General Identification

- Name: 江 X X
- Age: 29 y/o
- Gender: Male
- Height:172cm, Weight: 65kg
- Date of admission:95/09/27

Chief Complaint

- Sudden onset of seizure for several minutes

Present illness

- This 29-year old male had no past medical or surgical history and had been in healthy status until this admission
- One week before the current admission, he started to have fatique and malaise followed by diarrhea and mild fever.
- About one day before this admission, he had limbs convulsion and conscious disturbance and was sent to the ER of Tri-service general hospital

Present Illness

- Agitation presented in the ER, and impaired consciousness persisted
- Brain CT showed a hypodense lesion at fronto-parietal region, without enhensement
- He was transferred to our hospital for further evaluation and management

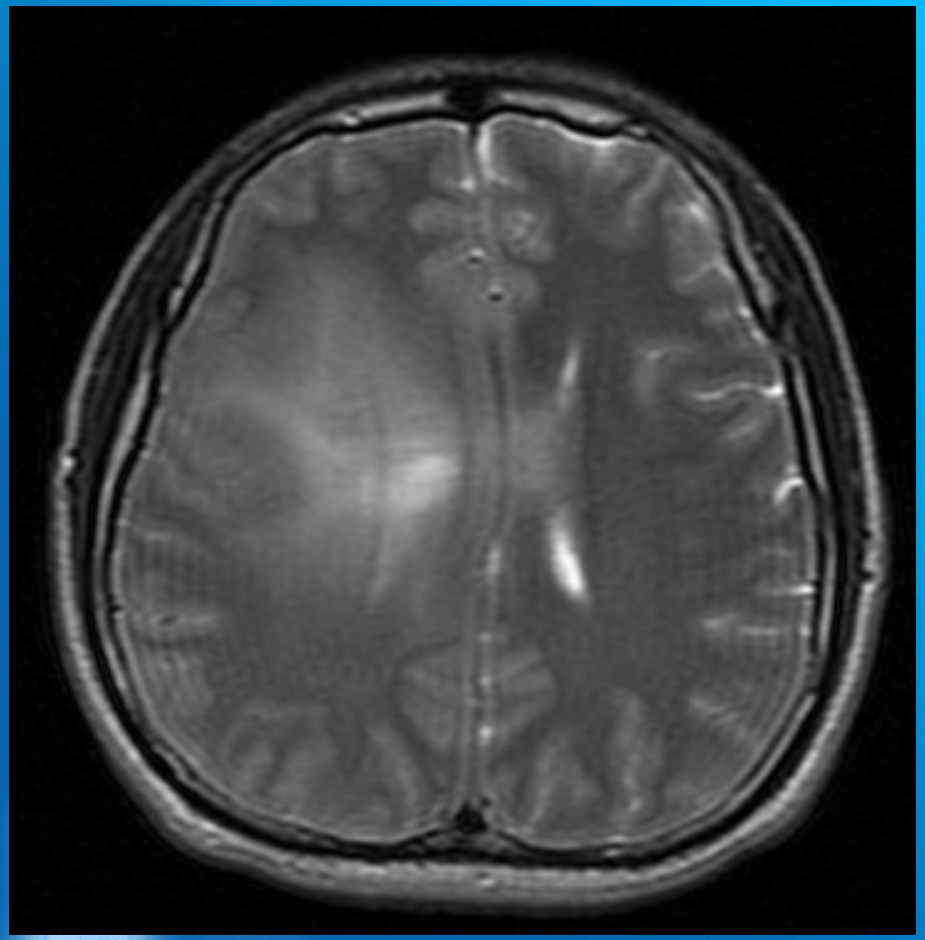
Laboratory Data

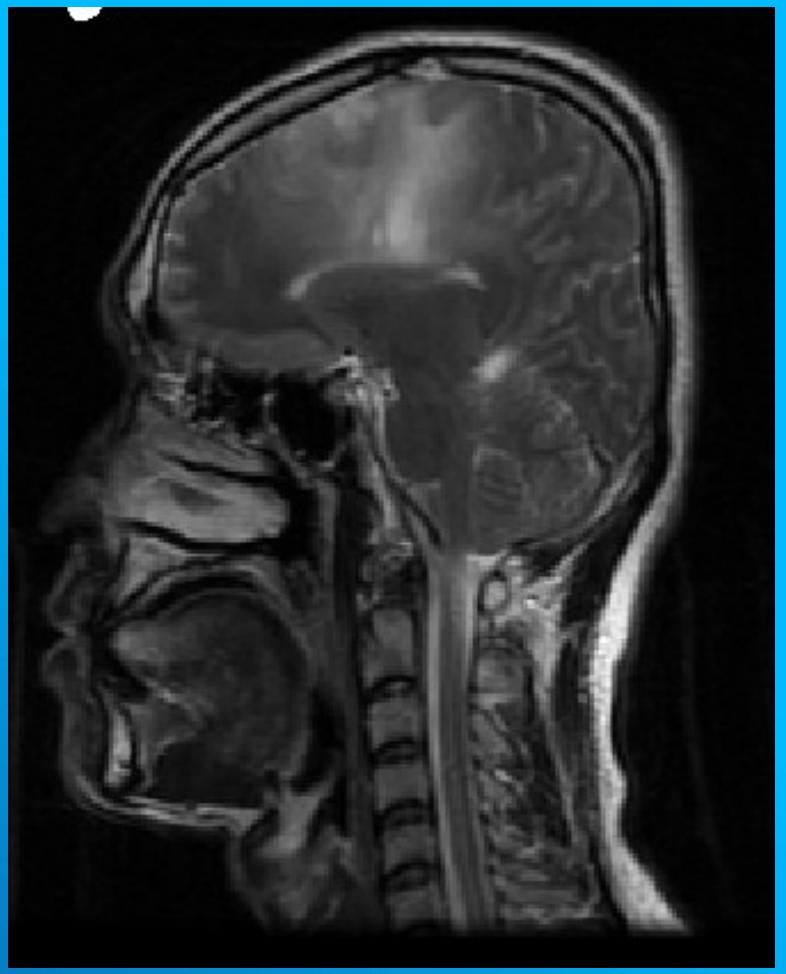
- WBC:15.99x10^3 / uL
- Neutrophil : 89.8%
- Glucose: 138mg/dl
- GOT: 121IU/L
- CRP: 7.40
- CSF: M-TP:23.0, Glucose: 88

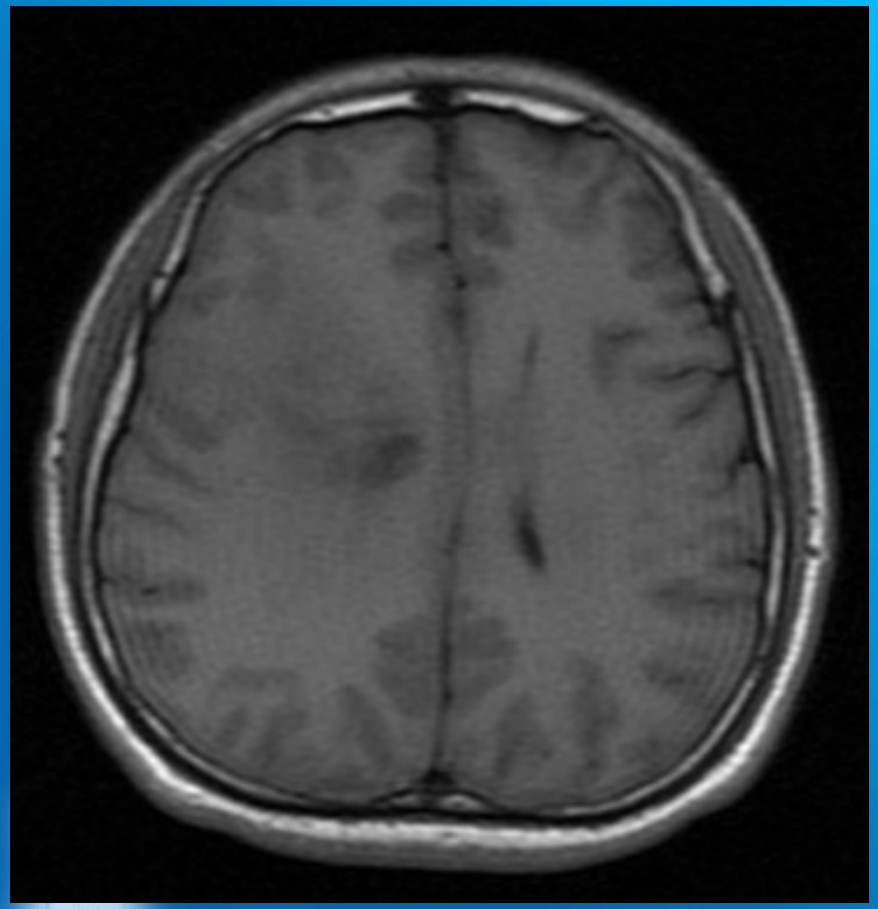
Image

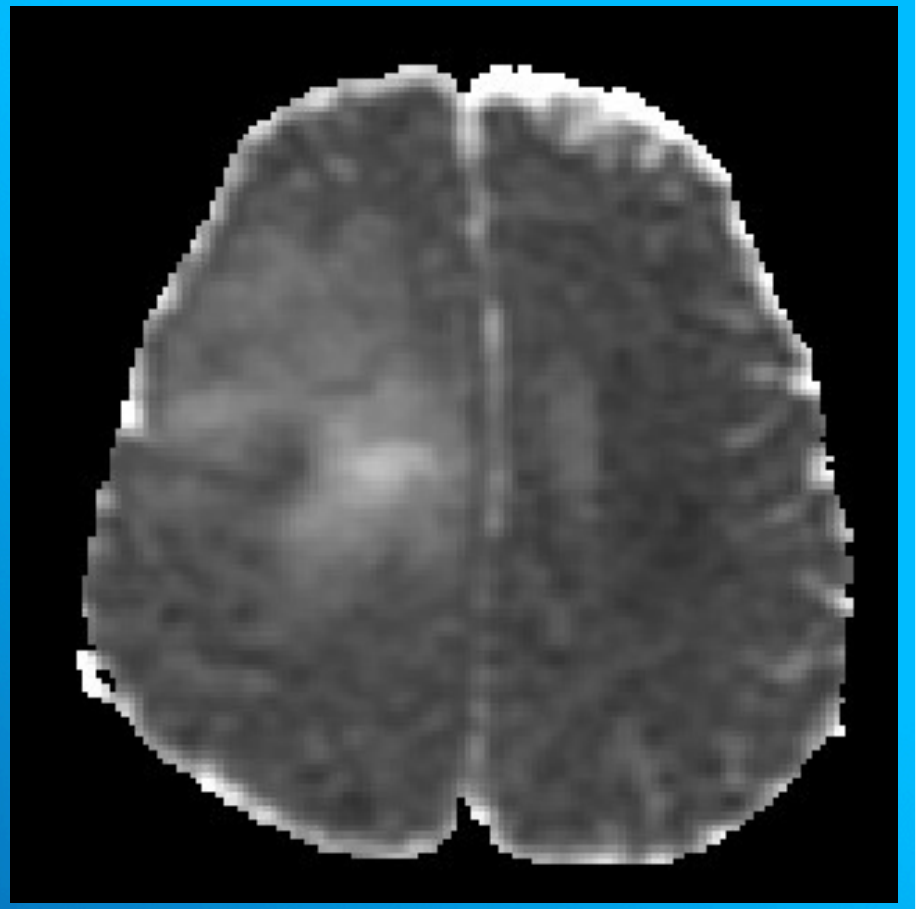
- Brain MRI 95-09-27

1. A diffuse, poorly circumscribed, infiltrating and non-enhancing lesion at right frontal lobe
2. Involved to the corpus callosum, whereas exhibits hyperintense on T2-weighted images and expands the adjacent deep and subcortical white matter.
3. Corresponding MR spectroscopy show elevated Cho-peak, high Cho/Cre ratio, slightly decreased NAA-peak and unremarkable lactate peak.









Differential Diagnosis

- Brain abscess
- Brain tumor
  - Astrocytoma
  - Meningioma
  - Metastasis
  - Oligodendroglioma

Treatment

- Seizure control
- IICP control
- Stereotactic biopsy on 95-10-13

Pathology

- Grade II astrocytoma
- Mildly increased cellularity of tumor growing in diffuse pattern with neurofibrillary stroma
- Tumor cell: mild nuclear pleomorphism
- No endothelial hyperplasia, necrosis or mitosis

Final Diagnosis

- Brain tumor, right fronto-temporal lobe
- Astrocytoma, grade II

Discussion - Astrocytoma

Grading- WHO scheme

- Grade I - Pilocytic astrocytoma
- Grade II – Diffuse (low grade)astrocytoma
- Grade III – Anaplastic astrocytoma
- Grade IV – Glioblastoma multiforme(GBM)

Clinical Features

- Epilepsy - low grade tumor: more common
- Focal brain damage – Dyshpasia, hemiparesis, personality change
- Raised intracranial pressure – headache, vomiting, conscious impairment
- Develop gradually: several weeks, months or years
- Sudden deterioration: hemorrhage of the necrotic area

Laboratory Studies

- No laboratory studies diagnostic of astrocytoma currently exist

Image Studies

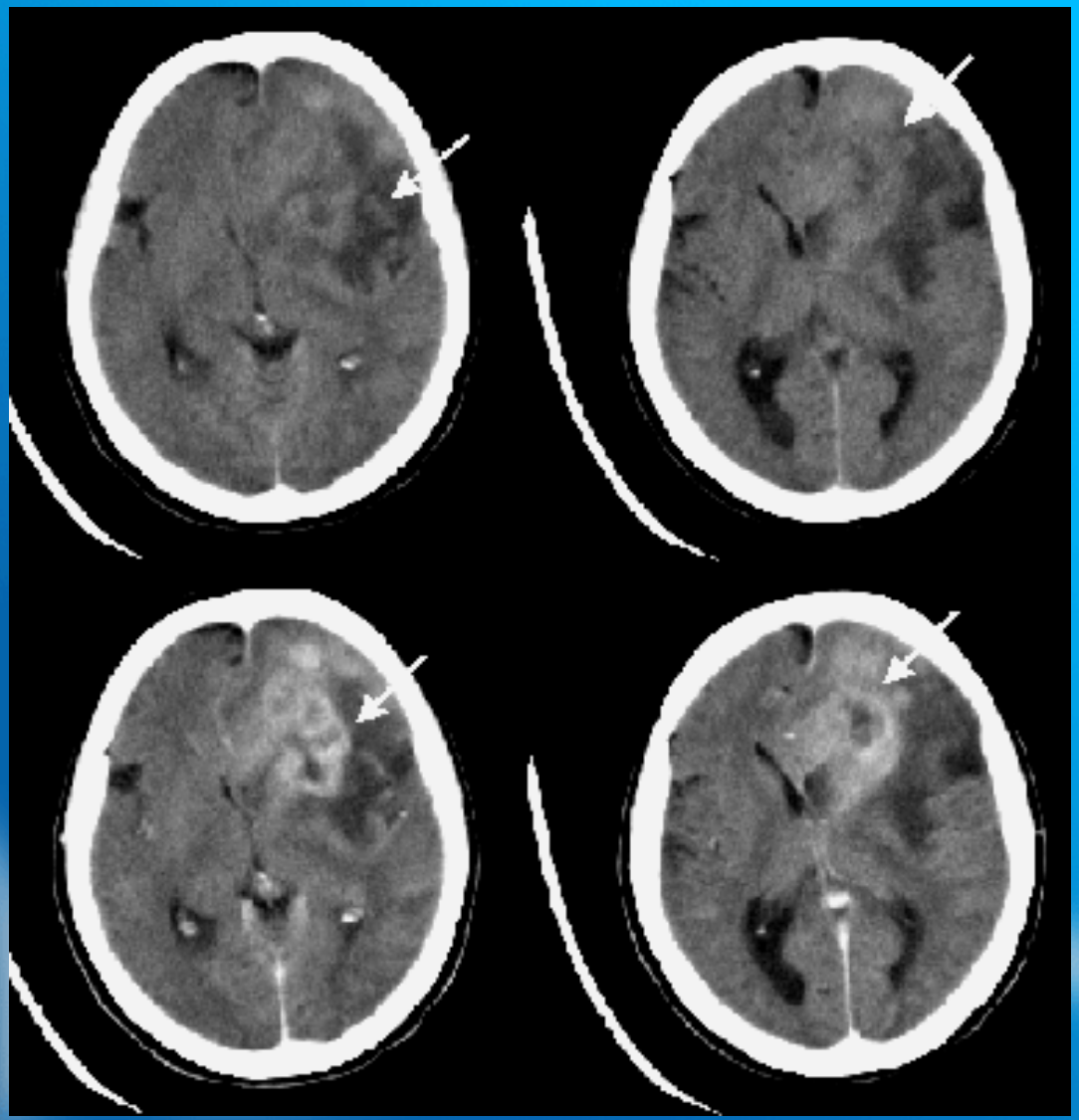
- CT scan with contrast enhancement
  - Short scanning times, decreased cost
  - Sensitivity: 65%~100%, specificity: 81%~100%
- MRI with contrast enhancement
  - Imaging modality of choice
  - Sensitivity: 82%~100% , specificity: 81%~100%
  - MR spectroscopy(MRS): chemical composition
- Perfusion-weighted imaging (PWI)
- Diffusion-tensor imaging (DTI)

CT Scan

- Low-grade astrocytoma
  - Well circumscribed, homogenous, low-density masses without contrast enhancement
  - 20% have associated calcification
- Grade III astrocytoma
  - Heterogeneous, edema often present
  - Enhancement pattern more pronounced
- GBM
  - More heterogeneous, enhance strongly
  - Hemorrhage and necrosis
  - Extensive edema and mass effect

Low Grade Astrocytoma

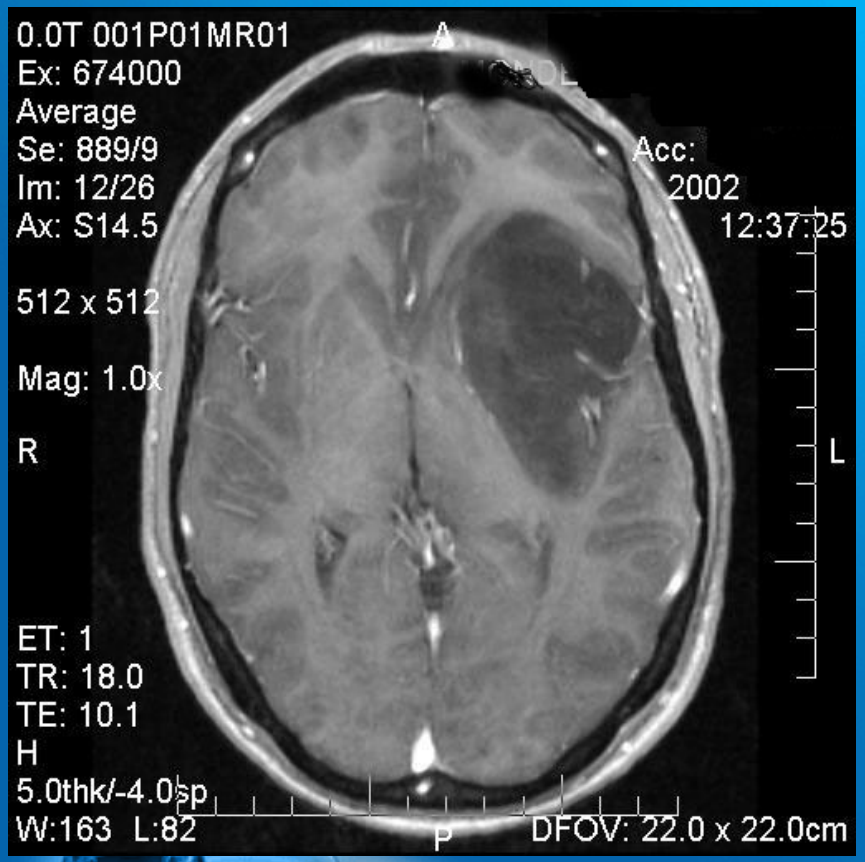
GBM

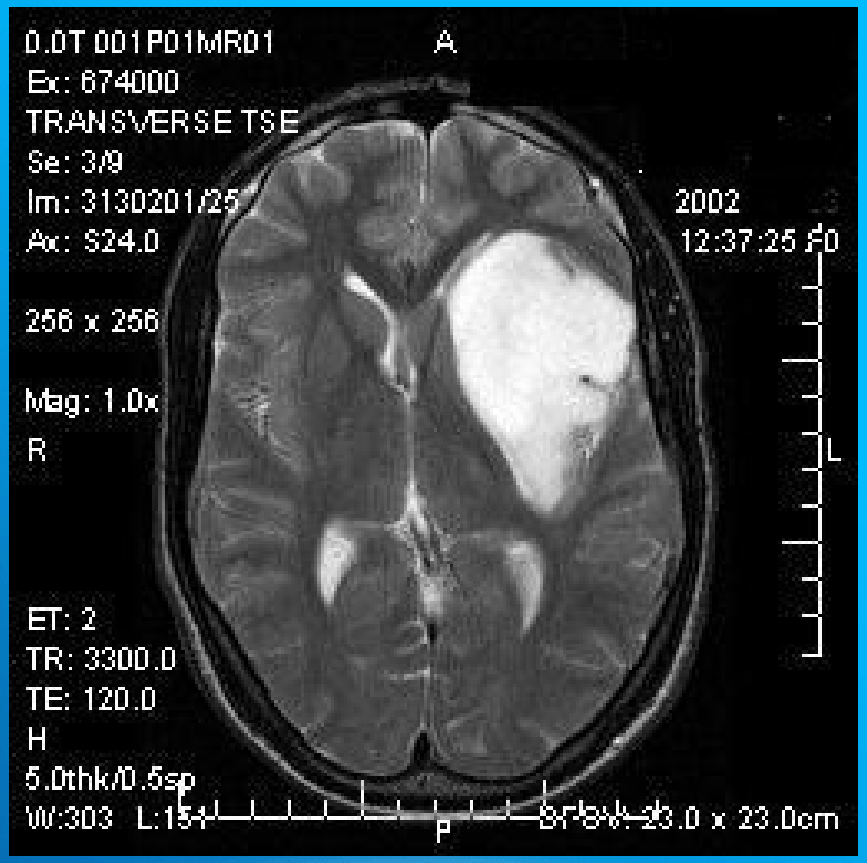


MRI

- Low-grade astrocytoma
  - T2: hyperintense
  - T1: hypointense relative to white matter
  - Contrast enhancement may be absent
- Grade III astrocytoma
  - Ill-defined borders, Surrounding edema, tumor infiltration
  - T2: inhomogeneous and bright
  - Enhancement usually seen
- GBM
  - Enhance peripherally, nodular and irregular
  - Hemorrhage and necrosis
  - Large amount of mass effect and edema

Low-grade astrocytoma

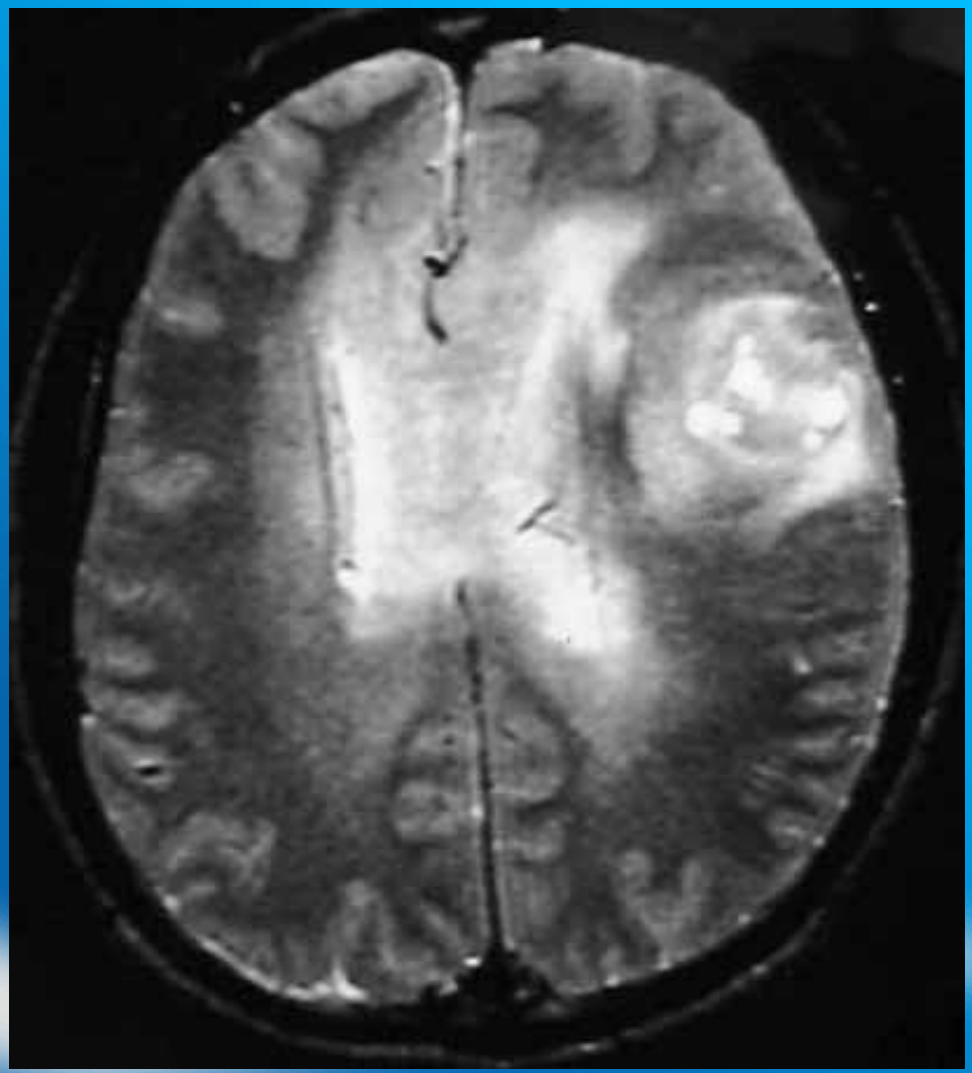




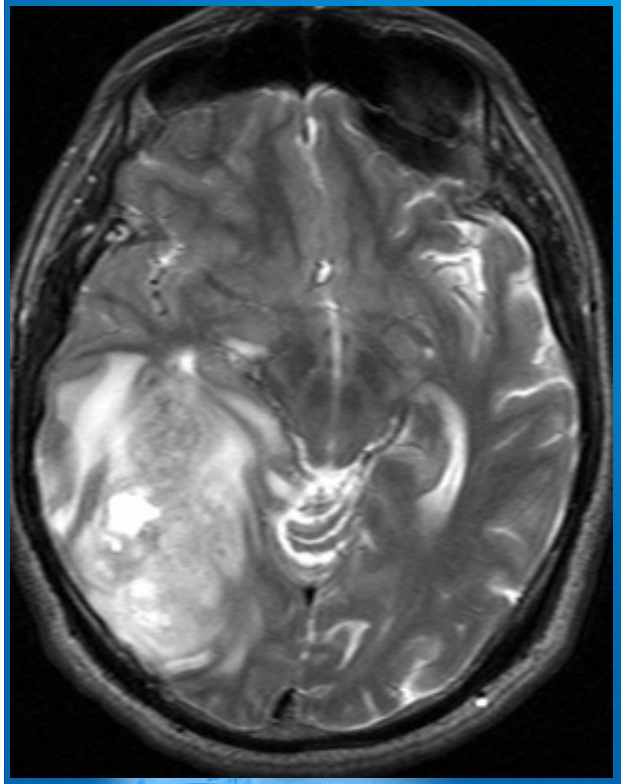
T1

T2

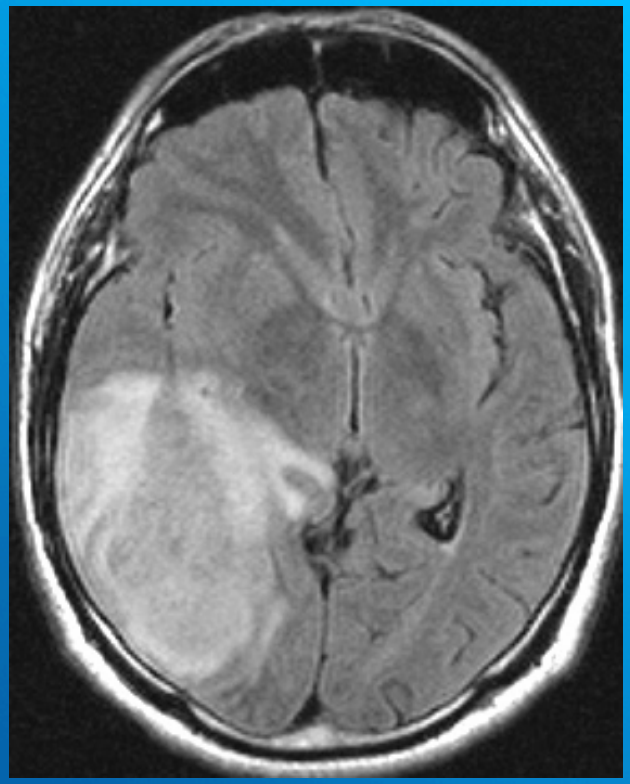
Anaplastic astrocytoma – T2



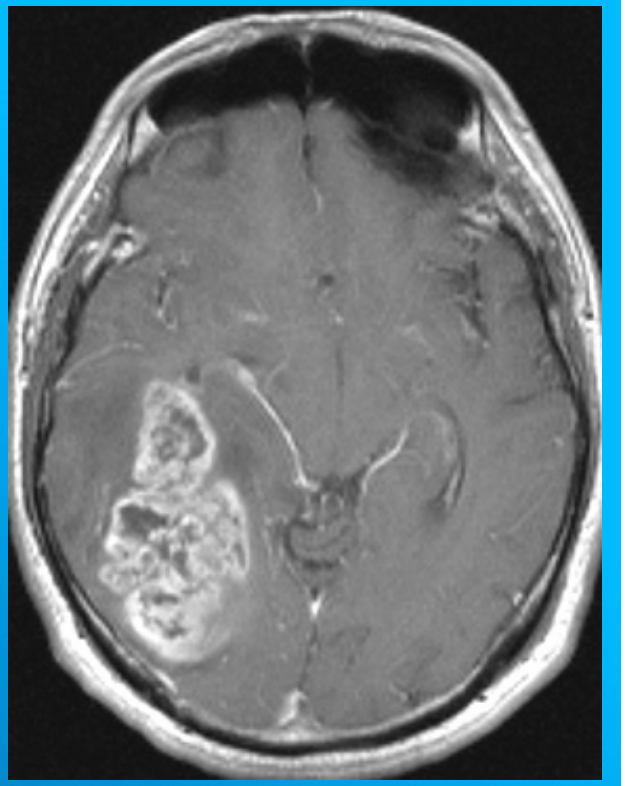
GBM



T2



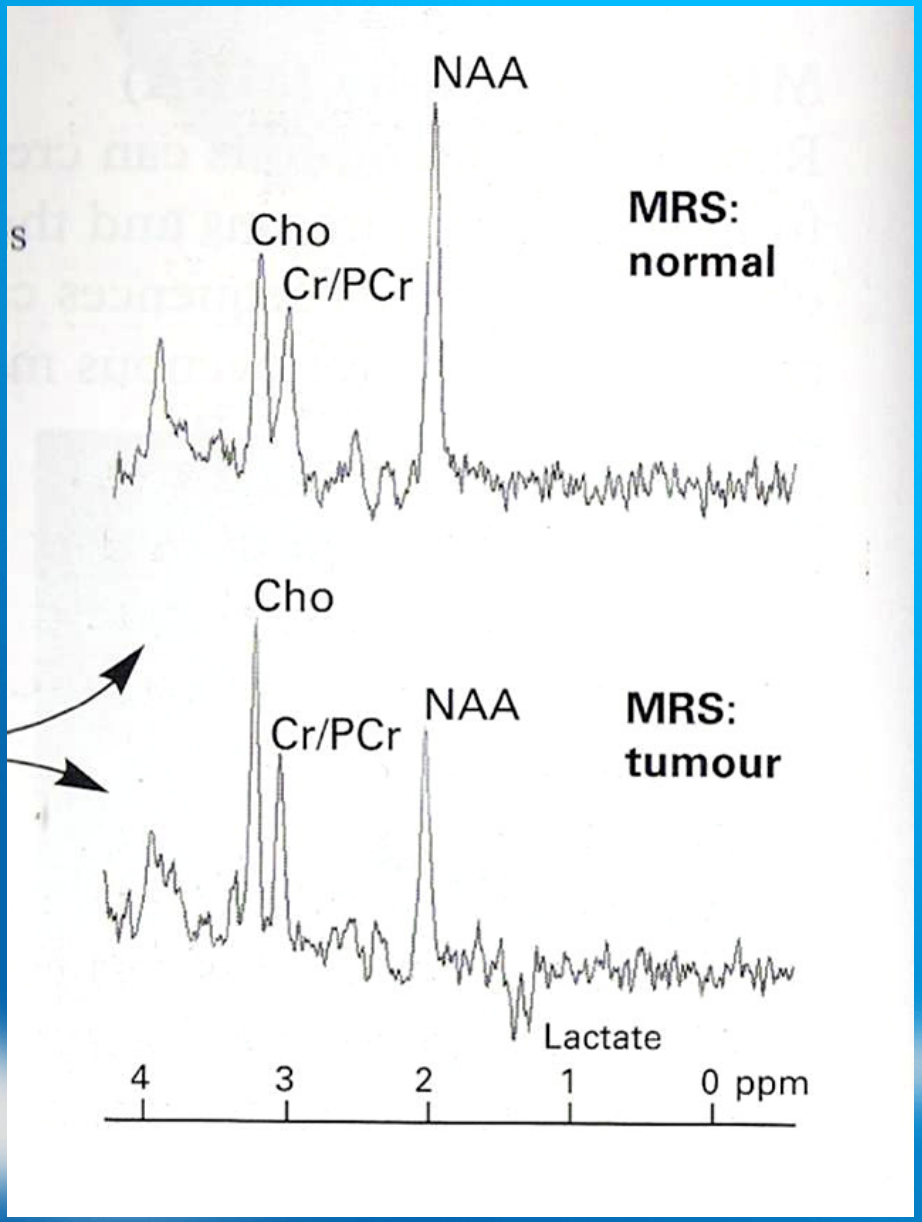
Flair



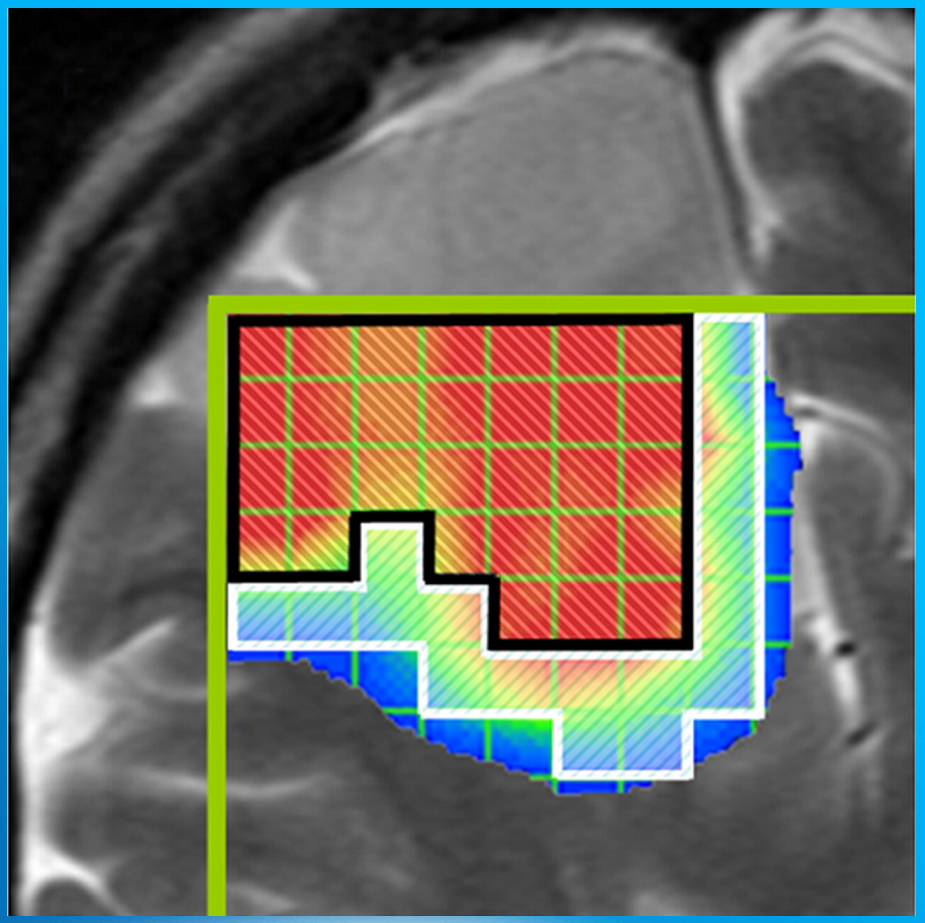
Contrast

MRS

- Cerebral metabolites: N-acetylaspartate(NAA), Choline(Cho), creatine(Cr), lactate, and lipids
- Cerebral gliomas: ↓ NAA, ↑ Cho, stable or ↓ Cr
- ↑ Cho/Cr, ↓ NAA/ Cr → Astrocytoma
- GBM: high Cho, lactate, lipid, and low NAA


NAA
Cho
Cr/PCr
MRS:
normal
Cho
Cr/PCr
NAA
MRS:
tumour
Lactate
4
3
2
1
0 ppm

Cho/NAA ratio image

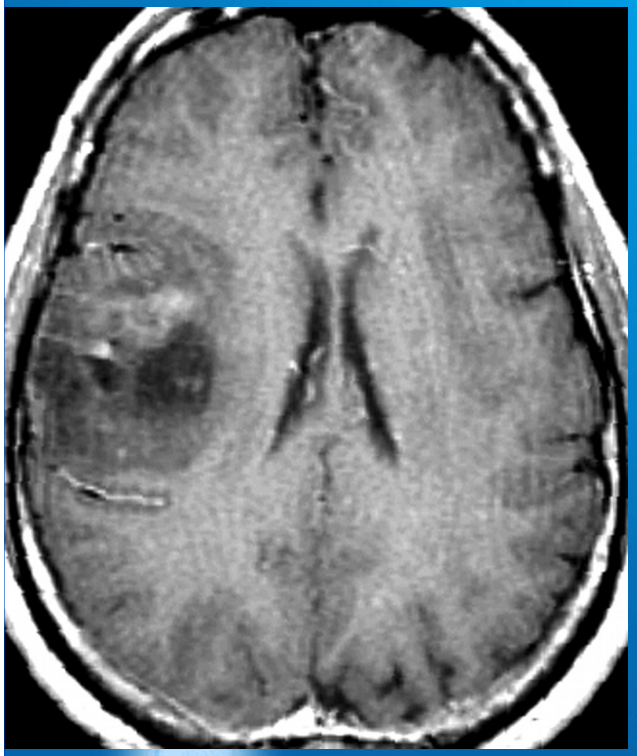


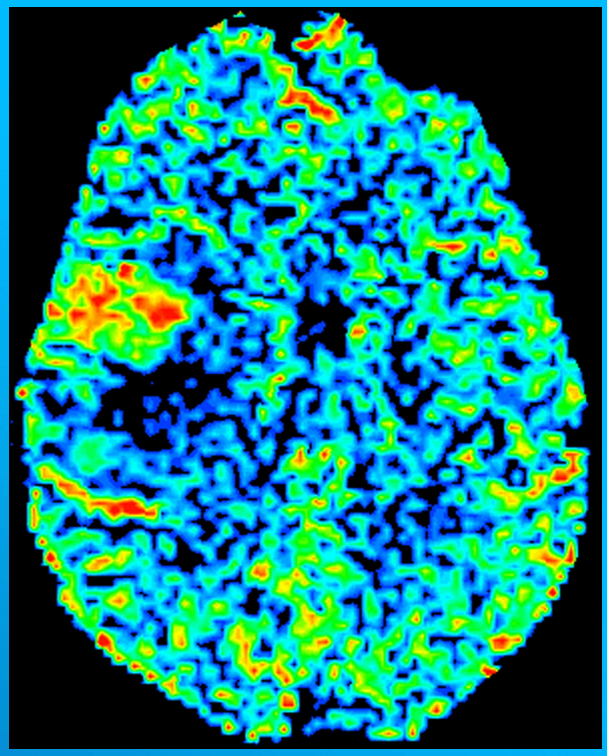
Grade II

Grade III

PWI & DTI

- PWI
  - Bolus tracking after the contrast injection
  - relative cerebral blood volume(rCBV)
  - rCBV ↑ → Grade ↑
  - Brain biopsy
- DTI
  - Experimental sequence
  - Structure and orientation of the white matter tracts



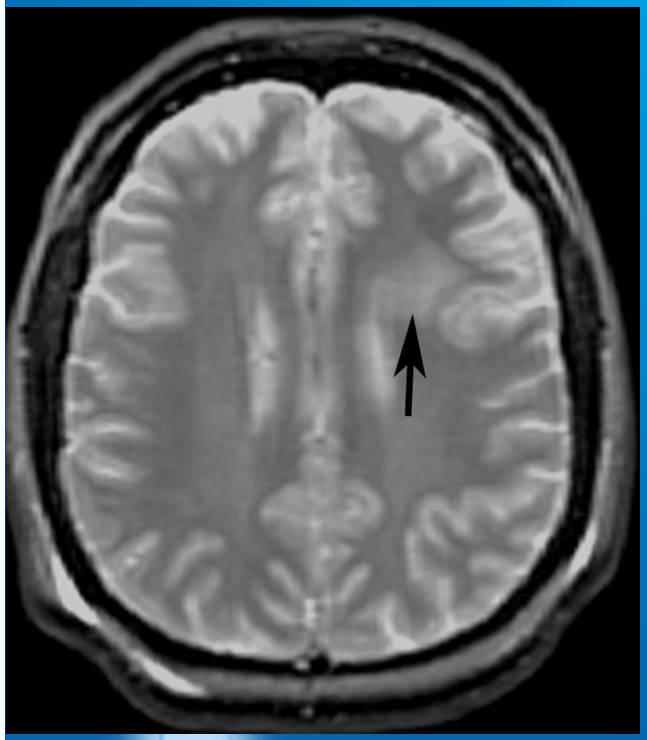


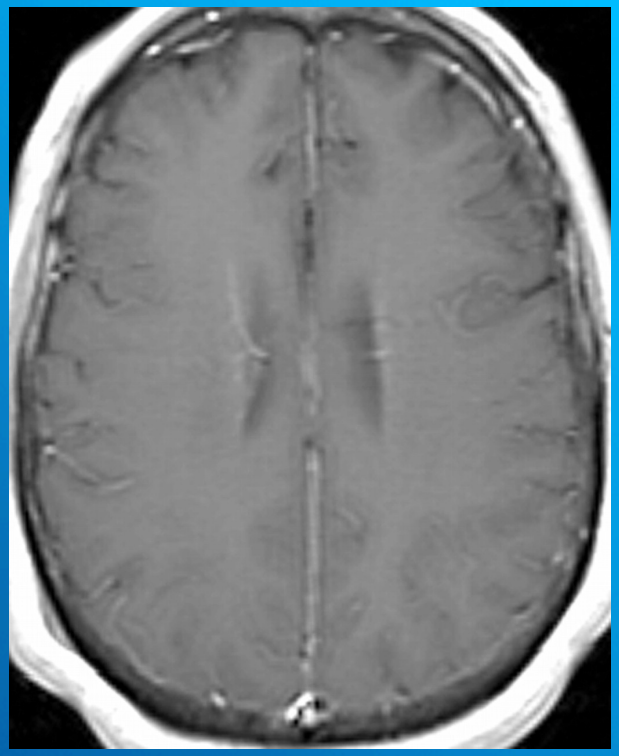
T1

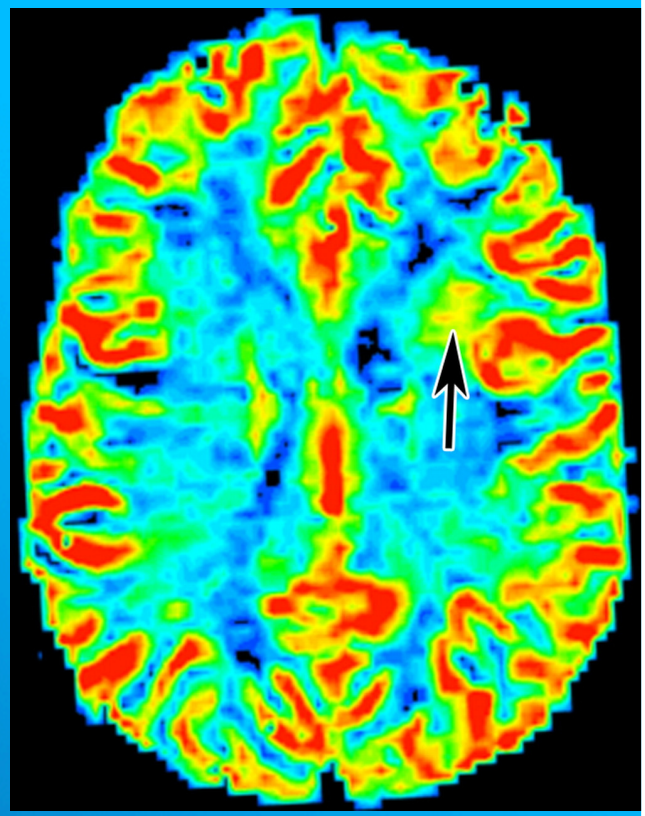
T2

PWI

Grade III **astrocytoma**







T2

T1

PWI

PET

- Brain tumors: ↑ glucose metabolism
- Metabolic activity: correlated with the grade of tumor and the patient's prognosis
- Assess the response of therapy

Treatment

- Anticonvulsant
- Corticosteroids
- Surgical resection
- Radiotherapy
- Chemotherapy
- Gene therapy

Prognosis

Grade	Age, y	Survival, %		
		1 Year	5 Year	10 Year
I	0-19	97	93	91
	20-44	93	87	82
	45-64	88	72	58
	>65	ND*	ND	ND
II	0-19	93	82	80
	20-44	90	57	38
	45-64	59	24	14
	>65	ND	ND	ND
III	0-19	78	52	48
	20-44	86	50	33
	45-64	54	16	12
	>65	20	2	2
IV	0-19	51	19	16
	20-44	59	13	8
	45-64	35	2	1
	>65	13	0.3	0.2

Reference

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