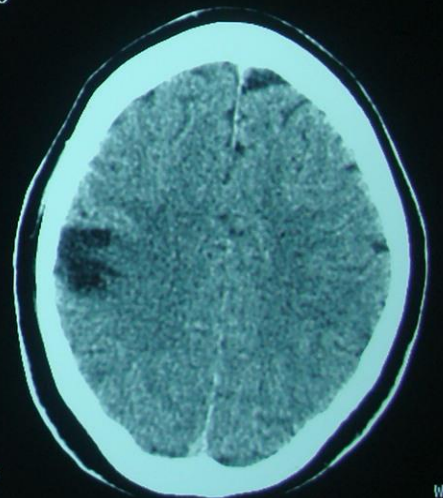
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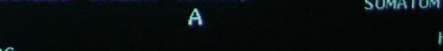
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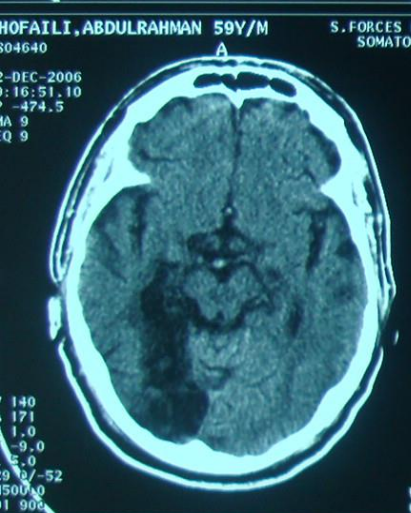
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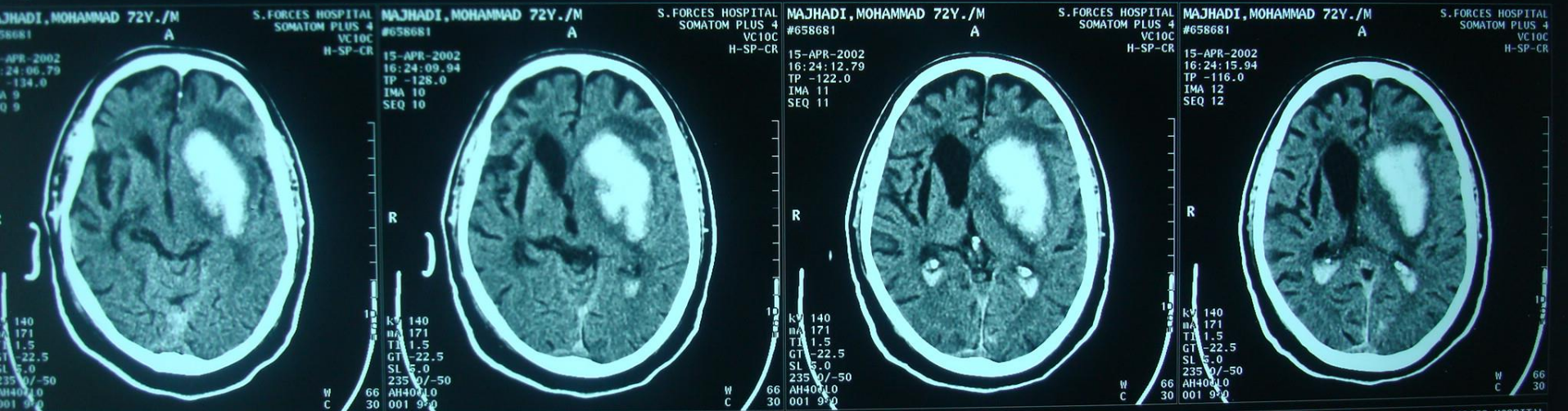
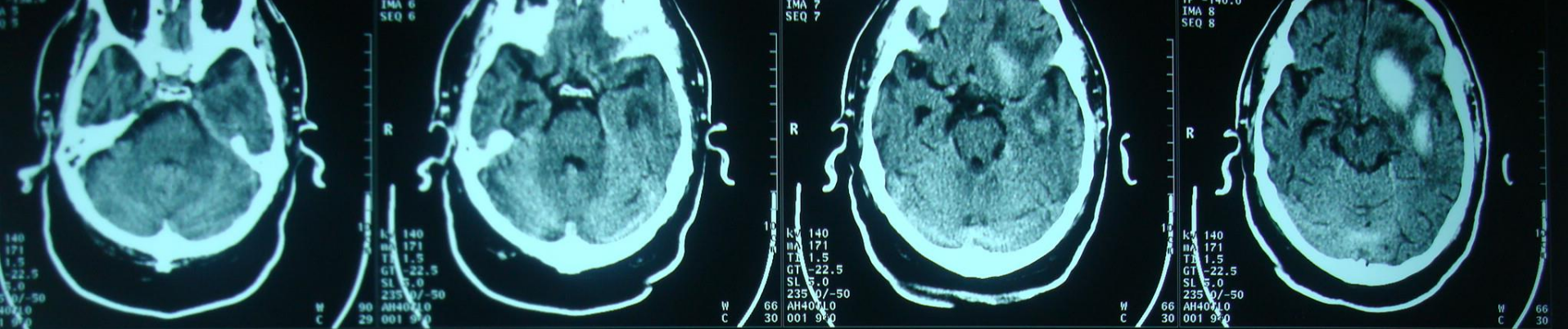


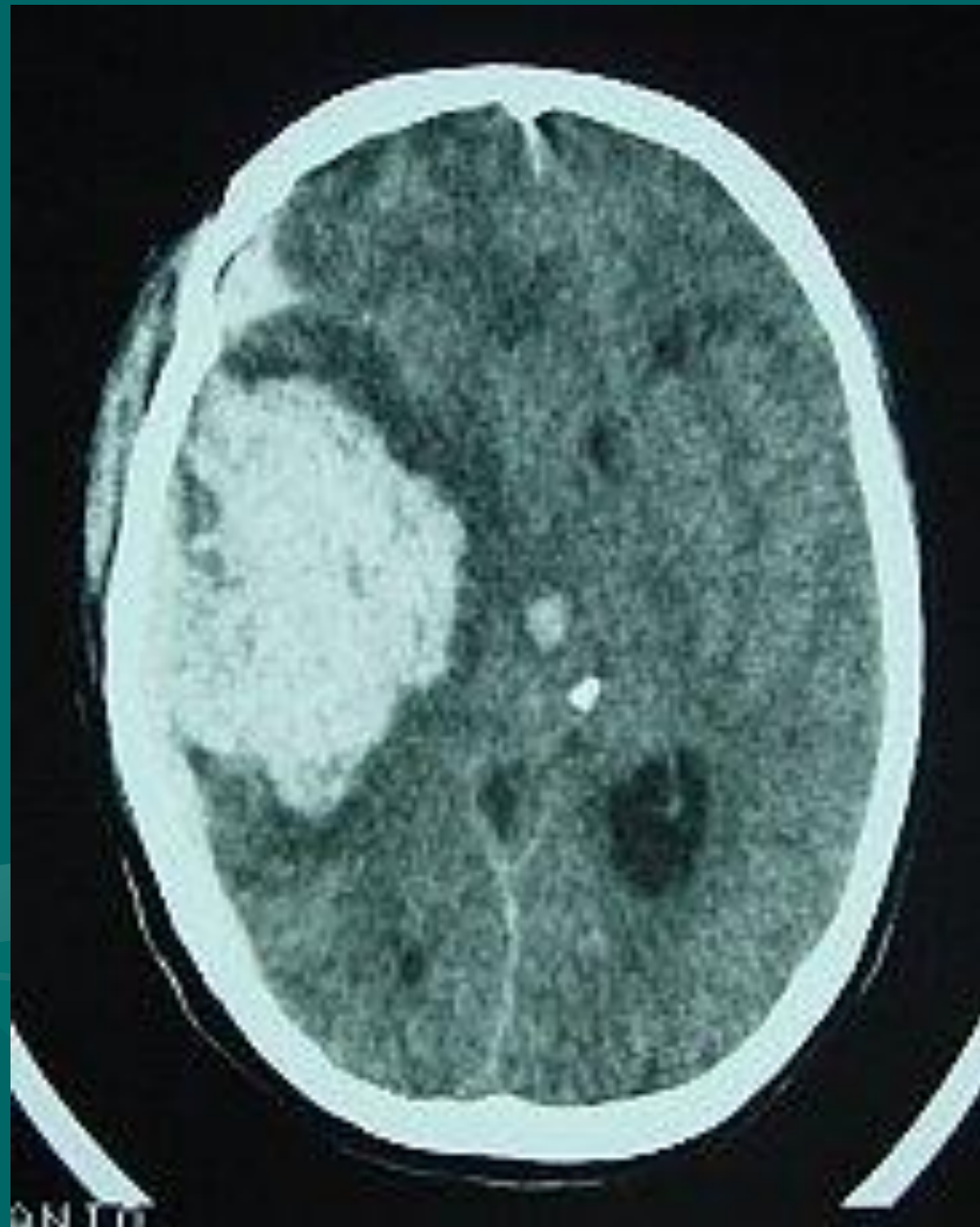
Brain hemorrhage

- Intracerebral hemorrhage:

Is bleeding in the brain caused by rupture of a blood vessel.

- May occur in any part of the brain, but the frequent sites are: basal ganglia, thalamus and cerebellum.
- A third of intracerebral bleeds result in intraventricular hemorrhage.
- **Most common causes are:**
 - Chronic hypertension
 - Rupture aneurysm or arterio-venous malformation





Intracranial Hematomas Head injury

- Intra parenchymal hematoma
- Epidural hematoma
- Subdural hematoma
- Subarachnoid hemorrhage

Epidural Hematoma

- Collection of blood between the inner table of the skull and the dura
- Most often occurs as a result of an arterial injury, usually meningeal artery or one of its branches, and therefore are usually temporo-parietal in location.
- The typical CT appearances of epidural hematoma is biconvex or lenticular, high density lesion.



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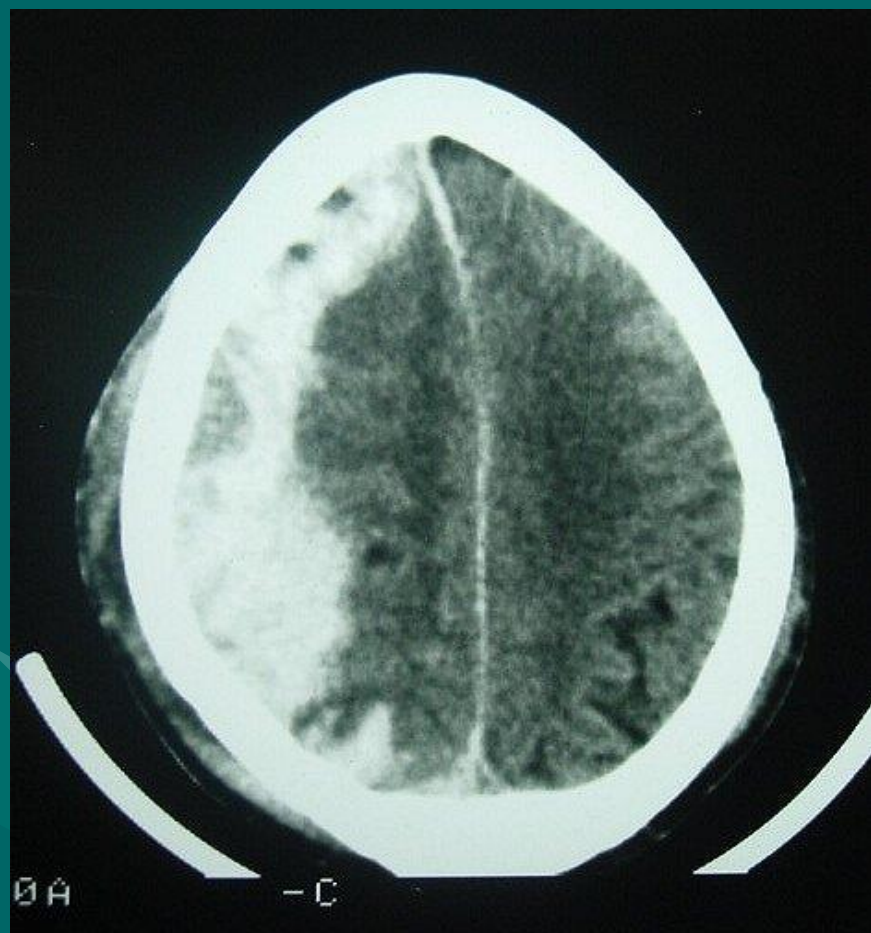


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Subdural Hematoma

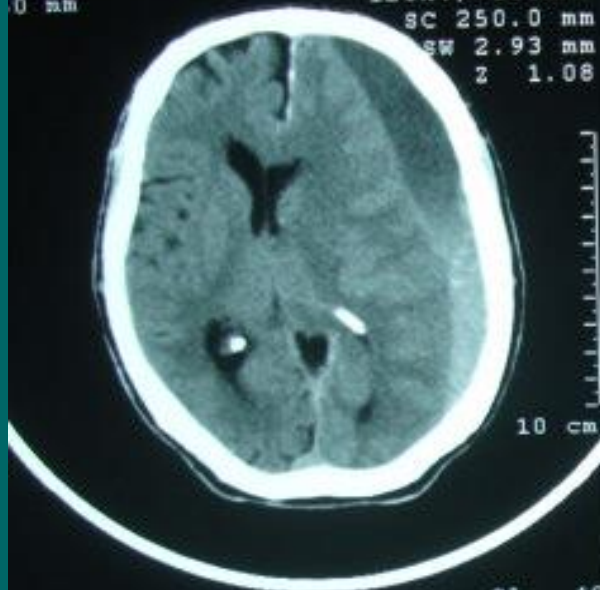
- Collection of blood between the dura and arachnoid
- Result from venous injury, usually tear of the bridging cerebral veins within the subdural space.
- The characteristic appearance of acute subdural hemaotma on CT is hyperdense crescent-shaped collection with concavo-convex configuration.





AD ALBSTANJI
M/70y
4-10 AXL
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Philips Brilliance
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SW 2.93 mm
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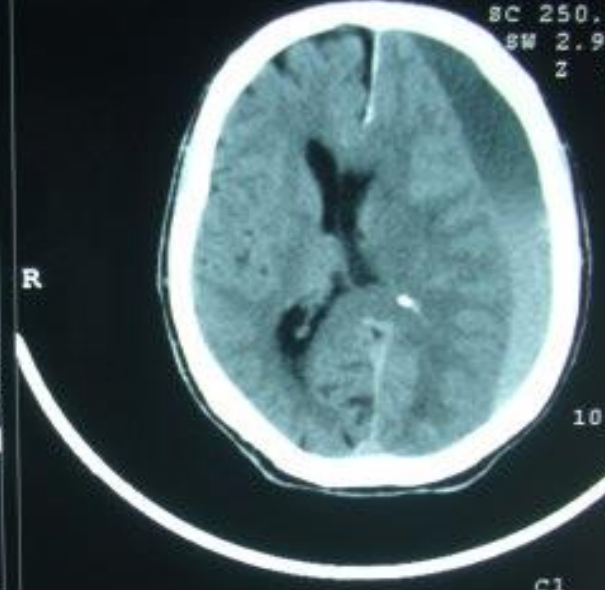


P

C1 40
W1 80

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Karak Hosp.
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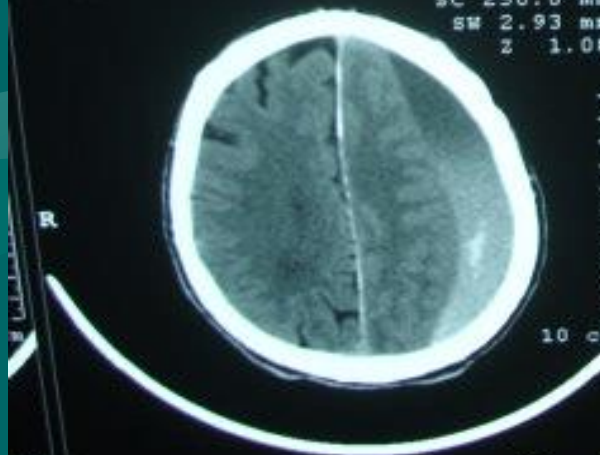
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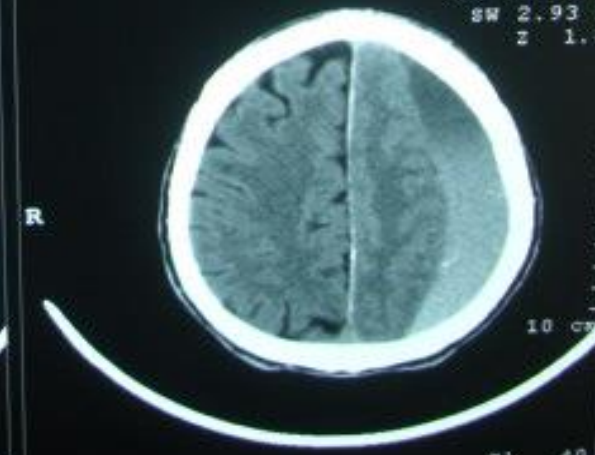
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SW 2.93 mm
Z 1.08



R

P

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W1 80

Subarachnoid Hemorrhage

- Hemorrhage into the CSF spaces, and frequently present in the acutely injured patient.
- SAH appear as hyperdensities filling the CSF spaces (basal cisterns, cerebral sulci, sylvian fissures and interhemispheric fissure).
- Subarachnoid hemorrhages are most often the consequence of penetrating injury, rupture aneurysm and systemic hypertension.

SOFAYANI FATMEH 63Y./F

#606941

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S.FORCES HOSPITAL

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W 60
C 28

S.FORCES HOSPITAL

SOMATOM PLUS 4
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Cerebral Contusion

- Bruising or crushing of brain tissue.
- Two types of cerebral contusion:
 - * nonhemorrhagic (necrotic)
 - * Hemorrhagic
- The hemorrhagic areas may not be evident in the very acute stage or in the first 24 hours.

MOHAINI, MAJED RASHED 24YR

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H-SP-CR



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Multiple sclerosis (MS)

- **MS is a white matter disease**, affects areas of the brain and spinal cord, destroying the fatty layer (**the myelin sheath**) which wraps around nerve fibers, resulting in areas of demyelination.
- Most common in young people and about two thirds of patients are female.
- The demyelinating lesions (plaques) present with a characteristic relapsing and remitting course.

Multiple sclerosis / 2

- **MRI is the investigation of choice.**
- The demyelinating plaques appear as focal discrete areas of abnormal high signal intensity on T2-weighted images.
- The common location of plaques are in the periventricular region, corpus callosum, and to a lesser extent in the brain stem, cerebellum, optic nerves and in the spinal cord.
- Contrast enhancement of the plaques indicate active disease.



Brain Tumors

Primary brain tumors can be classified as:

Intra-axial tumors:

arising in brain parenchyma.

Extra-axial tumors:

arise from cells outside the brain, such as the meninges and cranial nerves.

Brain tumors / 2

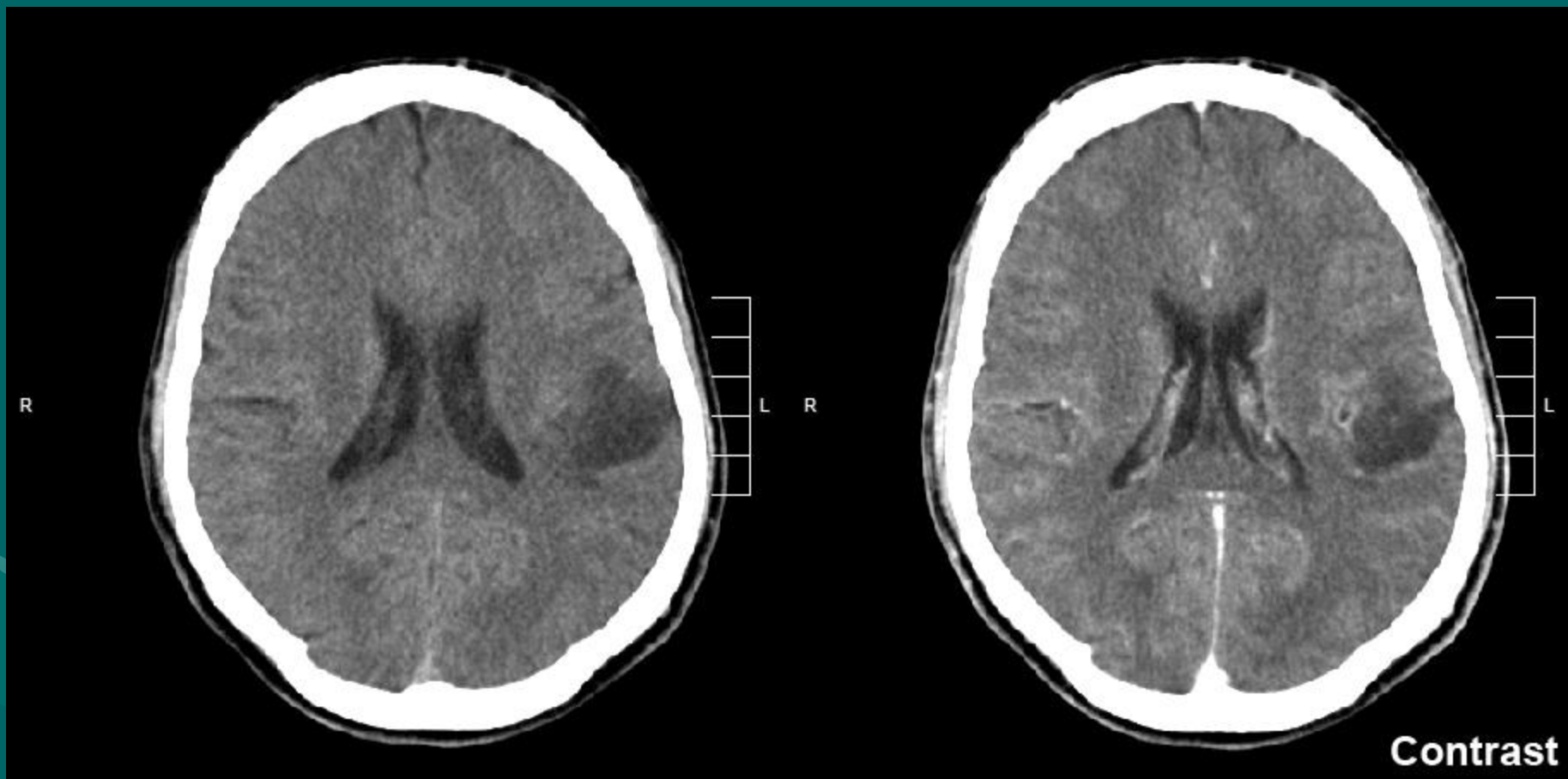
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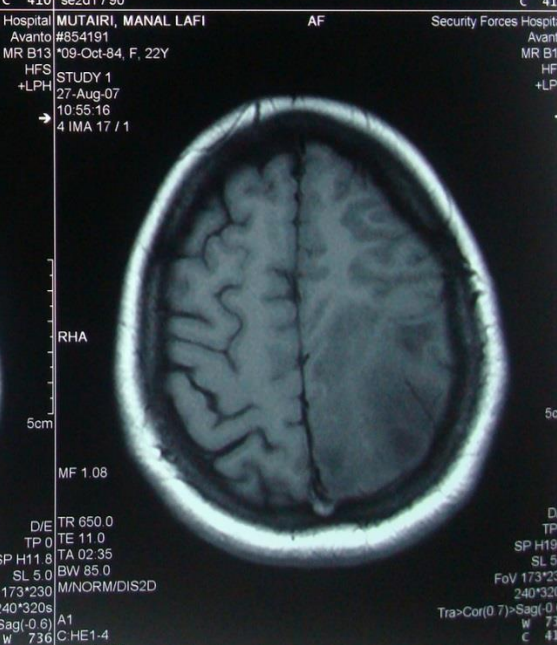
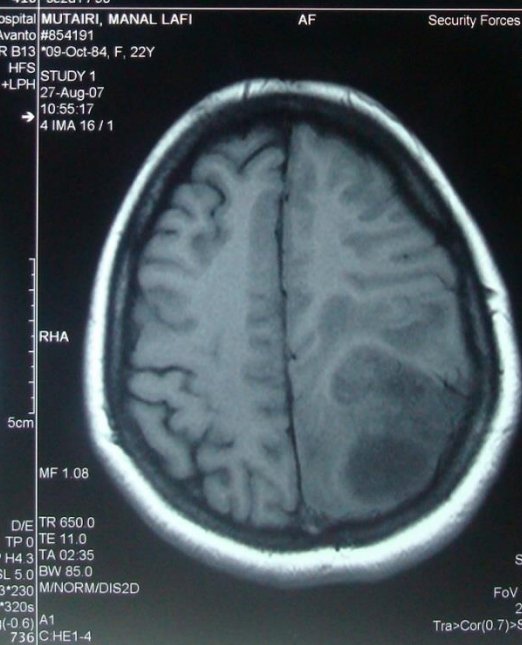
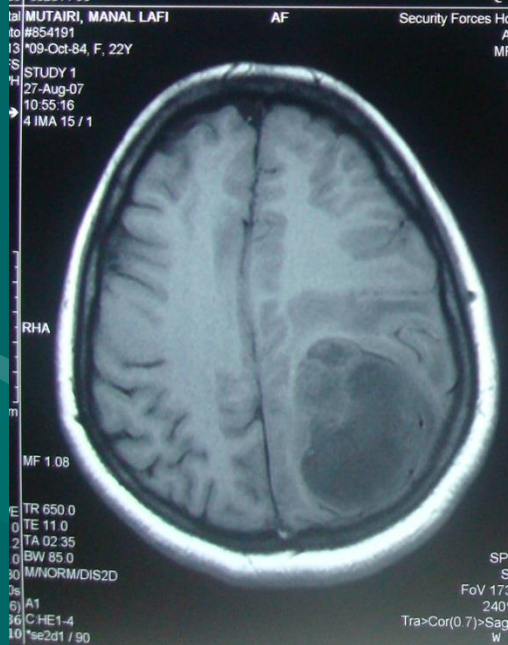
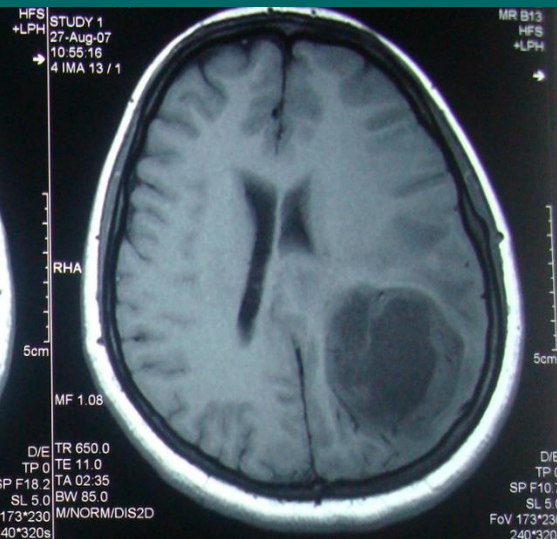
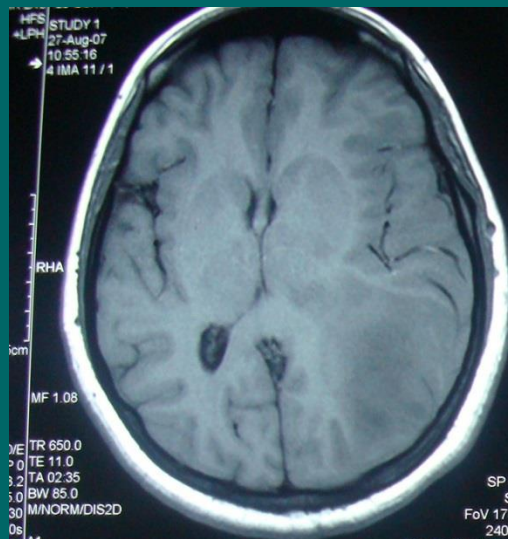
More than 50% of primary intracranial tumors are gliomas, and constitute a heterogenous group of tumors including:

- Astrocytomas.
- Ependymomas.
- Oligodendrogliomas.

Astrocytomas

- The astrocytomas are commonly given grades from 1 to 1V .
- The low grade astrocytomas are most commonly in young adults.
- The high grade astrocytomas (grade 1V) are called glioblastoma multiforme.







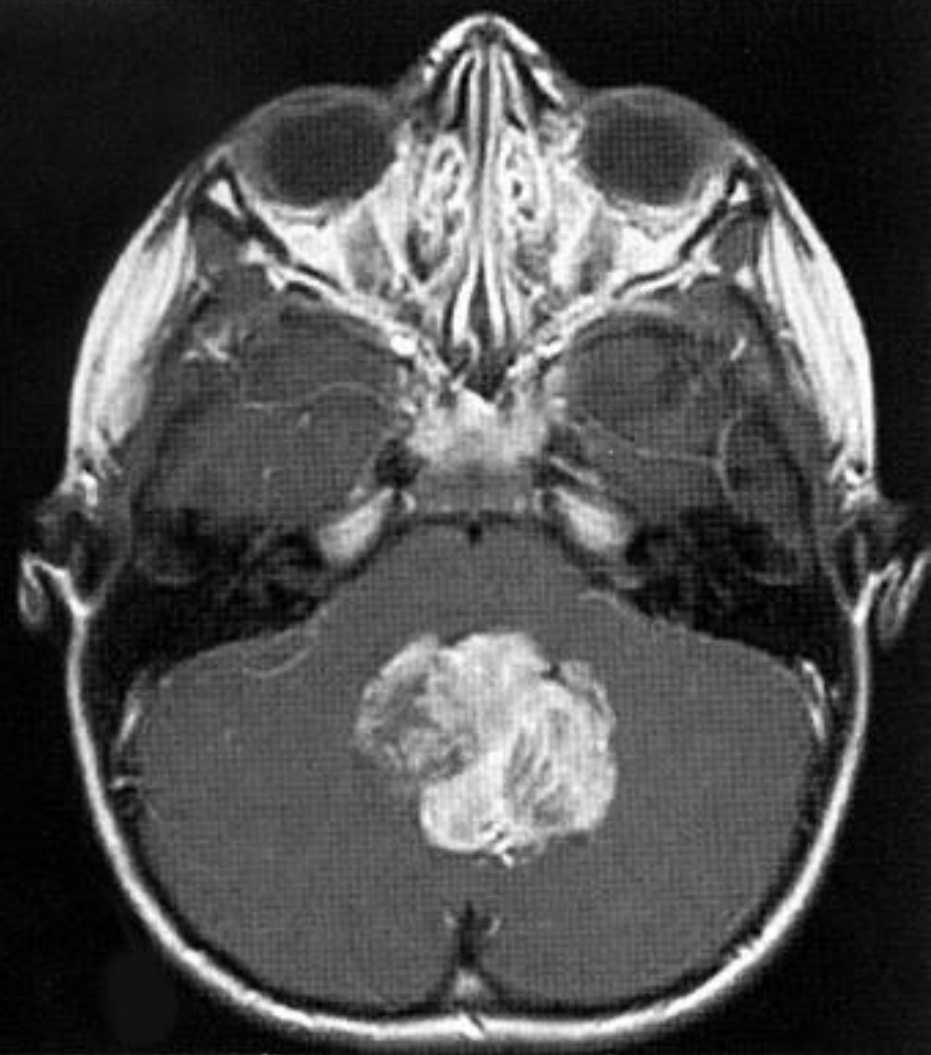
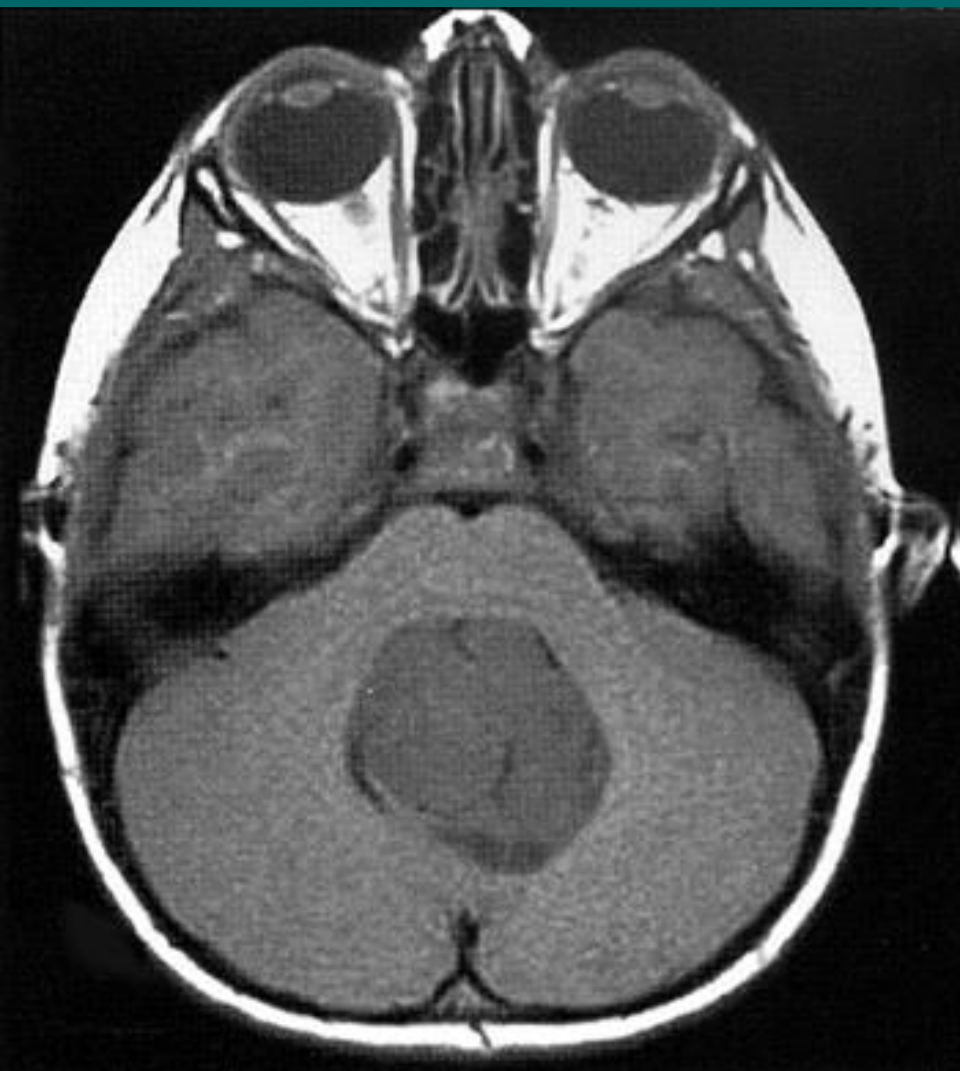
Cerebellar tumors

In adults:

- The most common cerebellar lesion is a metastasis.
- The second most common tumor is a hemangioblastoma.
-

In children:

- Medulloblastoma: is the most common malignant brain tumor of childhood.
- Astrocytoma.
- Ependymoma.
- Brain stem glioma.



What are the common extra-axial tumors ?

- ☐ Meningiomas
- ☐ Neuromas
- ☐ Metastasis
- ☐ Pituitary tumors

Meningiomas

- Represent 15-20% of primary brain tumors.
- They are benign, well circumscribed lesions, arising from any part of the meningeal covering of the brain, most commonly in the parasagittal region and sphenoid wing.
- Small punctate calcifications can be seen in 25% of tumors.
- CT or MRI show well defined lesions enhancing strongly and diffusely after intravenous contrast.

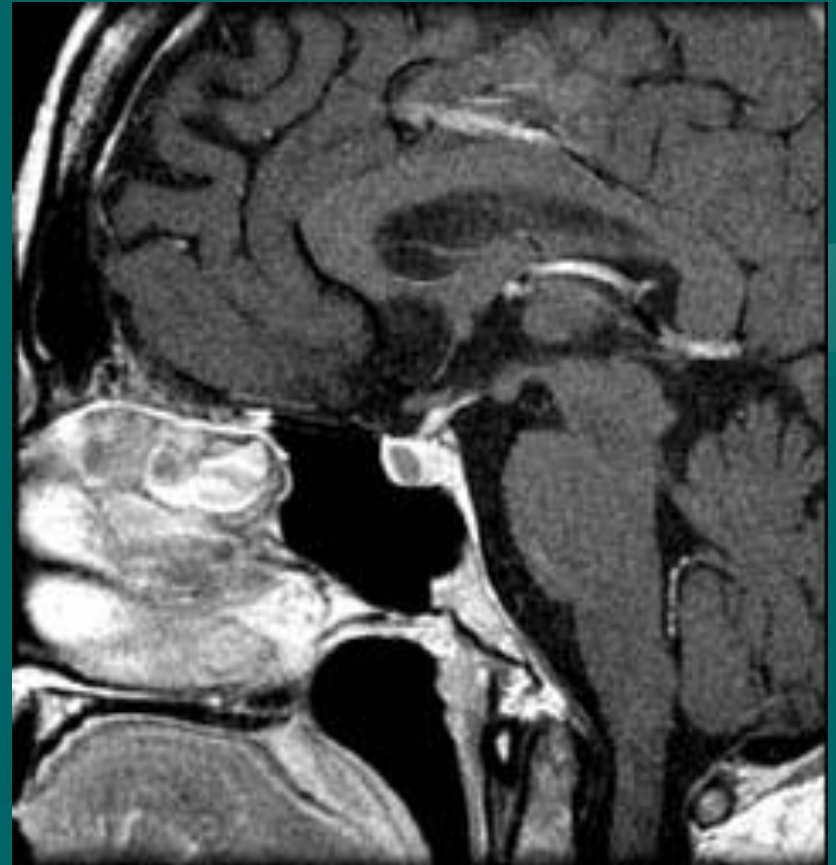
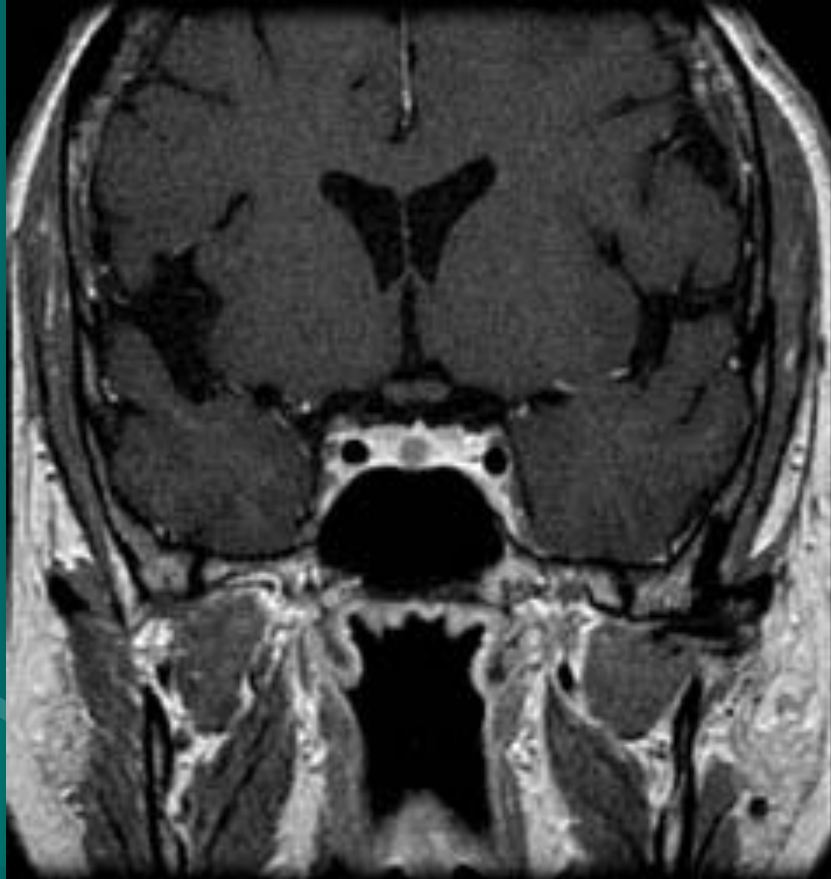


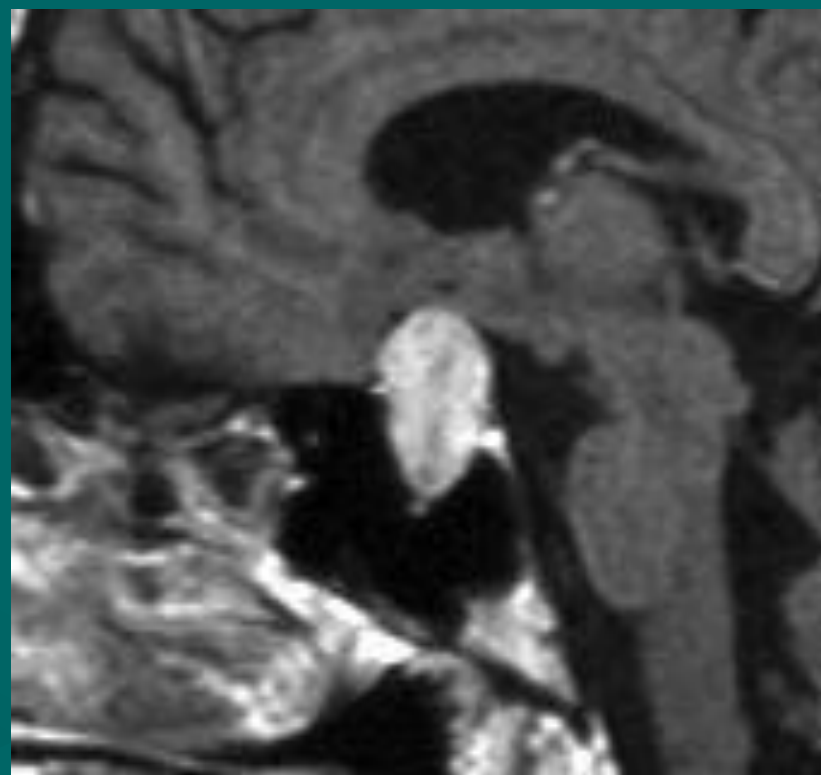
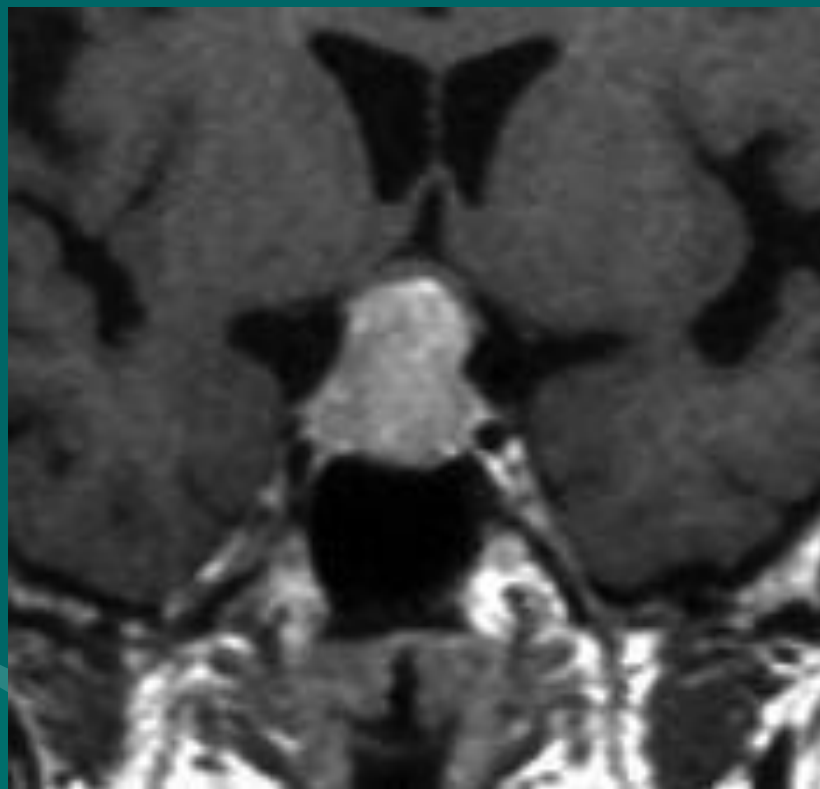
Pituitary tumors

- The plain films show pituitary fossa enlargement or erosion.
- Adenomas smaller than 1cm are microadenomas, and larger adenomas are macroadenomas.
- MRI is superior to CT in detecting adenomas.

Acoustic neuroma:

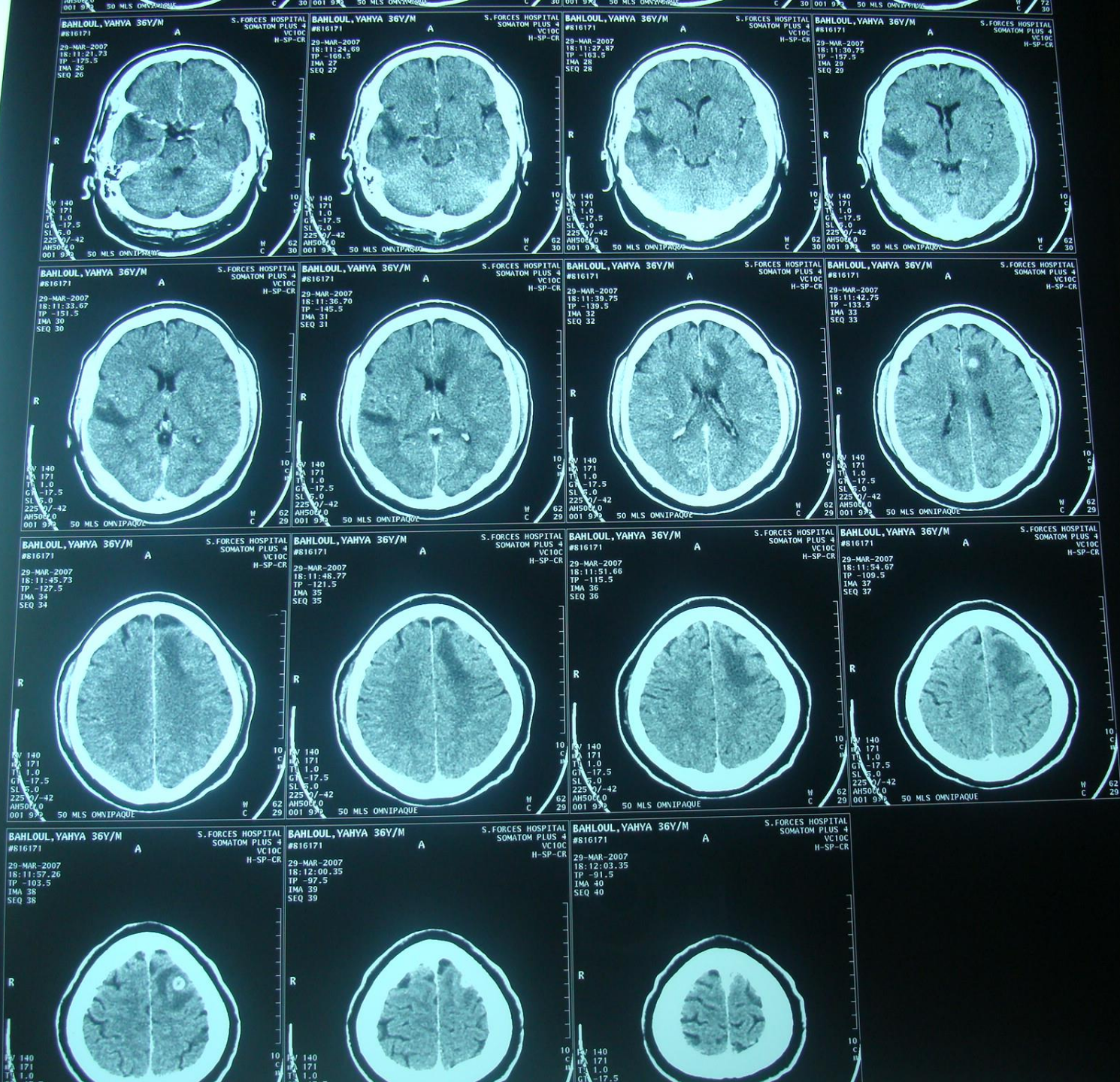
- Arise in or near the internal auditory canal and may cause widening and erosion of the canal.
- MRI is more sensitive than CT in its detection.





Brain metastasis

- The majority are multiple (80%)
- They can occur anywhere in the brain, but the gray-white matter junction is the commonest site.
- Metastatic lesions are usually associated with a considerable amount of surrounding edema.
- Brain metastasis are commonly from bronchial, breast and gastro-intestinal tumors.





Thank
You