

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَمَا أُوتِيتُم مِّنَ الْعِلْمِ إِلَّا قَلِيلٌ

صَدَقَ اللَّهُ الْعَظِيمُ  
(سُورَةُ الْإِسْرَاءَ - الْآيَةُ ٨٥)

# *Introduction Of BRAIN Tumors*

*From Lectures of  
Prof.Dr.Mamdouh Mahfoz*

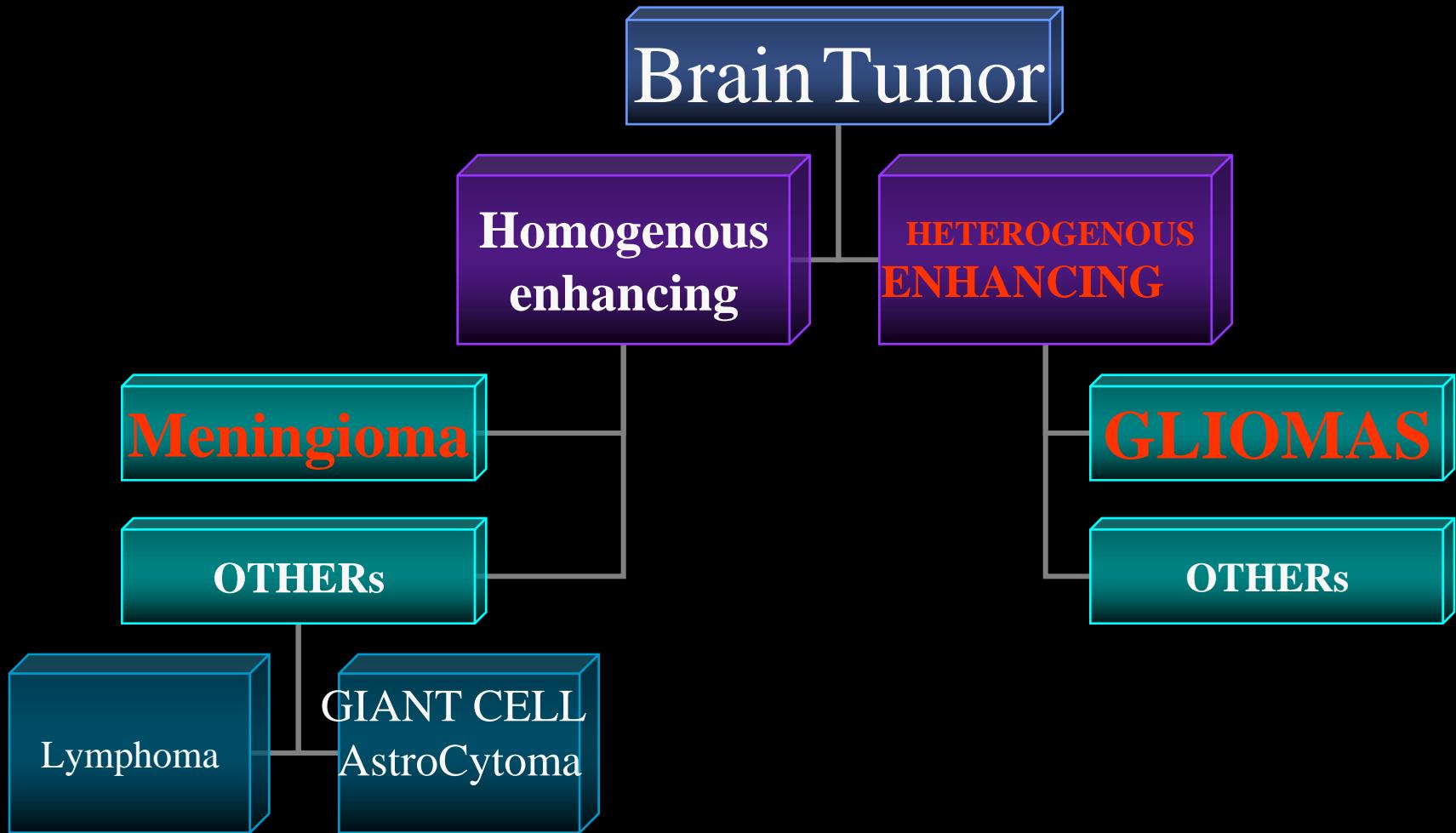
*By  
Ahmad Mokhtar Abodahab  
Radiology Department*



***DONOT FORGET***

To Diagnose Brain Tumor → Contrast  
is a must.

According To Pattern of enhancing  
They may classified into:



# According To WHO

## They may classified into:

- Neuro Epithelial Tumors i.e GLomas
- -Nerve Sheath T
- -Meningeal T
- -Metastases
- -Lymphoma
- -Cysts
- -Germ Cell T

# *General Roles*

- Edema Around neoplasm is

***VASOGENIC EDEMA***

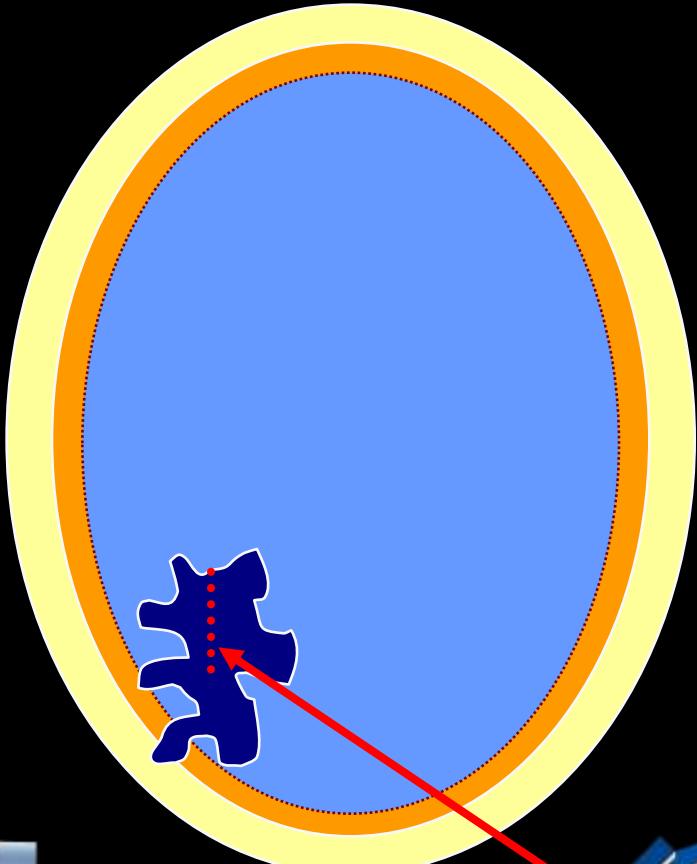
- Finger Like



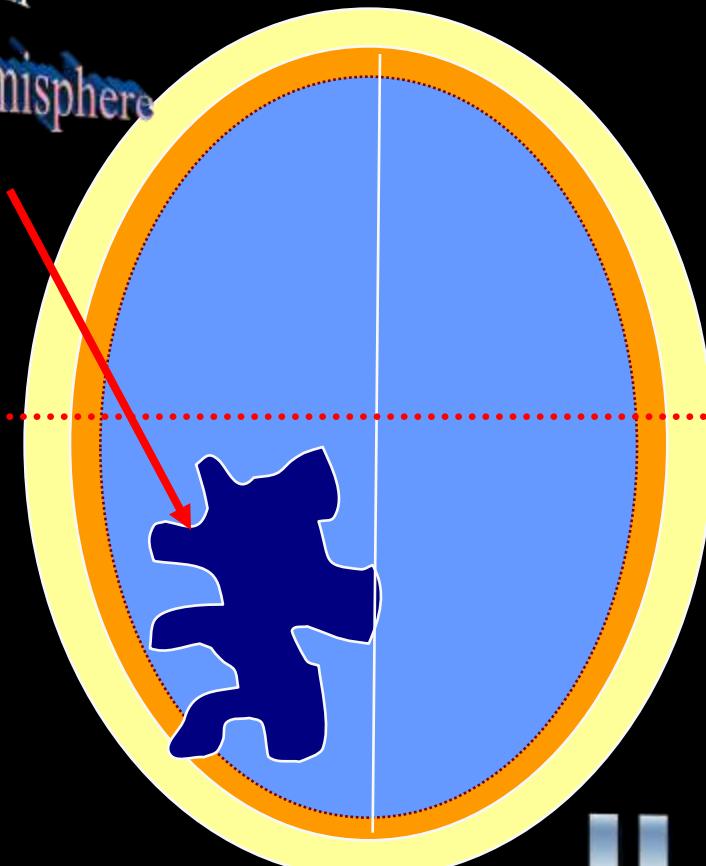
- *Grades:*

- I-Up to 2cm aronud
  - II- > 2 cm & < half hemispher
  - III> Half Hemisphere
- +/-
- IV-in other Hemisphere.

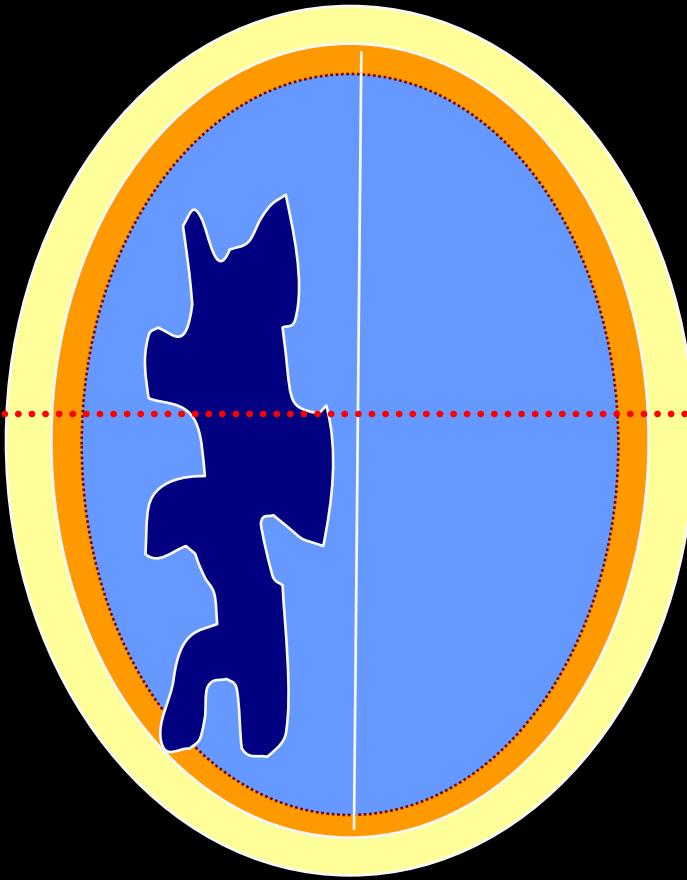
# ***Grades:***



$>2\text{cm}$   
 $<\text{Half Hemisphere}$

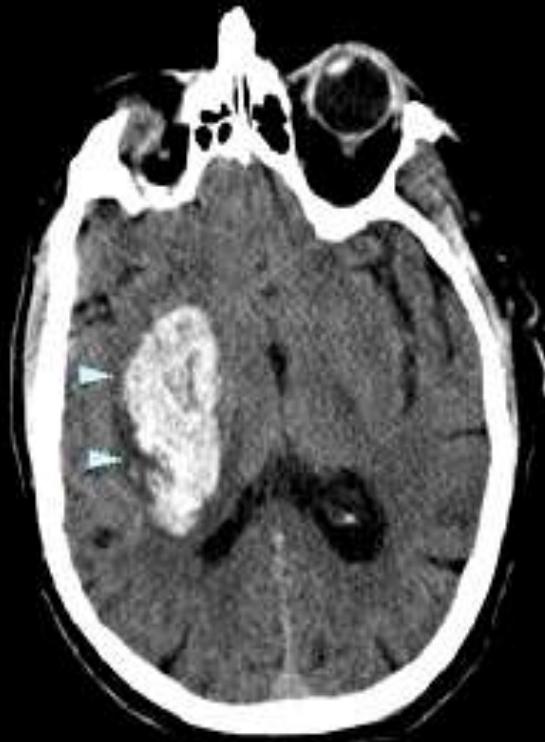


>Half Hemisphere

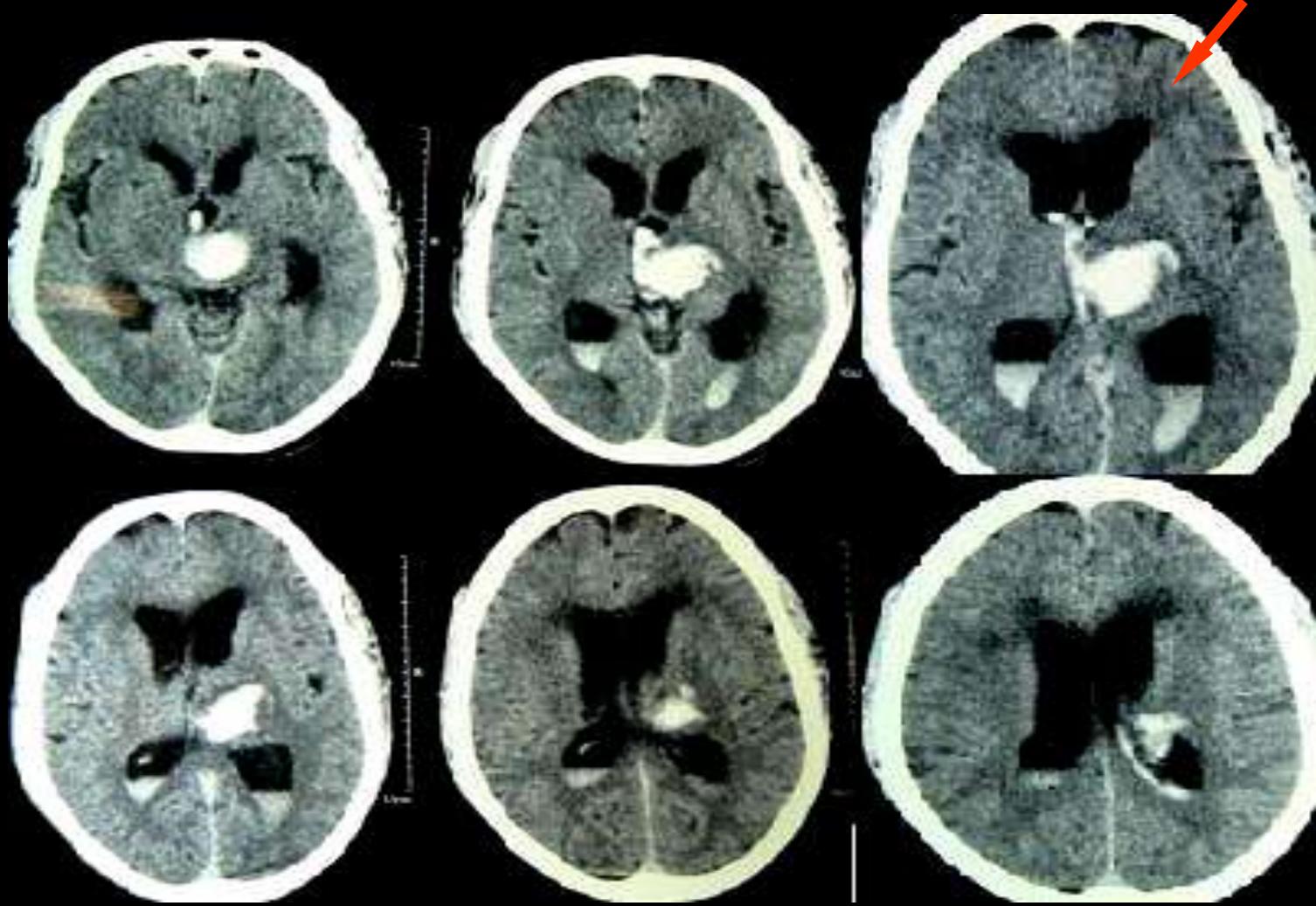


## Other Types of

- 1-cytoToxic: around infarct & hag
- 2-Vasogenic: SOL
- 3-PeriVentricular:  
around Ventricles also=(Retrograde  
TRansepindymal CSF Permiation)



Cytotoxic Brain Edema

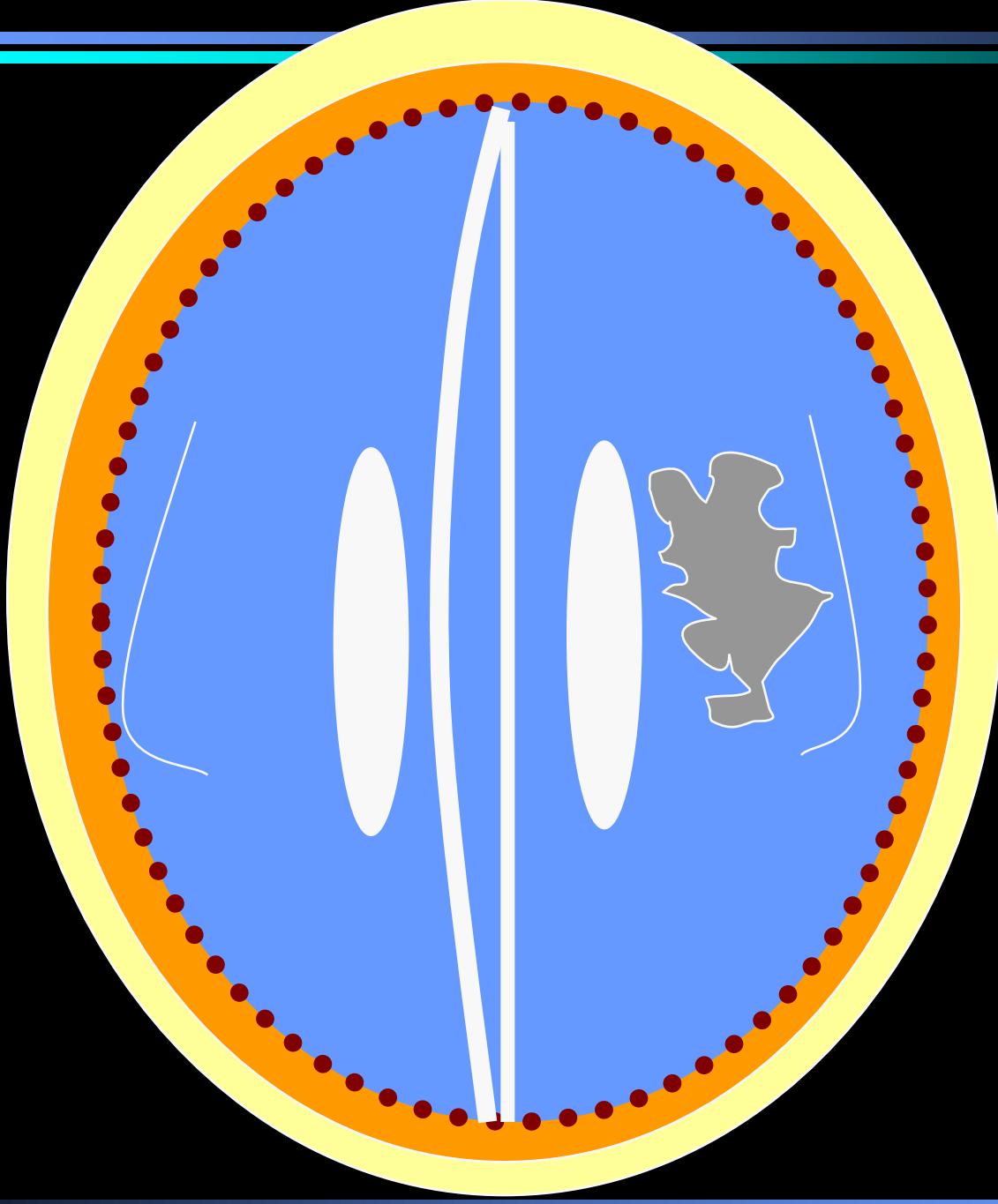


*Retrograde  
Transepидymal CSF  
Permiation*

# Mass Effect

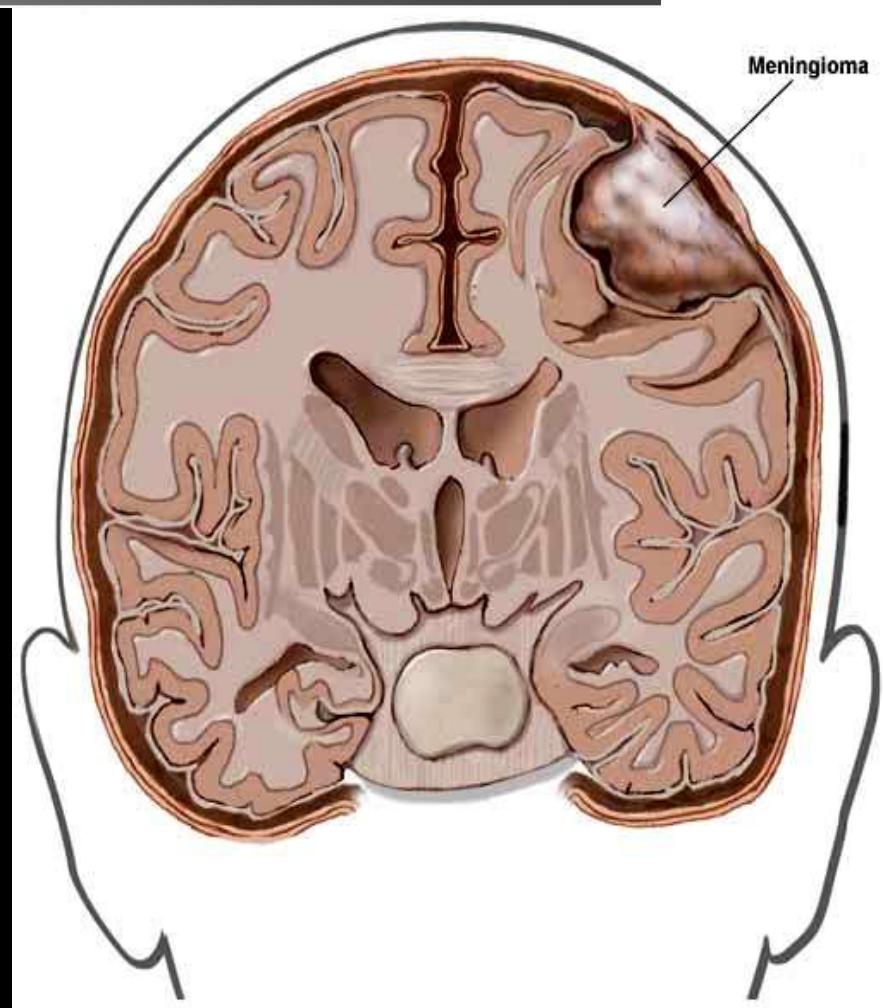
Mass effect is the SOL effect on Brain tissue, as follow:

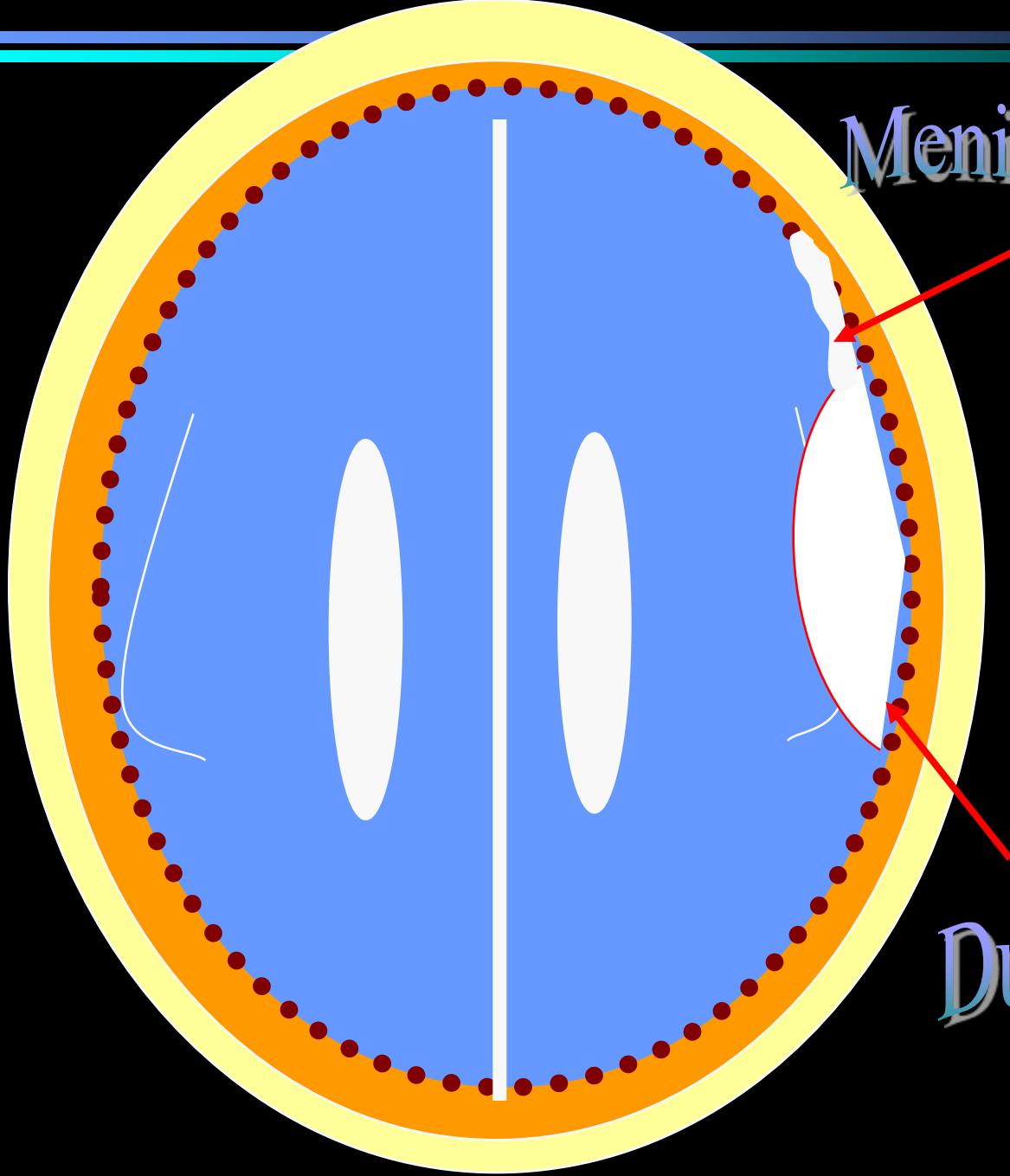
- 1-Sulci efface
- 2-Ventricle compression
- 3-MedLine Shift
- 4-Herniation Tras Tentoreal



# MENINGIOMA

- Tumor of Meninges.
- Commonest homogenous enhancing neoplasm of the brain.
- It is Extra-Axial Neoplasm.



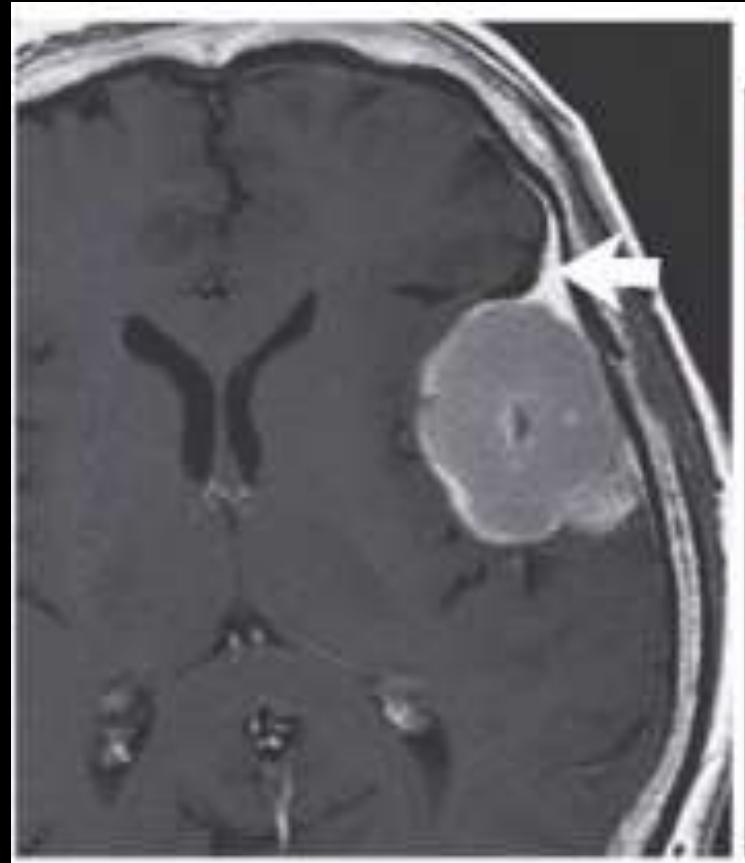


Meningeal Tail

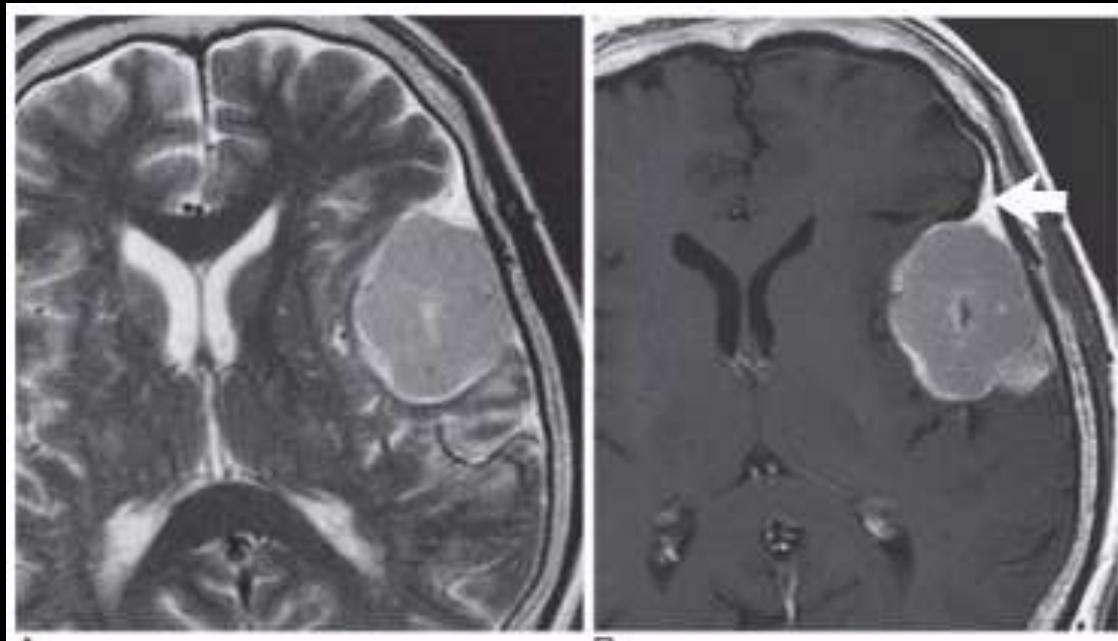
Dural Base

- \*Homogenous enhancing
- \*DuraL Base = wide connection to dura
  - +/\_
  - Calcification 10:20%
  - Bone Sclerosis ← Bone irritation.
  - Edema 40%
    - Subtypes Rapidly grow → More edema
  - Meningeal Tail:
    - Not Specific
    - Sign of Meningial irritation.





- MR:
  - Tumor contains water = Low T1 – Hi T2
  - Homogenous enhancing.
- What is the exceptions?
  - Calcification → Low T1/T2 & not enhancing.
  - Break down Foci → LoT1/Hi T2 & Not enhancing.



T2 & enhanced T1

# Other forms of meningioma

- Meningioma with cystic component.
- “ of optic nerve.
- Intraosseous (en plaque).
- Multiple meningiomas.
- Intra-ventricular meningioma.

# Other Homogenous enhancing Brain Tumors:

- Lymphoma
- Giant Cell Astrocytoma

# Lymphoma

- 1% of Brain Tumors.
- MostLy SingLe
- MuLtiple → in young immunocompromised.
  - Homo enh
  - No DuraL Base
  - PeriVentricuLar

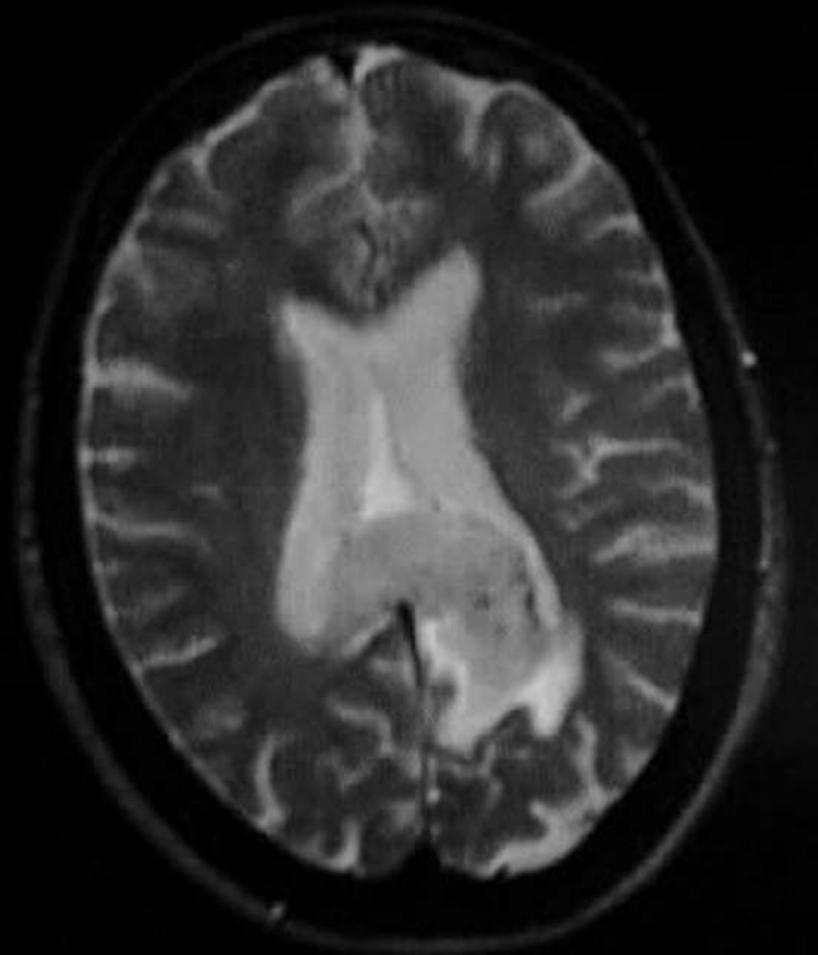
- Hi affinity to Corpus Ca → may cross midLine
  - No CaLc.
  - UsuaLLy LoT1/Hi T2 but IT HAS NO FIXED

SIGNAL PATTERN.

+/-

- Little Edema
- Mild Mass effect as لأنه ورم طرى it soft nature





# Giant Cell Astrocytoma

- See Gliomas

# HETEROGENOUS

*Enhancing*  
*Brain Tumors*

# \*\*\* GLIOMAS

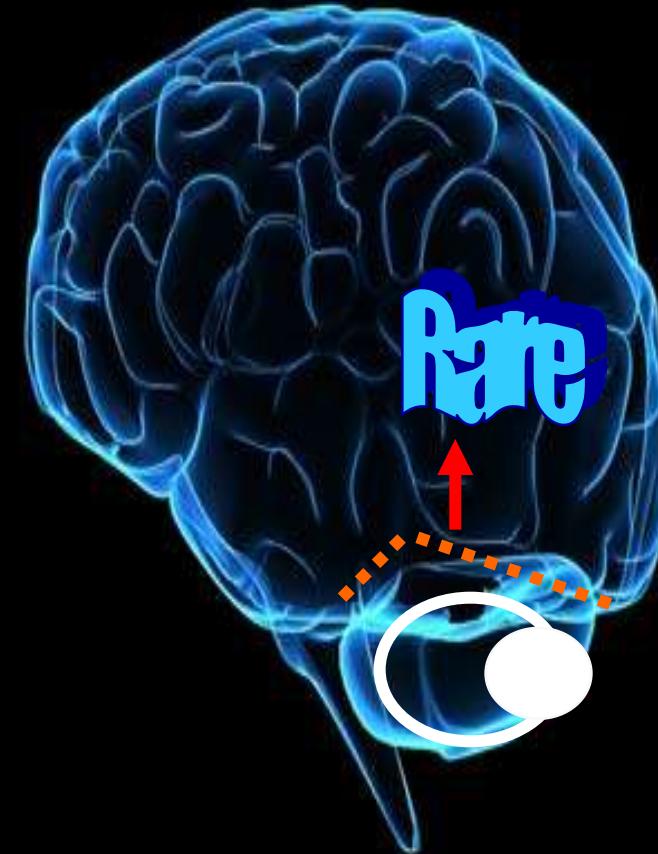
- 40:45% of Brain Tumors.
- 2 main groups:
  - Low & High Grade Glioma.  
I → Low Grade
    - 1-PiLocytic Astrocytoma
    - 2-SupEpendymal Giant CeLL Astrocytoma
    - 3-PLeomorphic Xano Astrocytoma "PXA"

## II- HIGH GRADE:

- 1-Diffuse Astrocytoma
  - 2-Anaplastic "
  - 3-GLiobLastoma MuLtiform
- Other Types not directly follow classification:
- 1-Gliomatosis Cerebri
  - 2-OLigoDyndroGLioma
  - 3-MuLtiCenteric GLioma

# L1- Pilocytic Astrocytoma

- Post.Fossa UsuaLLy / Rare SupraTent
- Cyst e Enhancing Mural nodule
- Contrast may diffuse inside → Fluid Level.

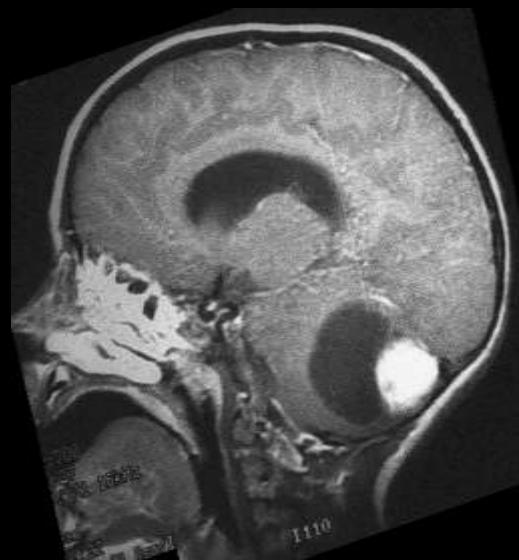
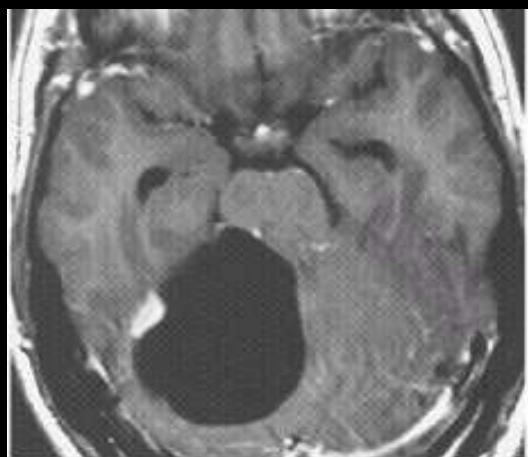


- **P**ILOCYTIC  
ASTROCYTOMA
- **P**osterior Fossa

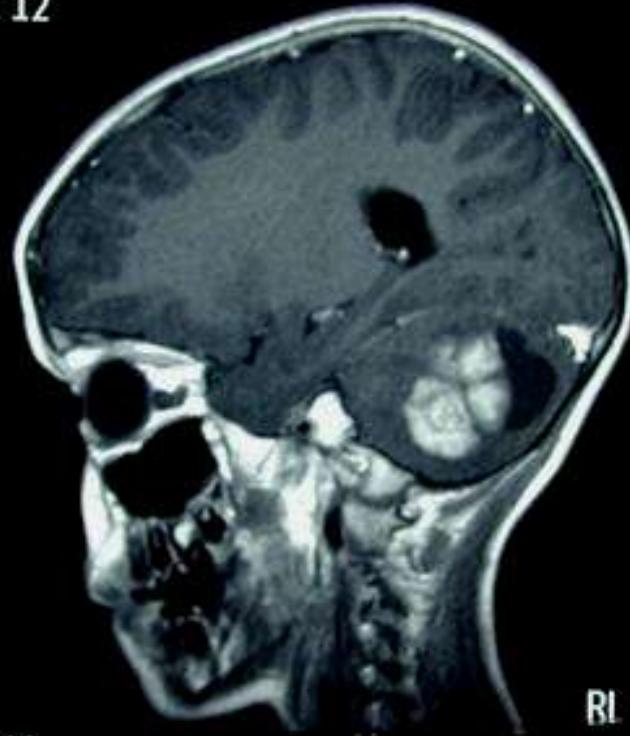




484  
515  
787



L12



L12

BL:

H



## L2- SupEpendymaL Giant cell Astrocytome

- THE ONLY HOMOGENOUS ENHANCING GLIOMA.
- Rare -20<sup>th</sup>
- Frontal Horn of Lat vent=Characteristic i.e Near Monoro Foramen.
- Non recurrent after ttt.  
(Associated with tuberous sclerosis)

**lateral ventricles**

**subarachnoid  
space**

**foramen of  
Monro**

**3rd  
ventricle**

**aqueduct of Sylvius**

**4th ventricle**

**obex**

**central canal**

**cisterna  
magna**

© Mayfield Clinic



R

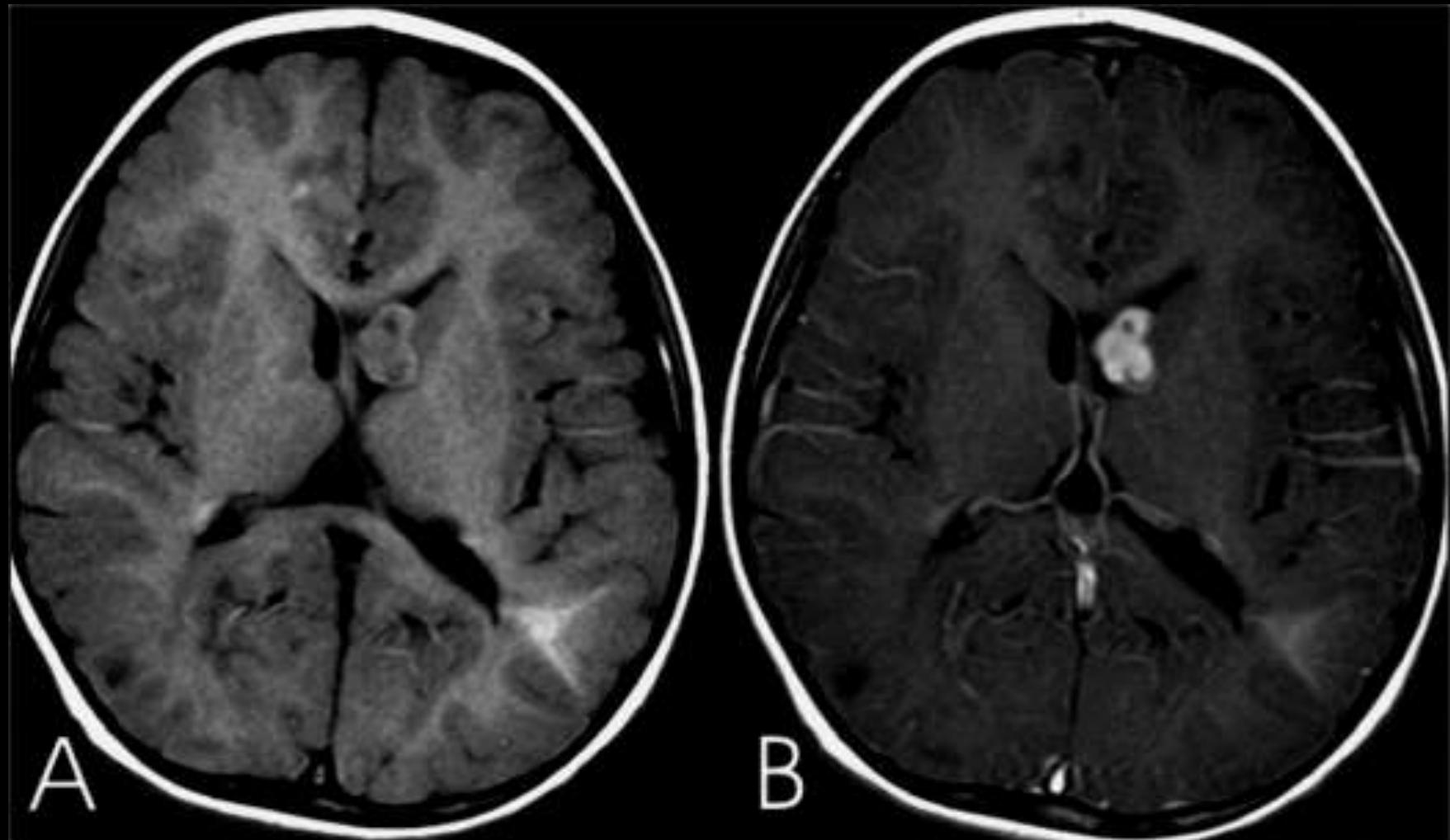
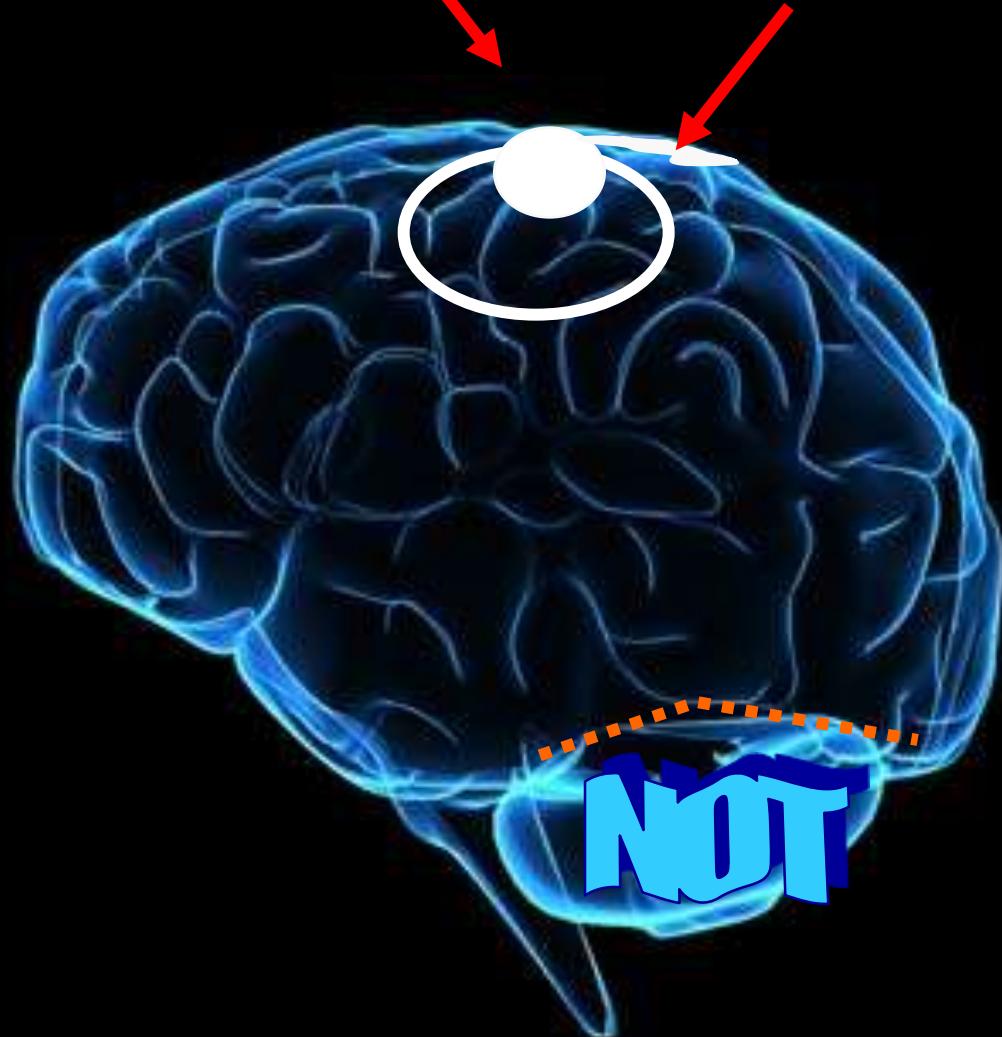


Fig 1. (A) Axial T1 weighted MRI before contrast administration shows a large left foraminal nodule promoting mild left lateral ventricle enlargement. Bilateral cortical tubers are also seen. (B) Axial T1 weighted MRI post-contrast administration demonstrates strong enhancement of the left Monro foramen nodule.

# L3- PLiomorphic Xantho Astrocytoma "PXA"

- Newly discovered '1993'
- Teen th -1M:1F
- SupraTentorial / **NOT in Post Fossa**
- Cyst e Enhancing Homogenous Nodule
  - Nodule on Surface
  - +/- Meningeal Tail

# *Superficial Nodule*



P.X.a

Posterior Fossa

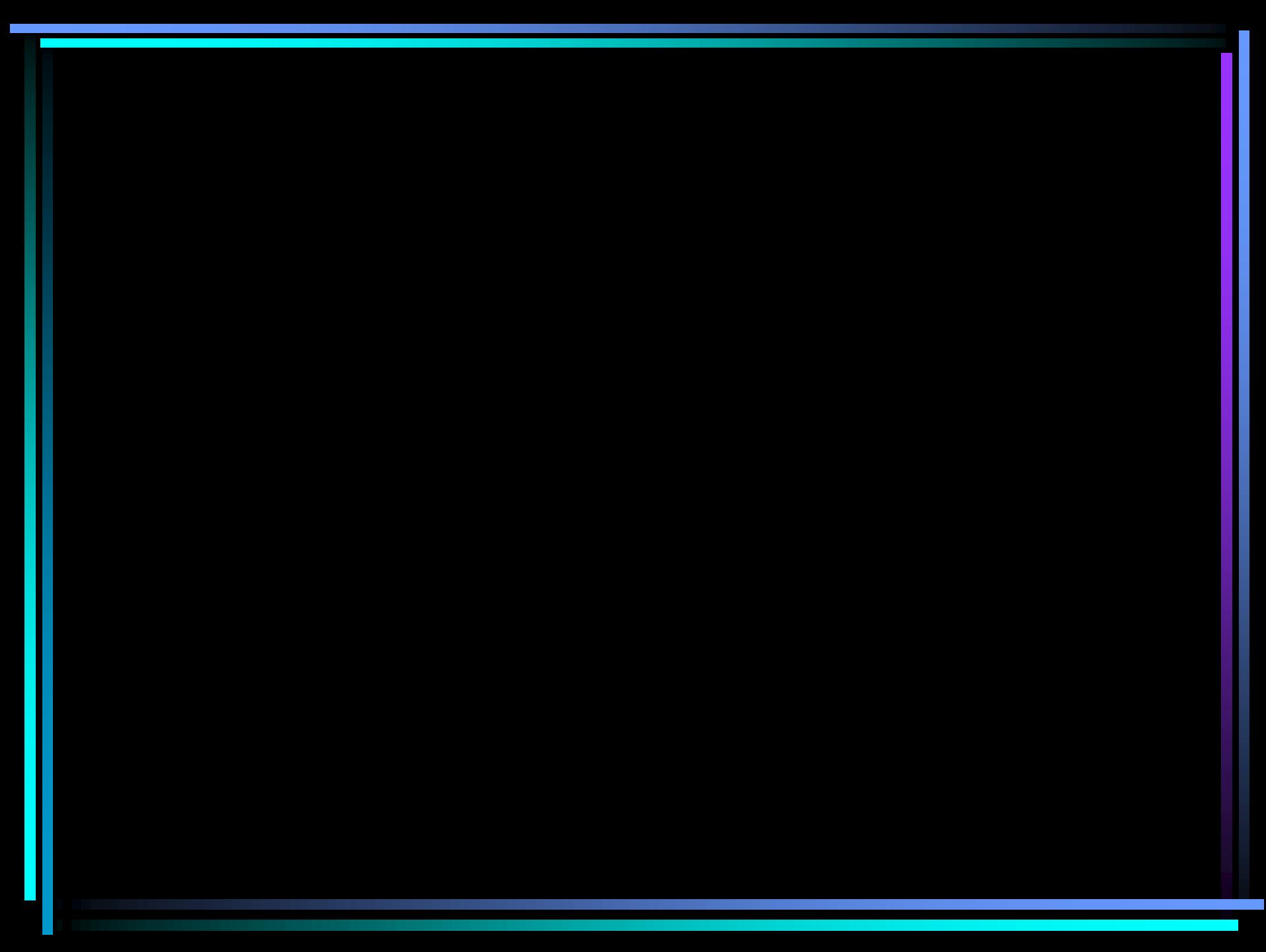
NOT

Astrocytoma

# D.D. of PXA / Meningioma e Cystic components

- Compare Tumore size (nodule) / Cyst.
  - Cyst > Nodule → PXA.
  - Cyst < Tumor → Meningioma e cystic component.

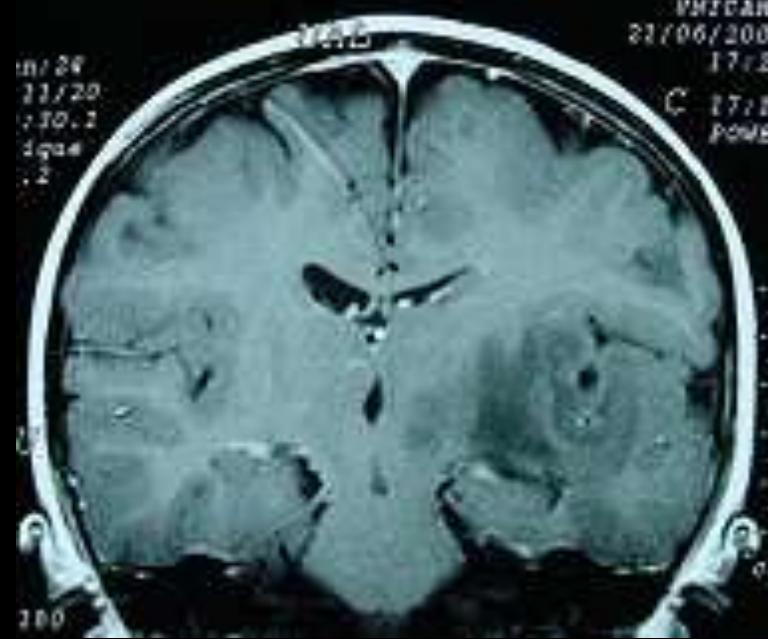




# H1-Diffuse ASteroCytoma

- 10% of Brain Tumor
- Teens :40 th decade.
- M > F
- CT: HYPO Dense
  - **Non Enhancing** (*but enhancing can occur after operative intervention*).
- MR:
  - Lo T1/Hi T2
  - Appear Larger->MR sensitive to outer microscopic edge.

- IT CAN PROGRESS TO OTHER TYPES.
  - D.D. INFARCTION , by
    - History/C.P
    - B.V. Cortical pattern



## H2 -ANAPLASTIC ASTROCYTOMA

- Patchy Enhancing "Plotted"
  - No Hemorrhage
  - No Necrosis
- MR: Iso T1/Hi T2

# **ANAPLASTIC**

= Hi Malignant

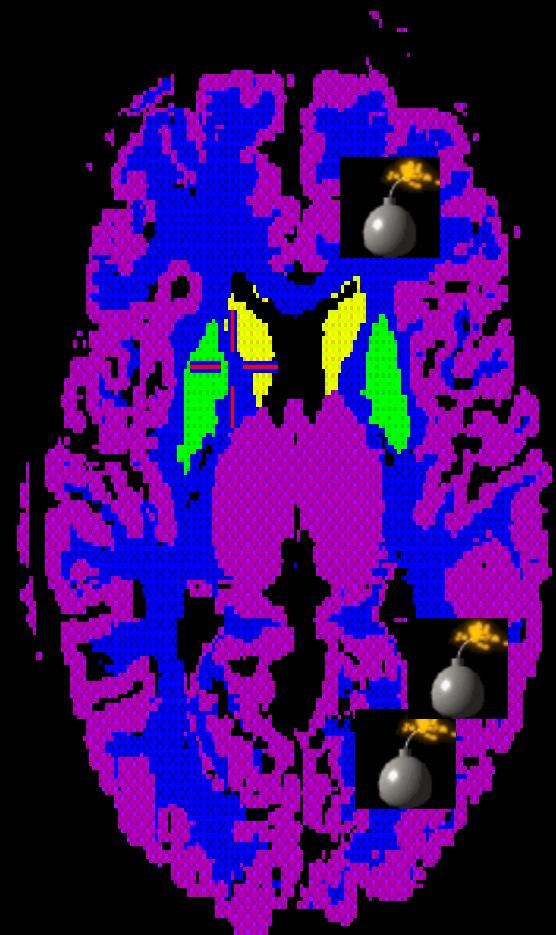
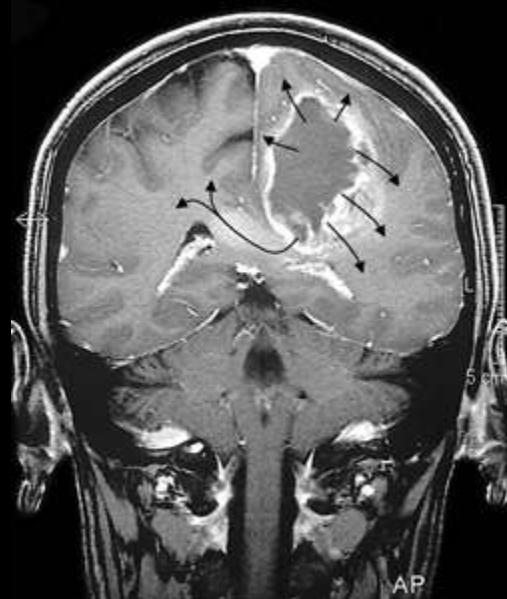
i.e. No Resistance

No Hemorrhage

No Necrosis

# H3 - GLIBLASTOMA MULTIFORM

- Frontal & Temporo-  
Parital
- 75% corpus Callos  
→Butterfly pattern.



- CT
  - Edema GII 90%
  - Real edge Beyond Radiology detection
- Enhancing: Heterogeneous or
  - Non Uniform Marginal
  - -/+ Hemorrhage.
- MR
- Hemorrhage -> Hi T1&T2 but NOT Enhancing.
- Hetero Lo T1
- Hetero Hi T2

**GB**

**MULTIFORM**

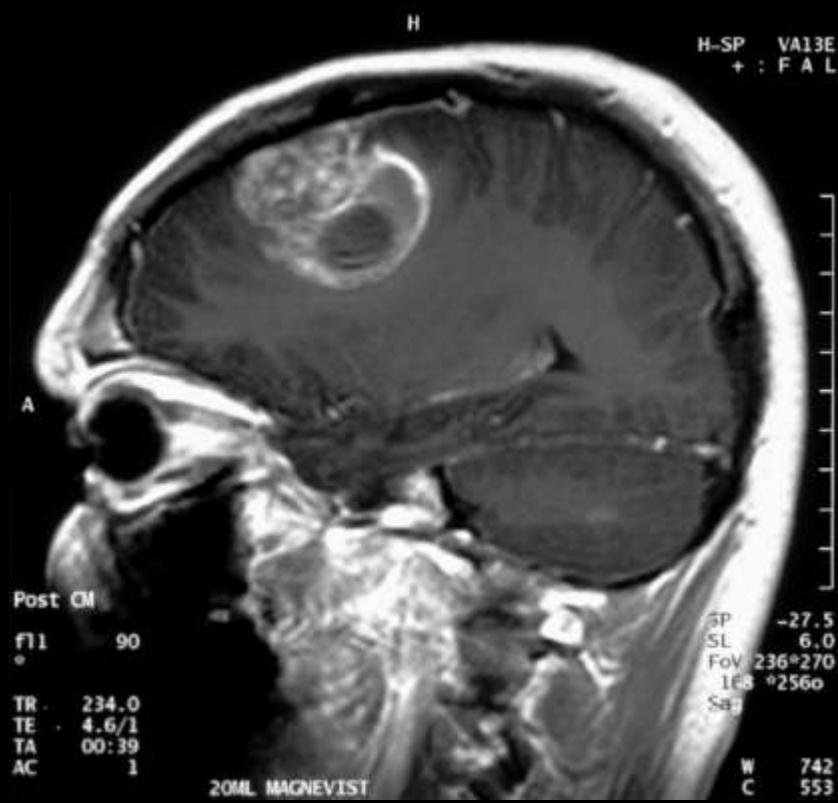
**Non Uni Marginal**

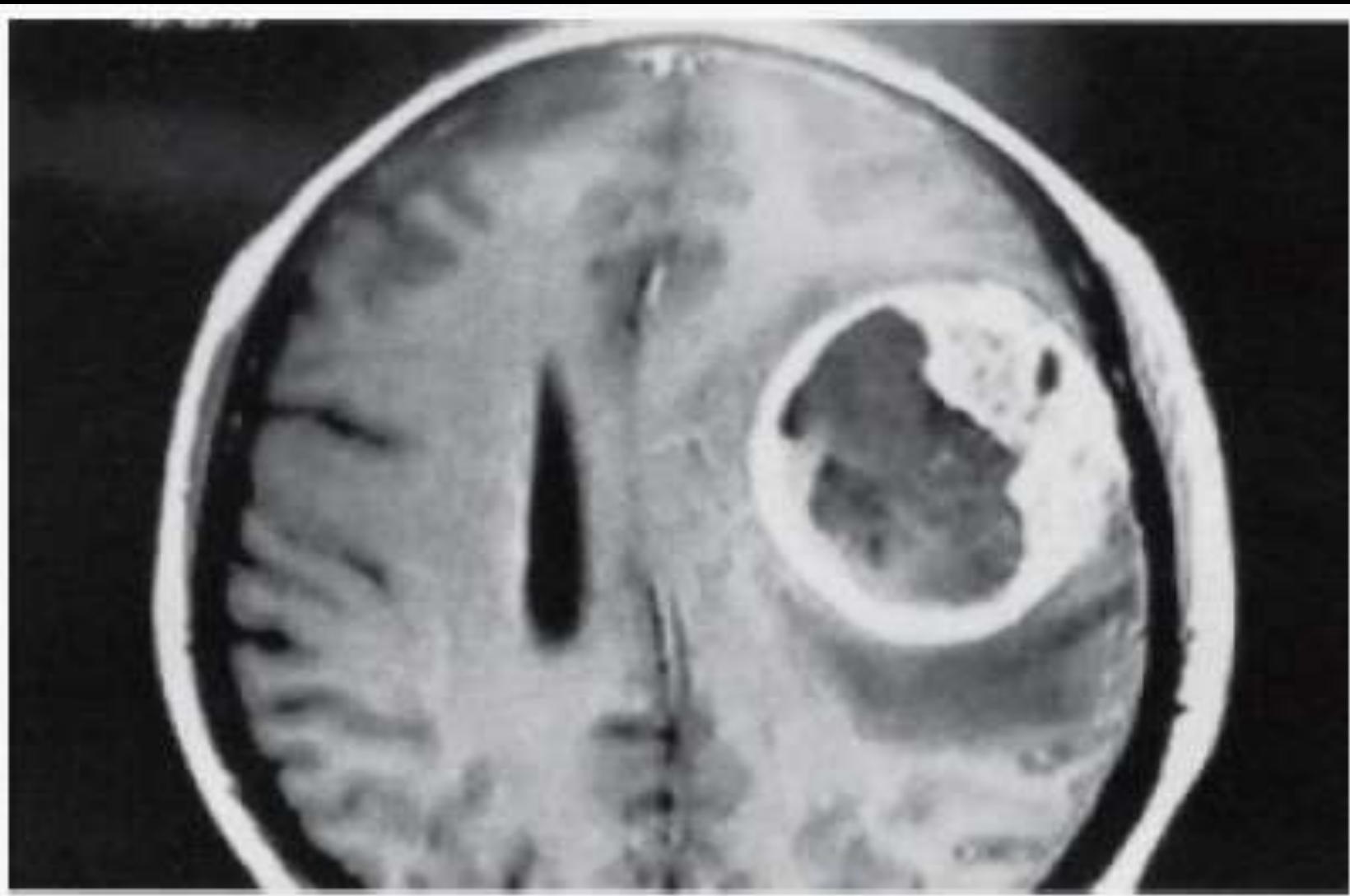


**HETEROGENOUS**









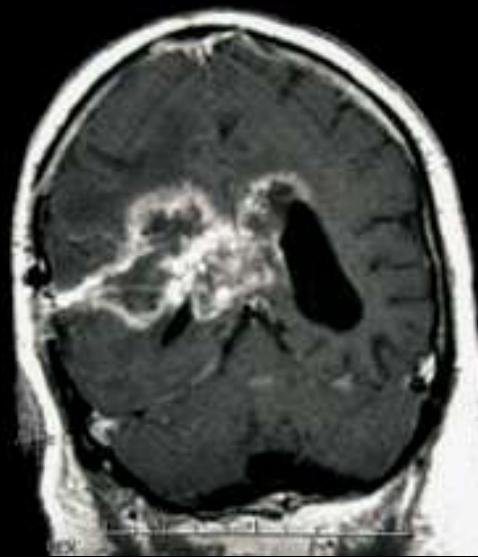
**FIGURE 2:** T1-weighted MRI with gadolinium contrast showing a typical appearance of a glioblastoma multiforme. Non-contrast-enhanced images of this lesion (not shown) revealed the presence of some hemorrhage.

1998

9



262  
212  
9/69



# GLIOMATOSIS CEREBRI

- Rare \* M = F \* 20:40 th
- Any Site
- Poor Prognosis
- \*CT
- Diffuse Isodense
- Mild Mass effect
- Non Enhancing
- \*MR
- Detected In T2

# OLigoDendroGlioma

= (Glioma contains Calcium).

- Low grade
- 30:40th
- Heterogeneous enhancing
- Little edema

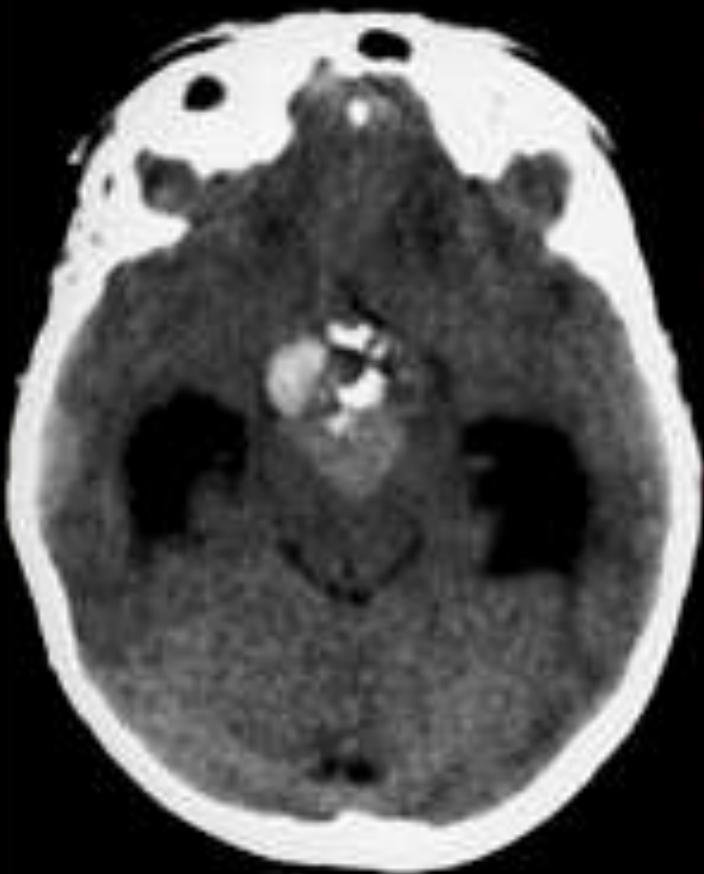
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## **Calcifications :**



### **Intra-axial tumors:**

- Astrocytomas (20%)
- Oligodendrogiomas (90%)
- Metastases
- Ependymoma (50%)
- Choroid plexus papilloma (25%)
- Ganglioglioma (40%)

### **Extra-axial tumors:**

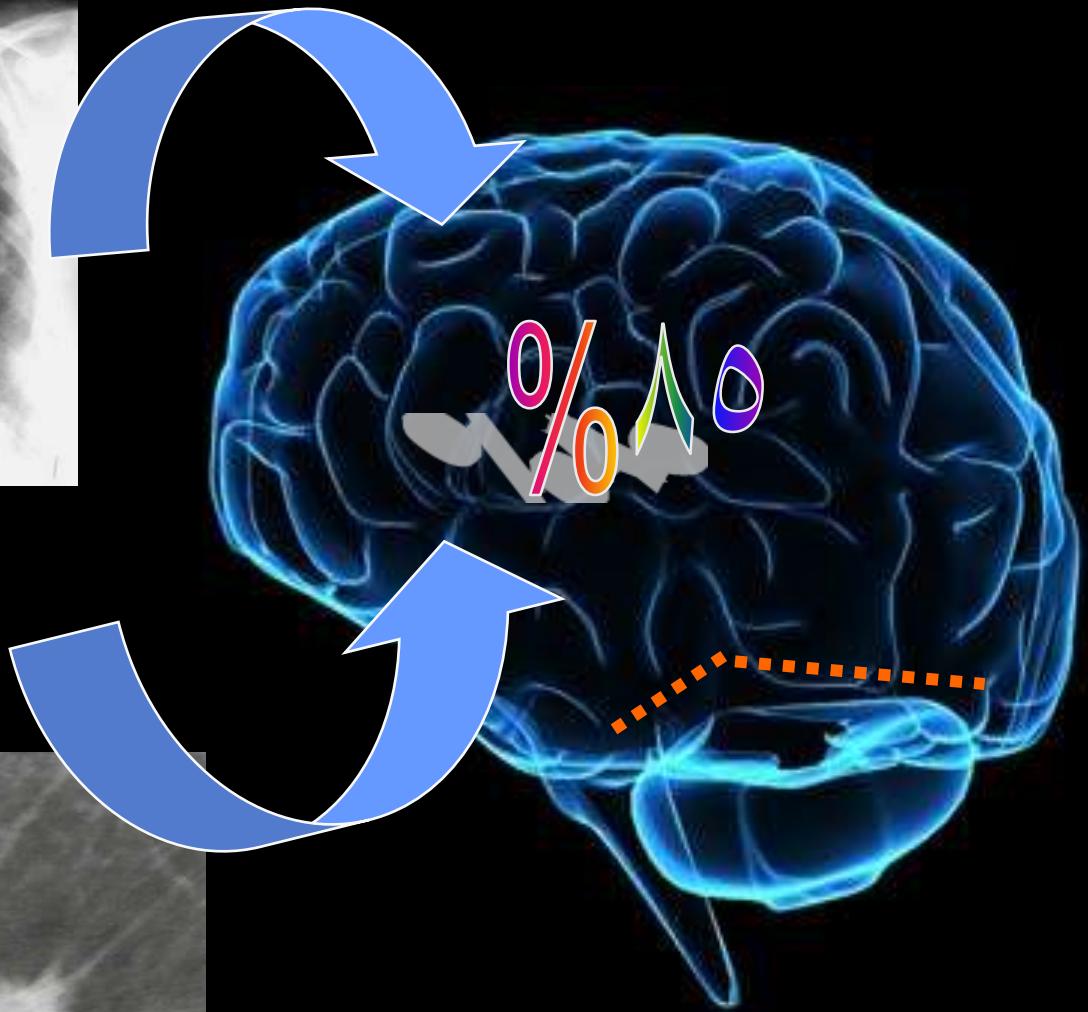
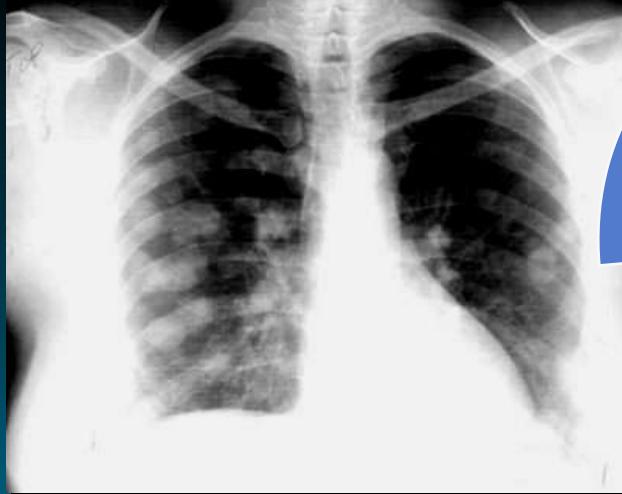
- Meningiomas (25%)
- Craniopharyngiomas (90%)
- Chordomas
- Chondrosarcomas

# MULTICENTRIC GLIOMA

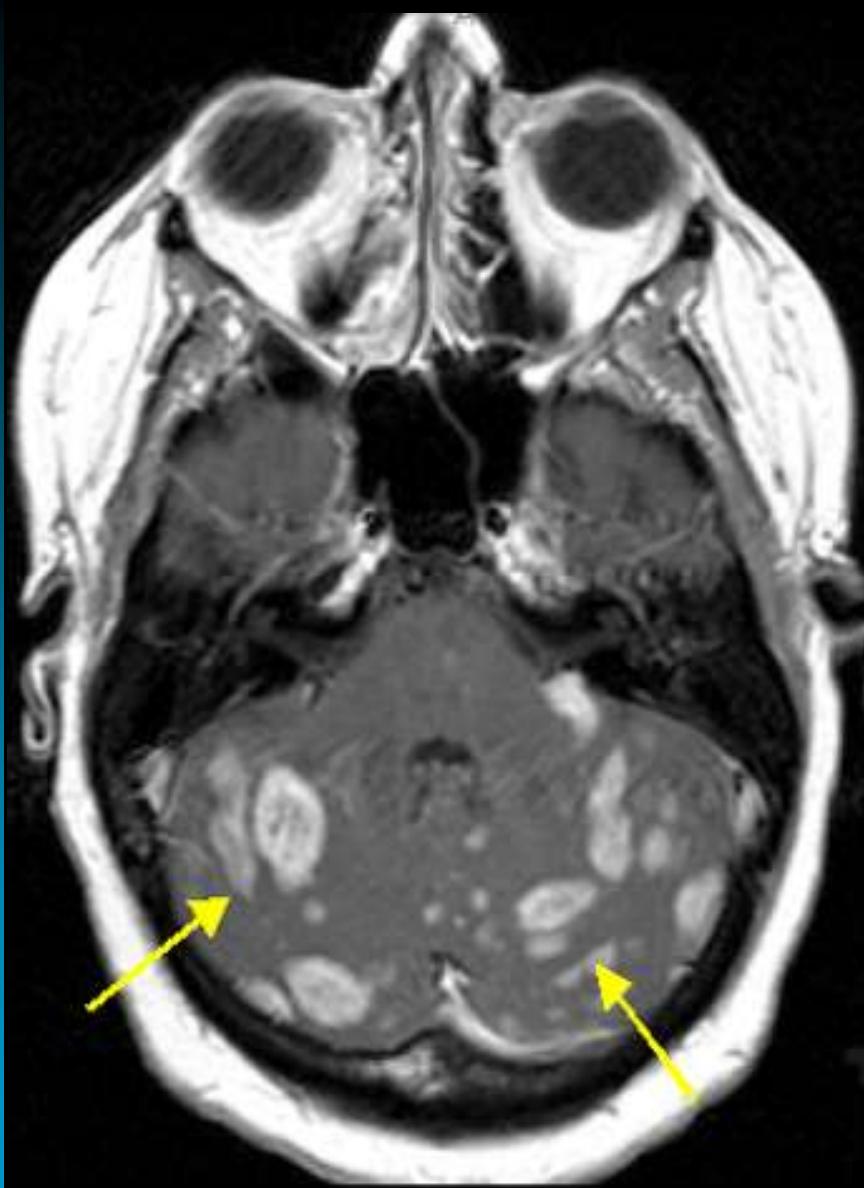
- GLioma e multiple Foci
- Common diagnosed as Metastases, as it More frequent.

# METASTATIC DEPOSITES

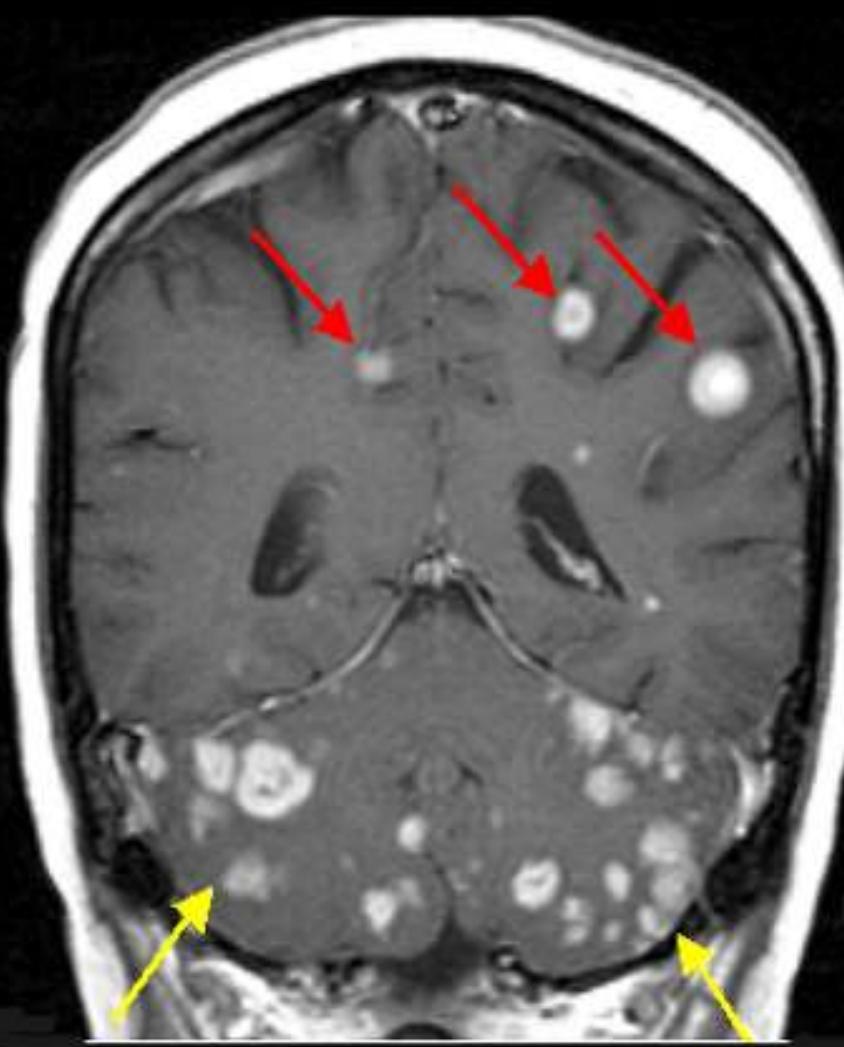
- 85% SUPRATENTOREAL
- SOURCES: most common
  - \*\*\*BRONCOGENIC
  - \*\*\*Breast
    - → SO WHEN FOUND BRAIN METASTASES SEARCH IN CHEST.



- \*CT:
- Multiple
- Enhancing heterogeneous +/- Any pattern
- Hi Edema ← Hi Malignant
- Edema=3 times Tumor size
- \*MR:
- Lo T1/Hi T2



Post-contrast Axial T1 Wtd MRI

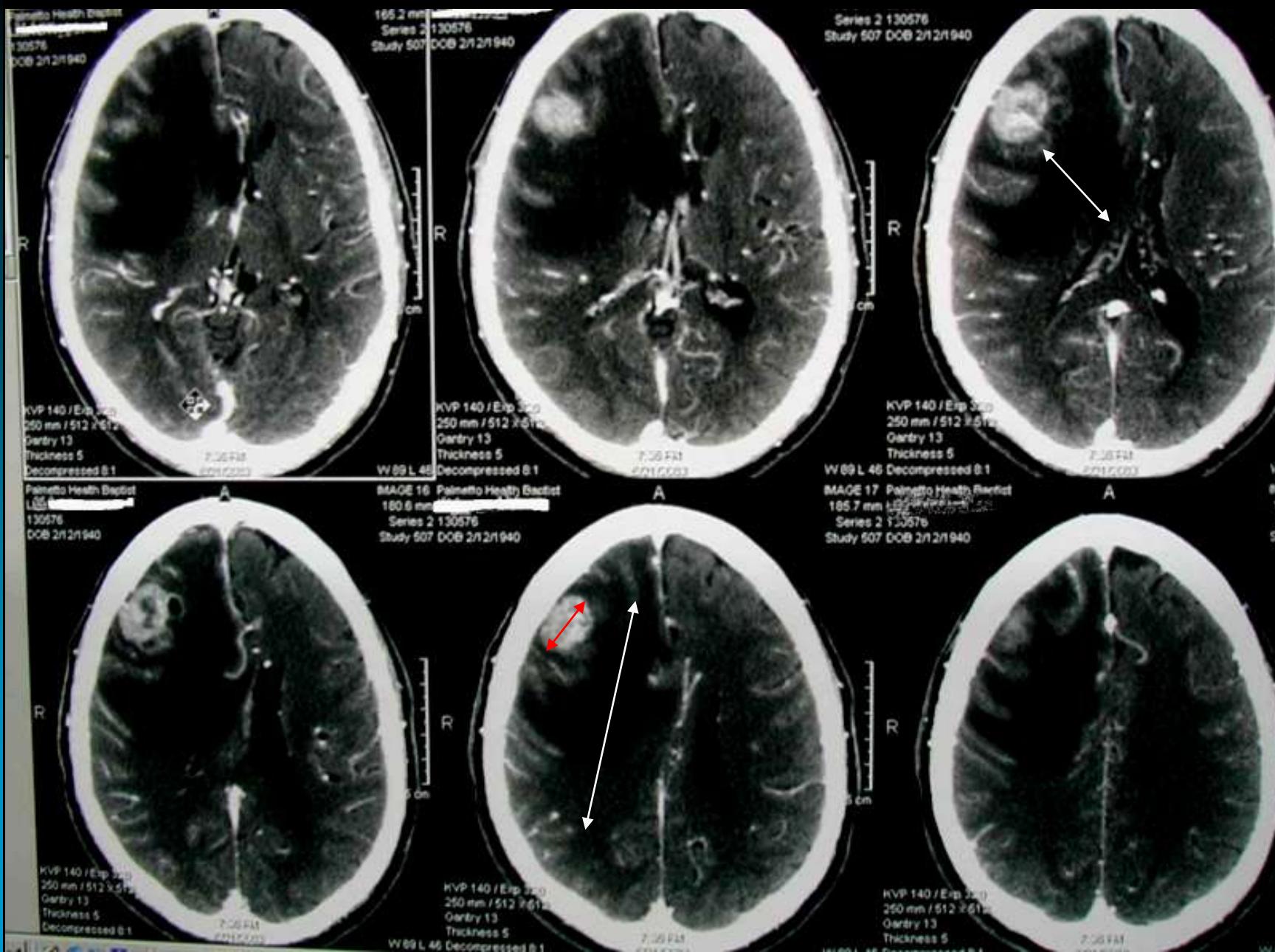


Post-contrast Coronal T1 Wtd MRI

## =SOLITARY METASTASES Deposits.

- Heterogeneous enhancing
- Edema Significant
- -/+ Known 1ry

SO 1ry Tumor + BRAIN Lesion =  
Brain Metastasis until proved otherwise



# **CONCLUSION**

- HOMOGENOUS ENHANCING:
- \*\*\* **Meningioma:**
- \* *DuraL Base +/- Mening Tail +/- Bone ScLerosis*
- **Lymphoma:**
- ***PeriventricuLar + No DuraL Base***
- **GIANT CELL AstroCyt.**
- Very Rare
- Frontal Horn of Lat vent=Chractrestic i.e Near Monoro Foramen.

- HETEROGENOUS ENHANCING
- \*GLioBLastoma MuLtiform.
- \*AnaPLastic AstroCytoma.
- Oligodendrogloma : + + + Ca
- Non Uniform Marginal
- \*GLioBLastoma MuLtiForm

- CYST+Enhancing Mural Nodule:
- \* Pilocytic AstroCytoma
  - Mostly Posterior Fossa
  - D.D. Hemangioblastoma
- Less common
- \* PXA
  - Supratentorial
  - Superficial Nodule
- D.D. Meningeal Cystic (Nodule/Cyst)

- Non Enhancing:
  - Diffuse Astrocytoma
  - Gliomatosis cerebri.

سَبَّابِلُ الْمُهُورِ وَرَبِيعَ الْمُهُورِ  
أَسْعَدَكُمْ مَا تَرَوْنَ إِنَّ اللَّهَ



***THANK YOU***

**COMMANDOS**