

# \*MR Imaging in Epilepsy

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# \*Role of MR Imaging

- \*Identify underlying structural abnormalities that require specific treatments.
- \*Preoperative evaluation in epilepsy surgery.

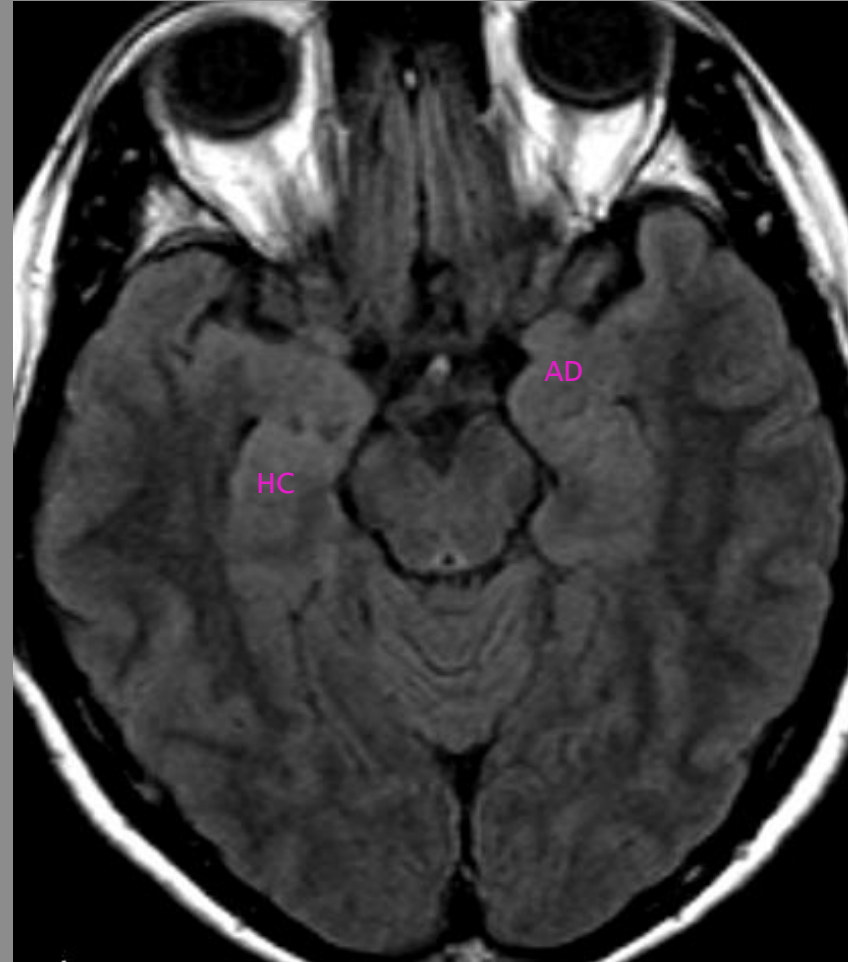
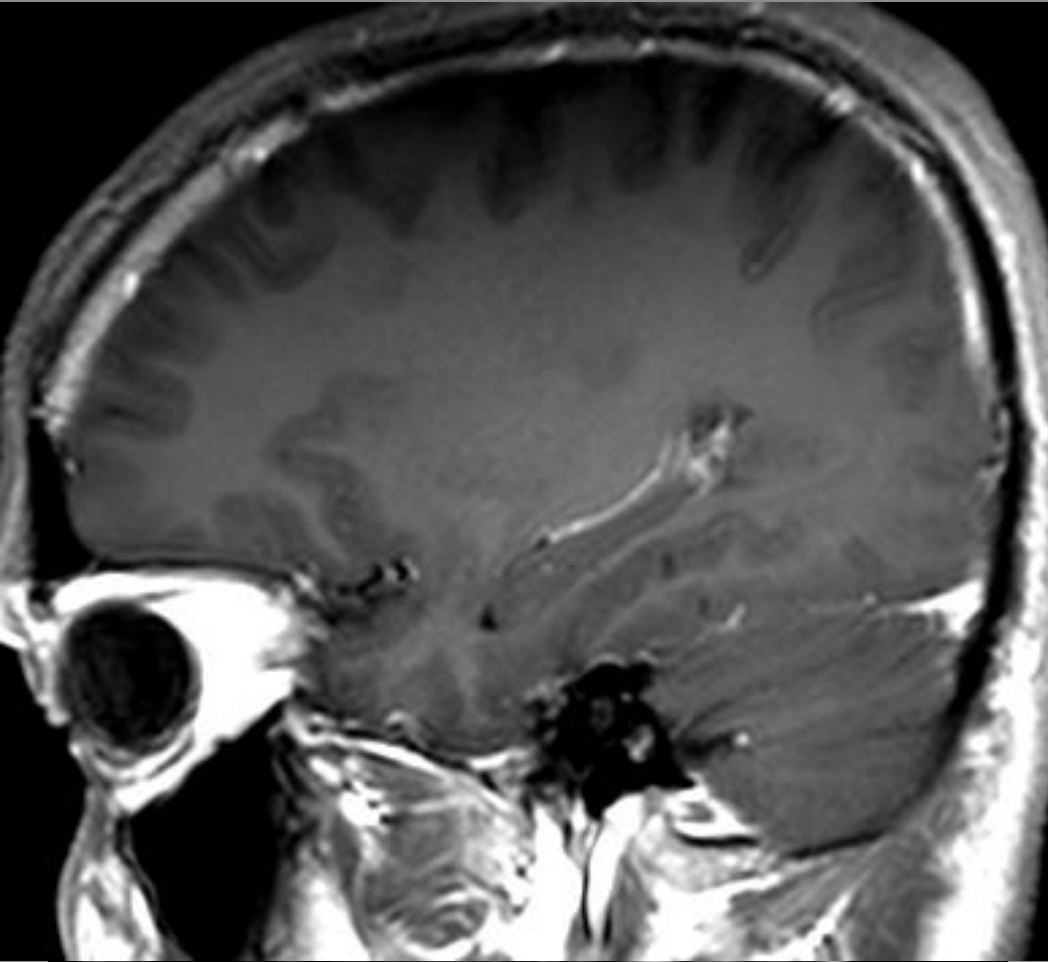
# \*Epileptogenic substrates

- \*Hippocampal sclerosis
- \*Malformation of cortical development
- \*Neoplasm
- \*Vascular malformation
- \*Gliosis and miscellaneous abnormalities

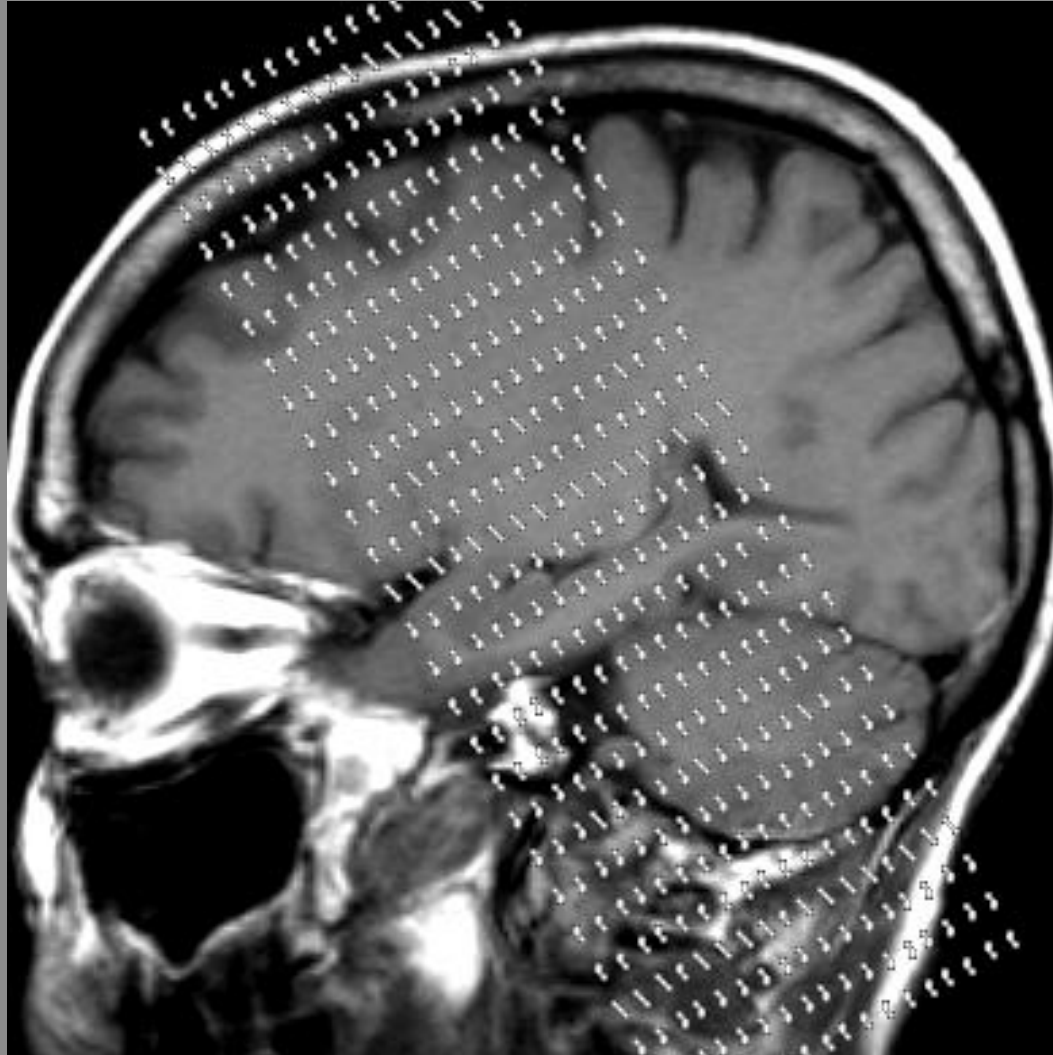
*\*Hippocampal Sclerosis*



# \*Hippocampus

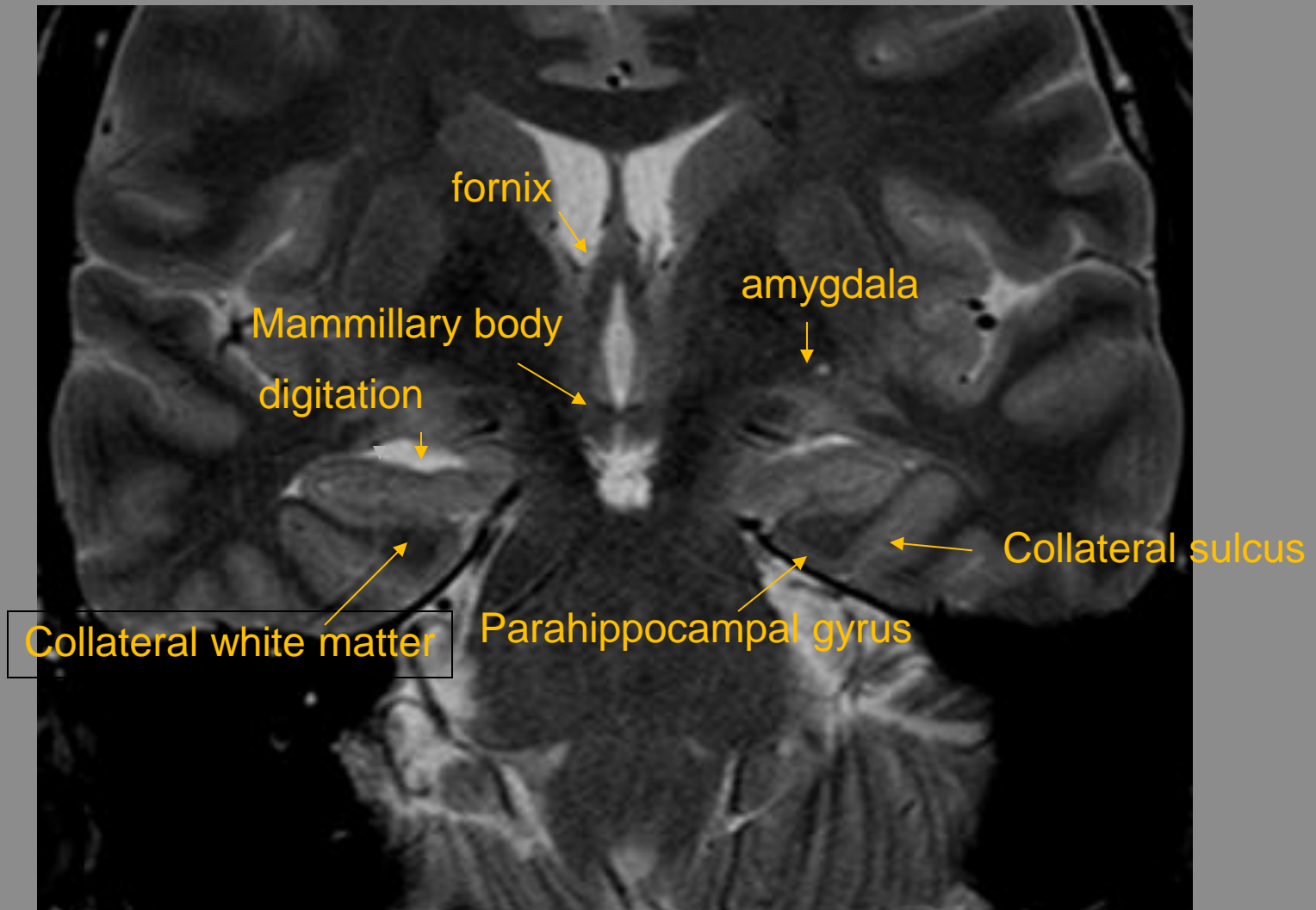


# \*Hippocampus



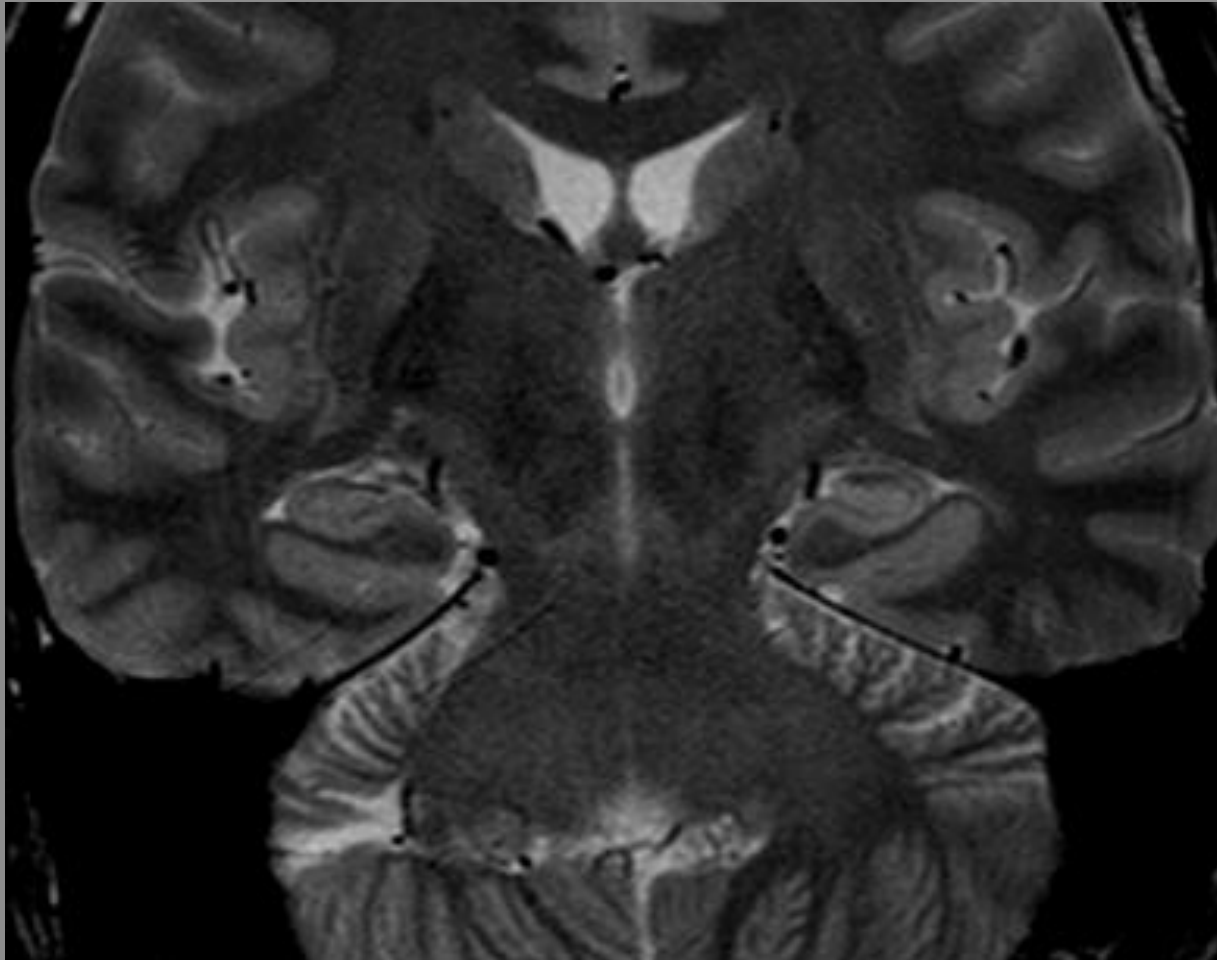
# \*Hippocampus

The head is not covered by choroid plexus and has digitations.



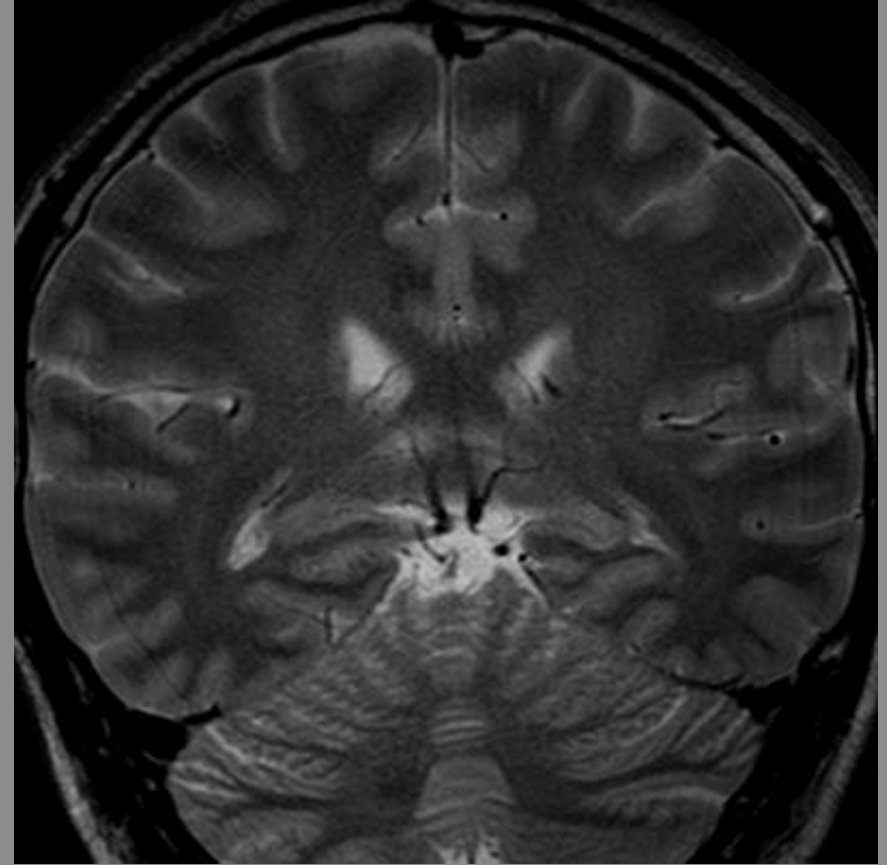
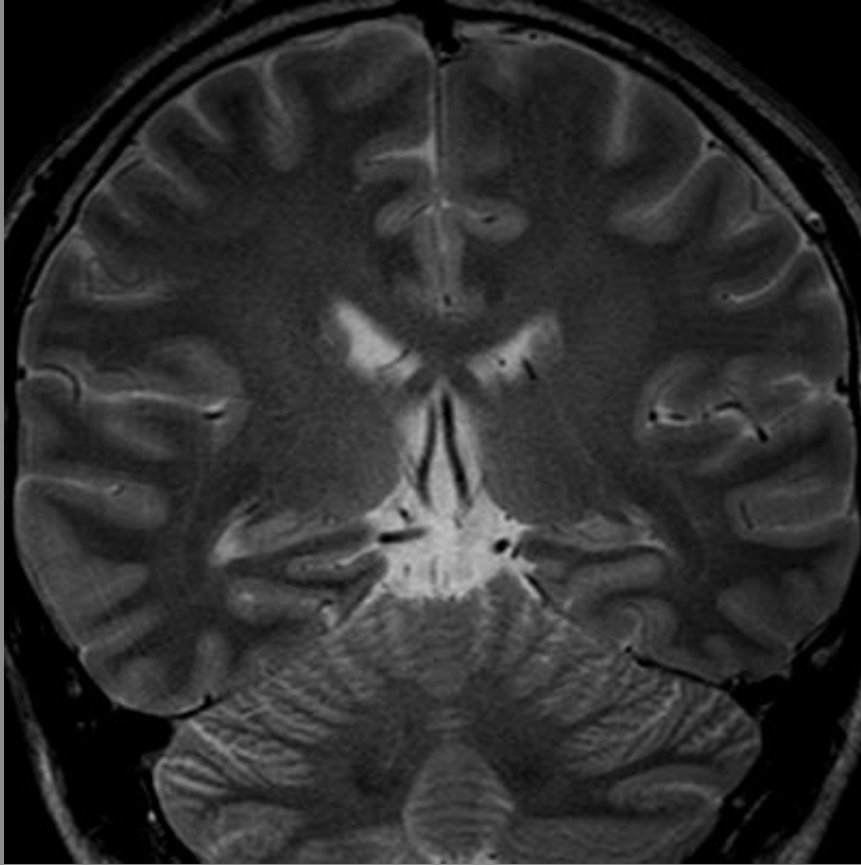
# \*Hippocampus

The body can be seen at the level of the anterior brain stem.



# \*Hippocampus

The tail can be seen at the level of the cerebellum.



# \*Hippocampal Sclerosis

- \*Hippocampal sclerosis is characterized by neuronal loss and gliosis mainly in CA1, CA3 and end folium.
- \*Mossy fibre sprouting
  - \* New axons arising from granule cells extend upwards into the molecular layer of the dentate gyrus.
  - \* May contribute to epileptogenesis.
- \*Granule cell dispersion
  - \* > 10 cells depth (normal 4-5 cells thick)
  - \* Also occurs in the opposite side, may be a response to seizure activity.
- \*Widespread inflammation in HS specimens should always raise the possibility of an underlying or previous limbic or autoimmune encephalitis, particularly in adult onset epilepsy.

# \*Hippocampal Sclerosis

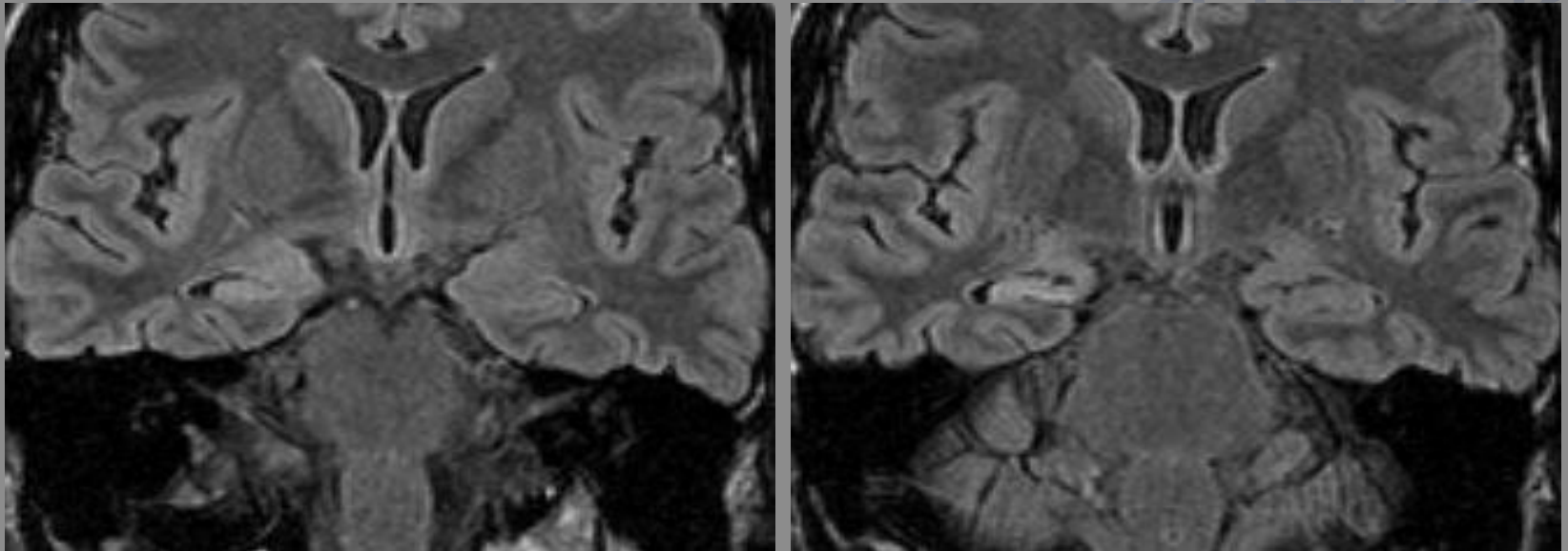
- \*Hippocampal sclerosis refers to neuronal loss in CA1-4 but not the dentate gyrus.
- \*Mesial temporal sclerosis implies more extended sclerosis of extrahippocampal tissue, such as the amygdala and parahippocampal gyrus

# \* Hippocampal Sclerosis: MRI findings

- ▣ Loss of internal architecture
- ▣ Loss of hippocampal head interdigitations
- ▣ Abnormal hypersignal T2 change of hippocampus
- ▣ Hippocampal atrophy
- ▣ Atrophy of the ipsilateral fornix
- ▣ Atrophy of the ipsilateral mammillary body
- ▣ Atrophy of the ipsilateral collateral white matter
- ▣ Dilatation of the ipsilateral temporal horn

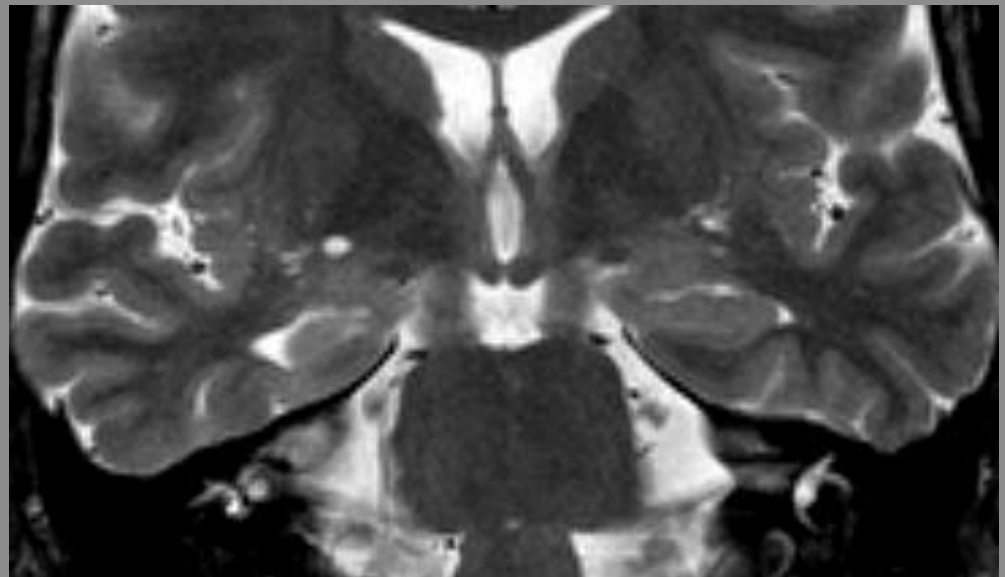
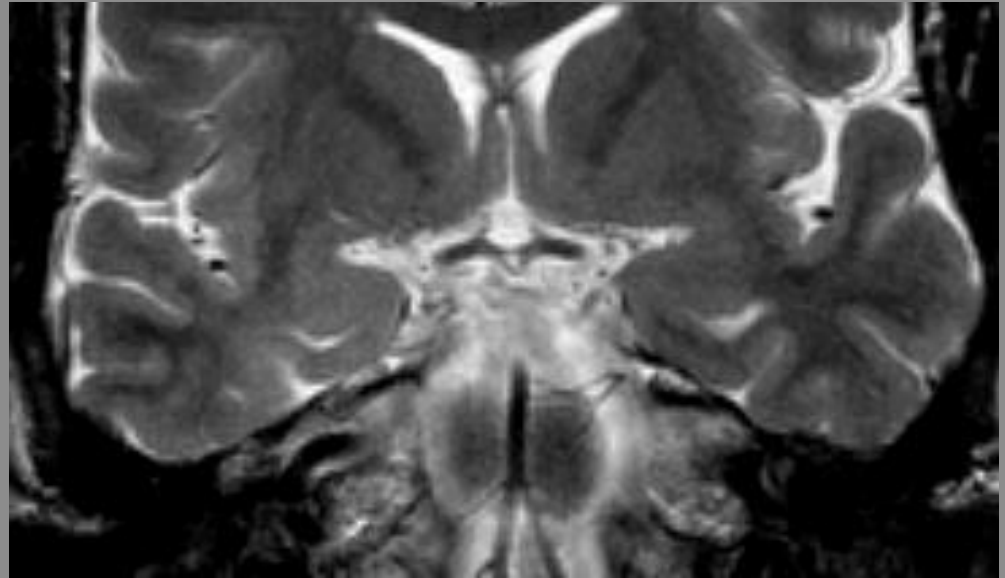
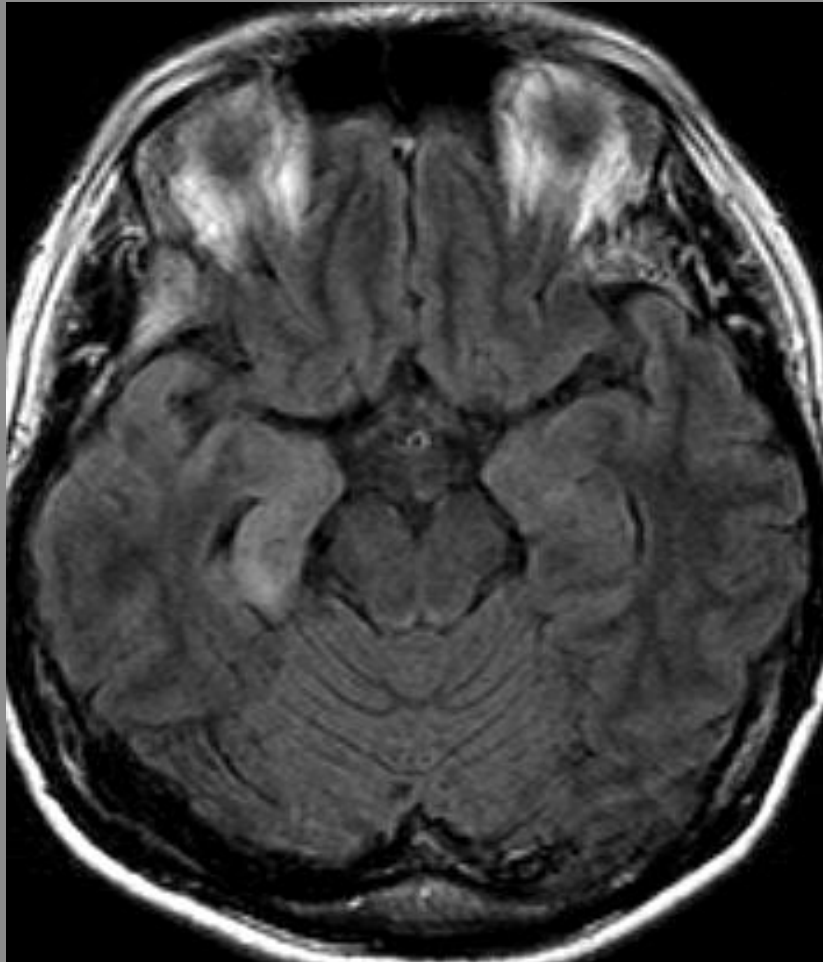


# \*Right Mesial Temporal Sclerosis

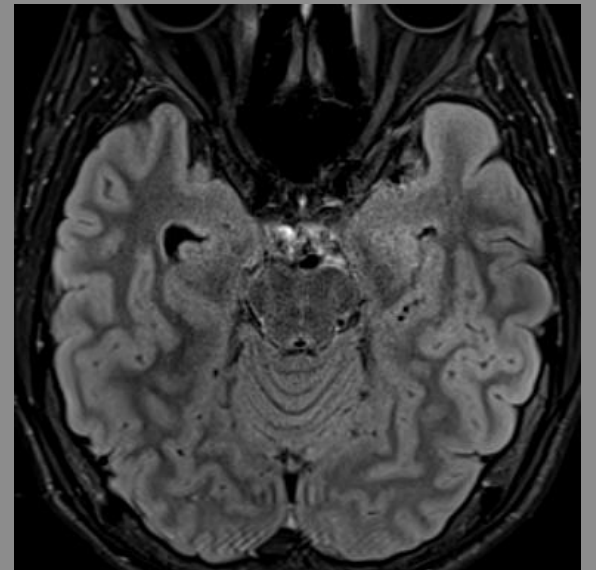
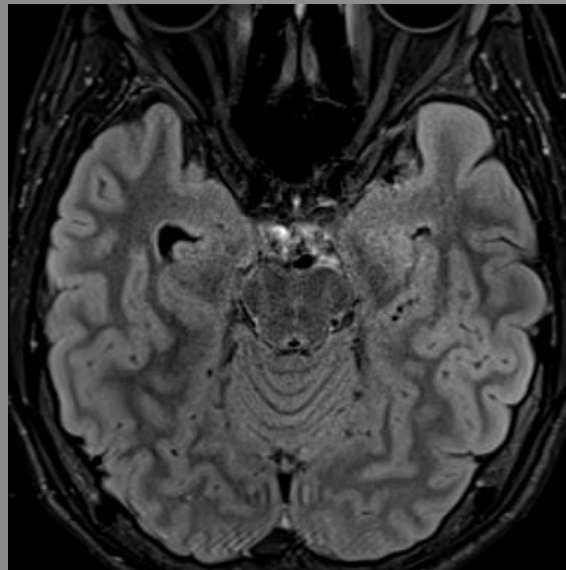
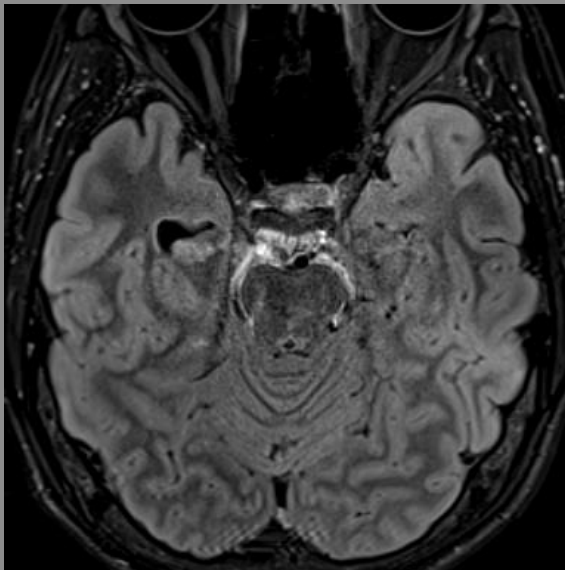
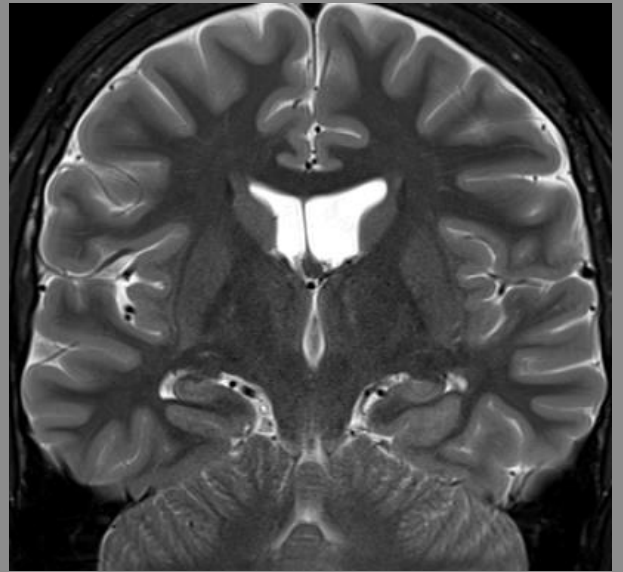
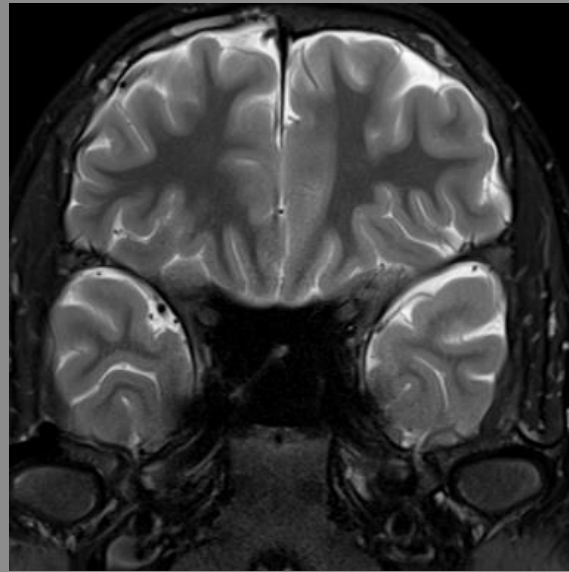
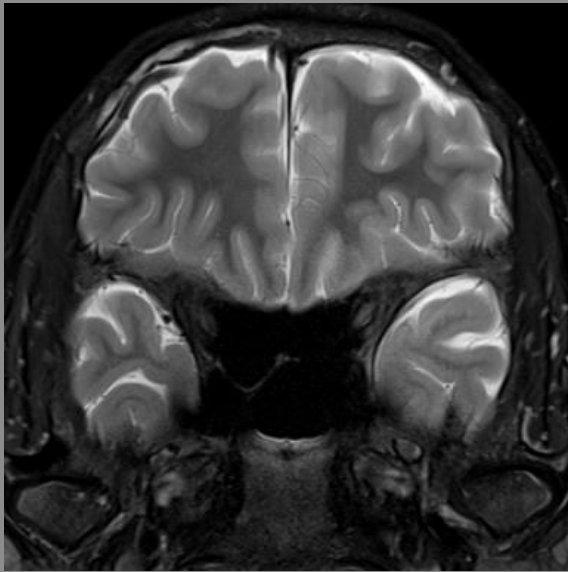


# \* Right Mesial Temporal Sclerosis

A 37 year-old female epilepsy since 2 years of age with visual aura.

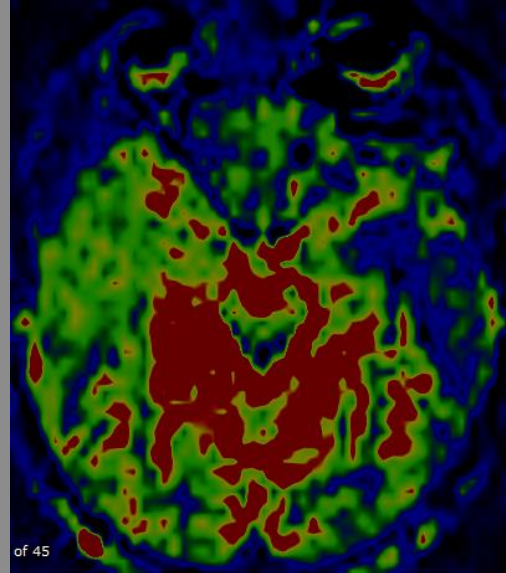
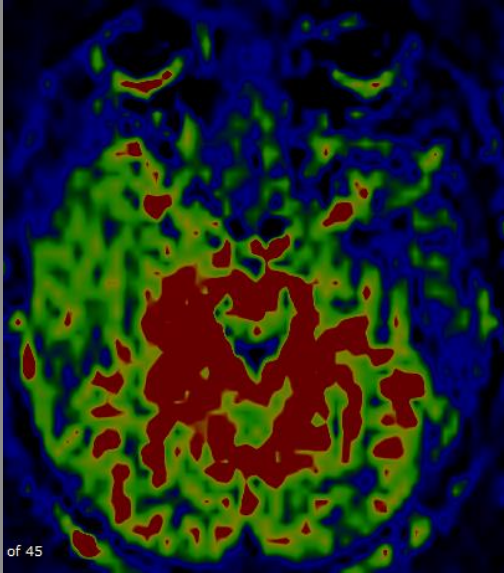
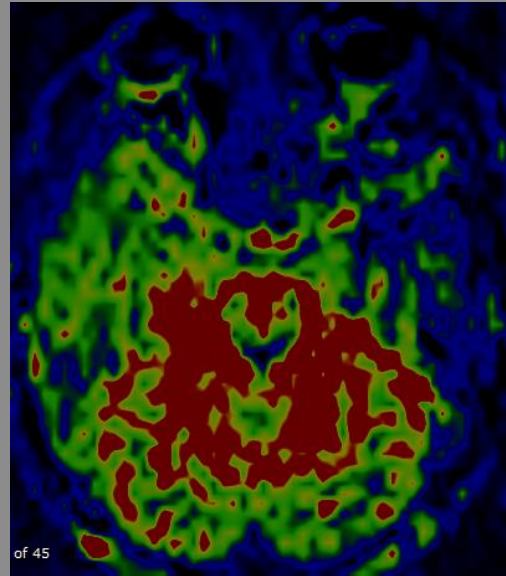
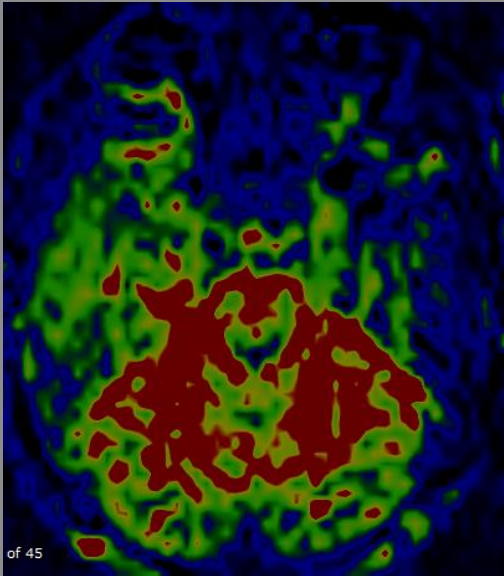


A 14 year-old male had seizure and abnormal EEG at the left temporal region.





# Left Mesial Temporal Sclerosis



A 14 year-old boy  
had abnormal EEG at  
the left temporal  
region

Perfusion study  
with 3D ASL

## \*Pitfalls:

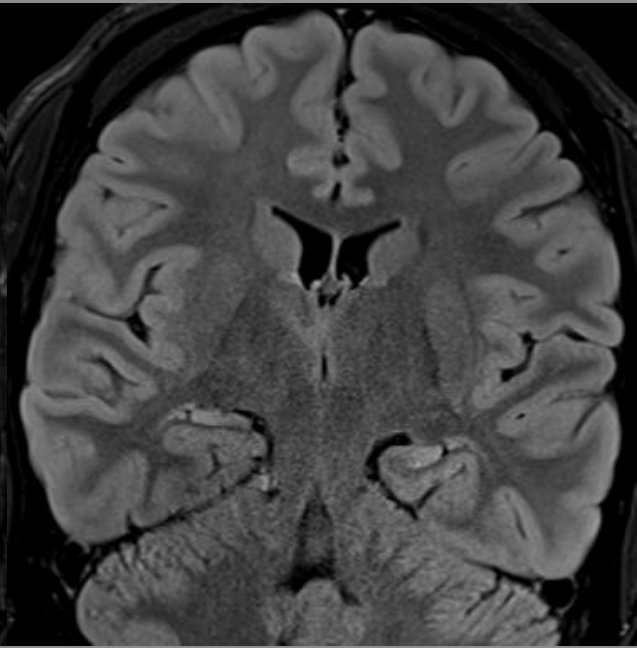
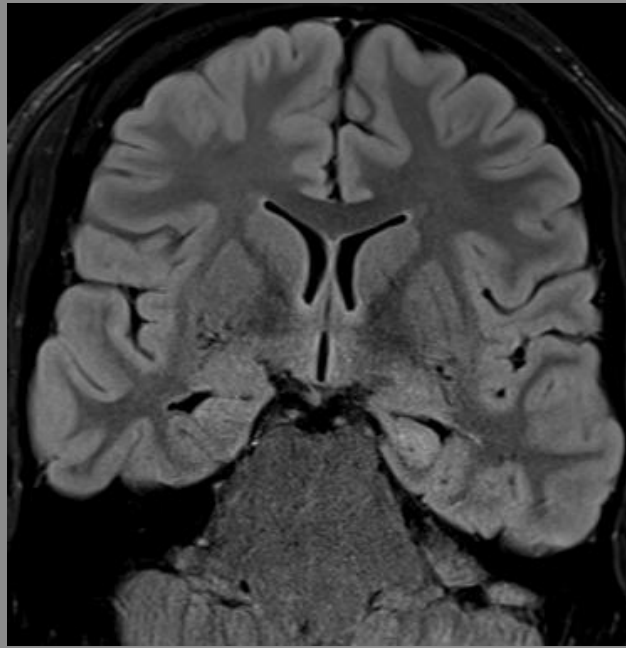
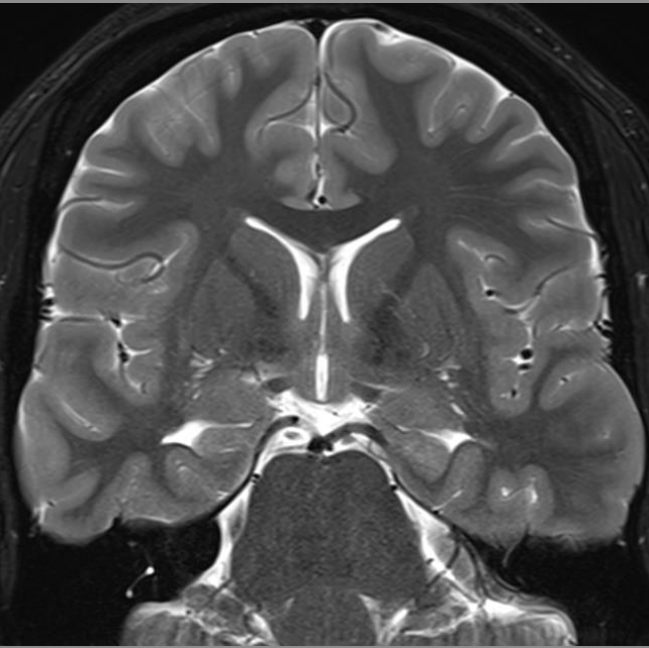
- \*When interpreting MR images of TLE, we should pay careful attention to the anterior temporal lobe.
- \*WM abnormalities in the anterior temporal lobe are clinically useful because they indicate the side of the seizure foci.

# \*Dual Pathology

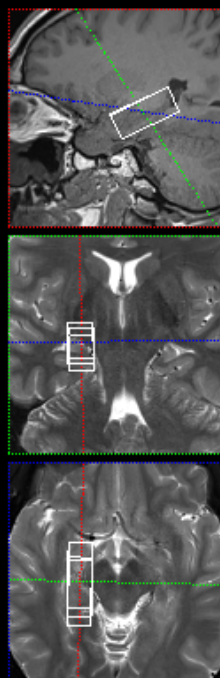
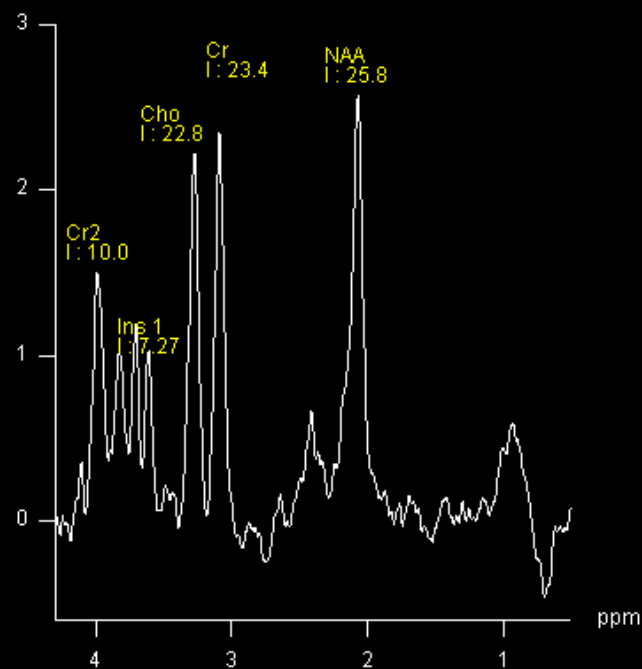
\*Usually in mild HS in combination with a second pro-epileptogenic lesion.



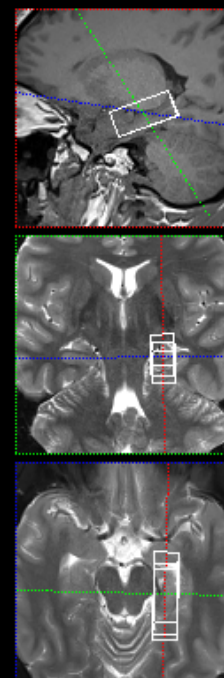
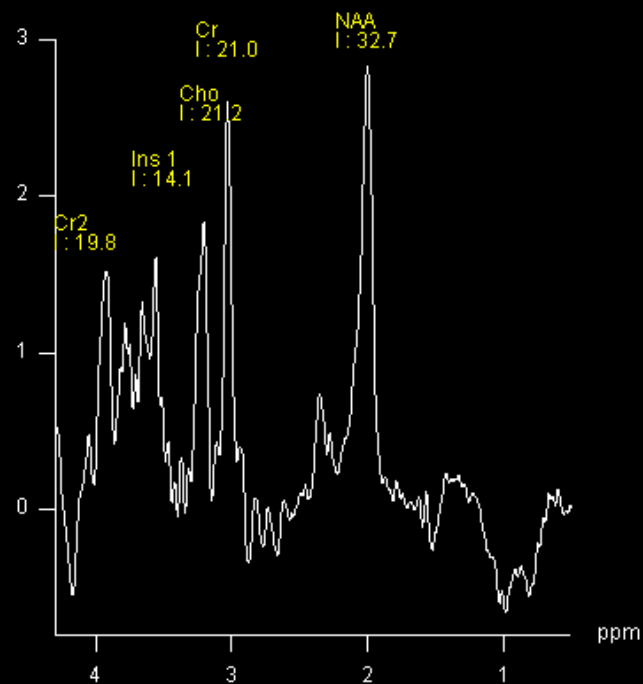
# \*Mesial Hippocampal Sclerosis



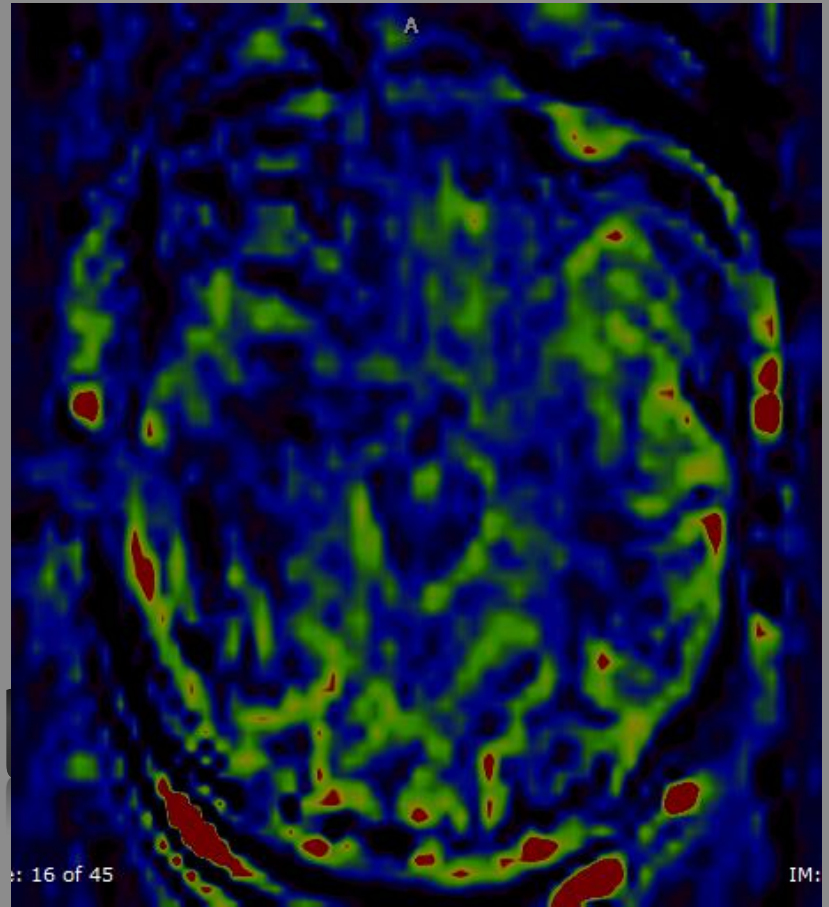
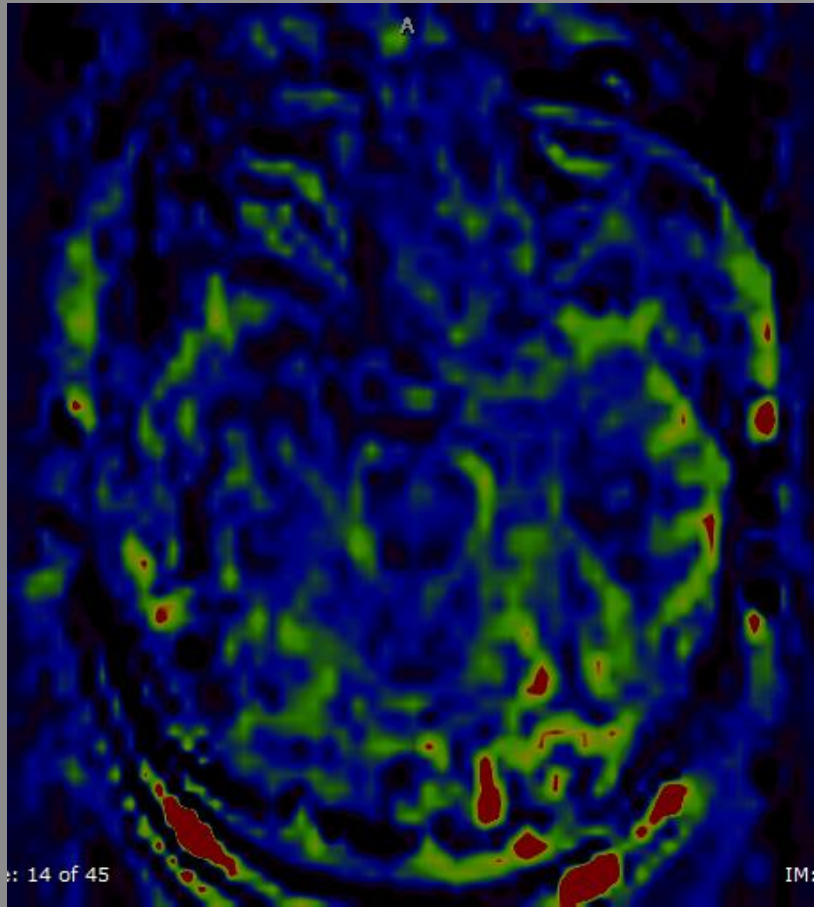
I: Integral



I: Integral

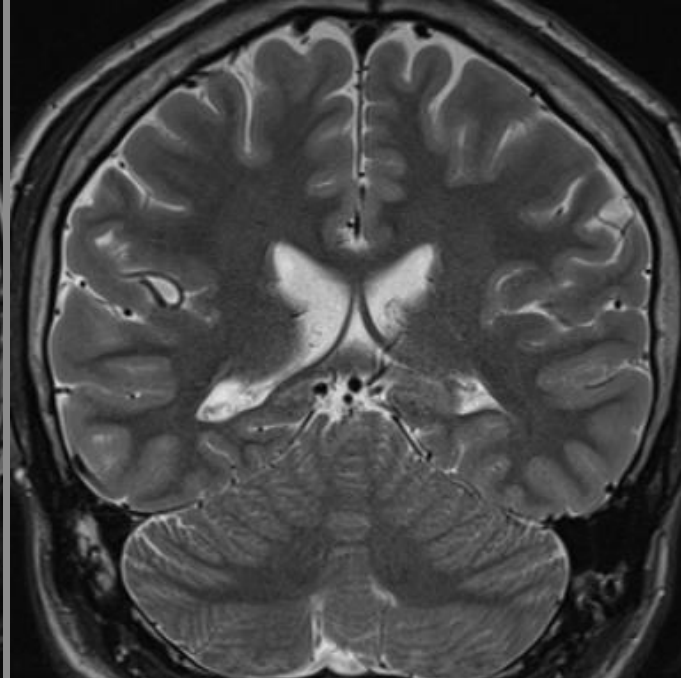
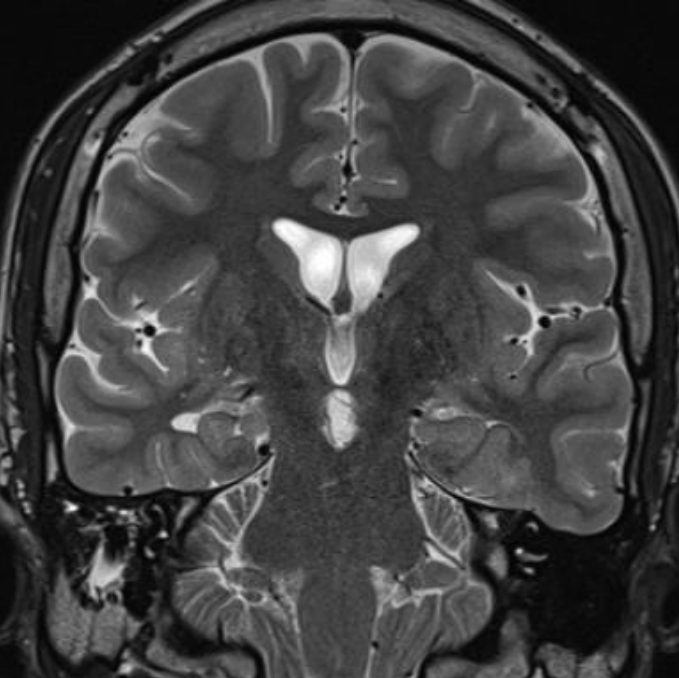
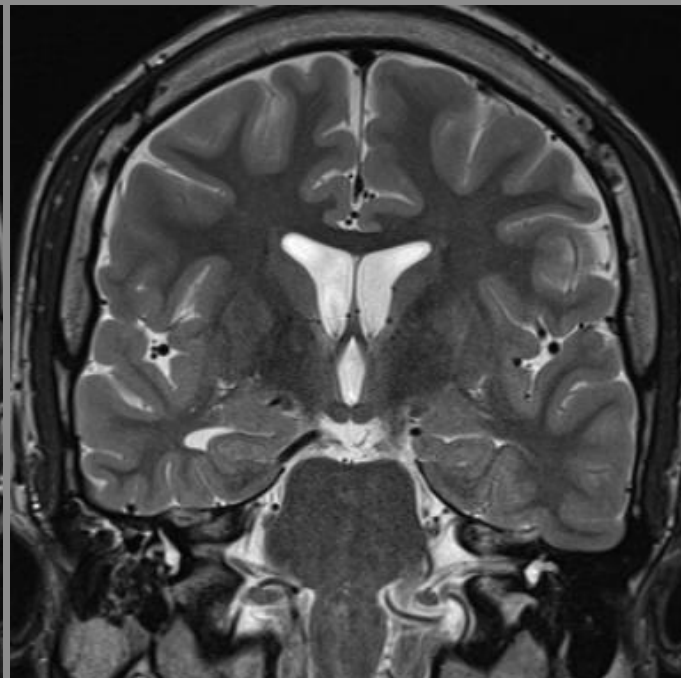
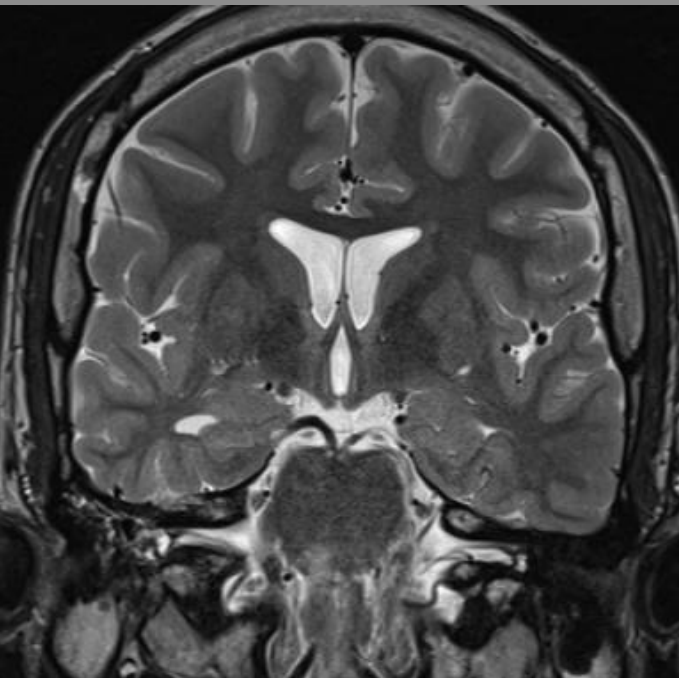




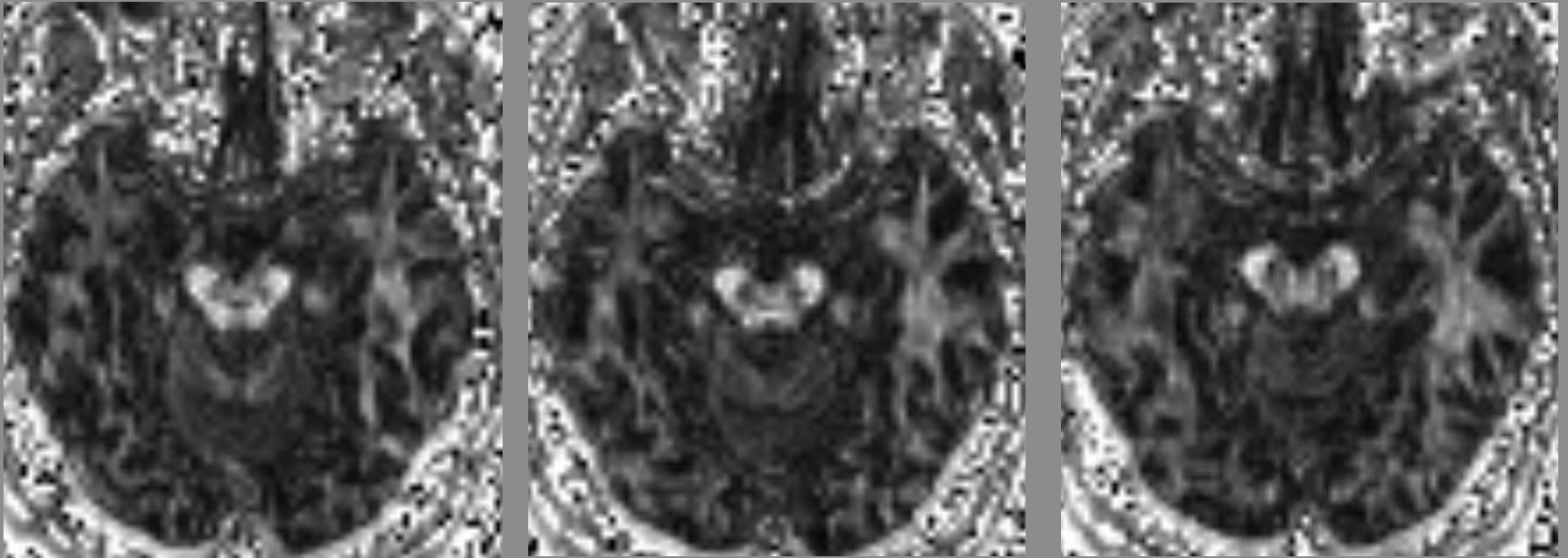


Perfusion Study with 3D ASL

\* Right  
mesial  
temporal  
sclerosis.



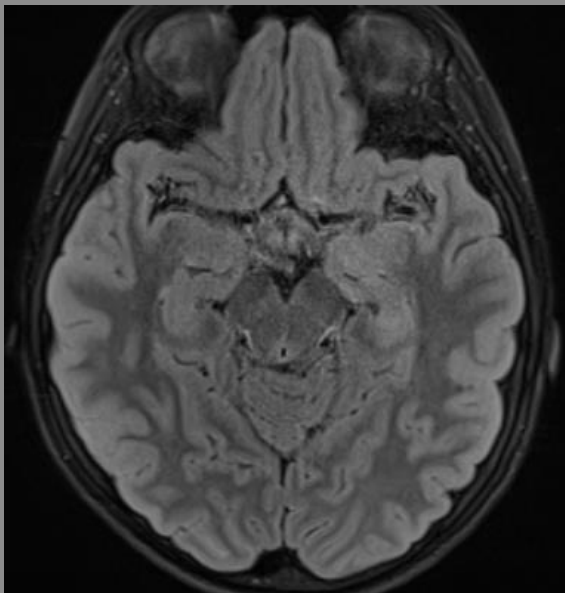
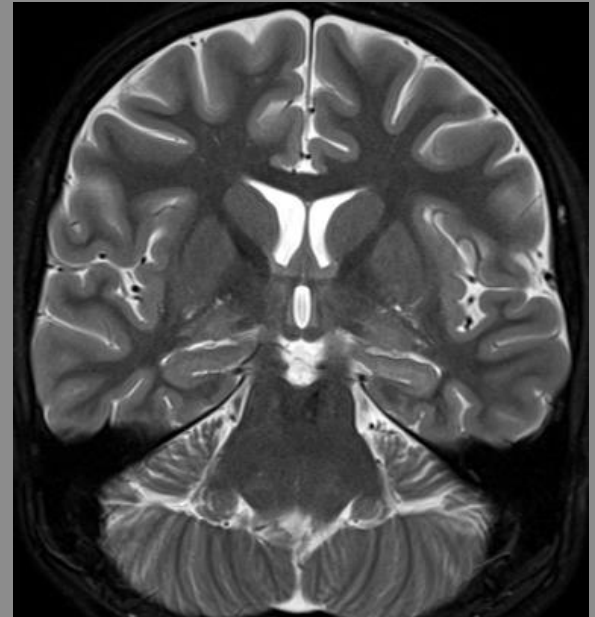
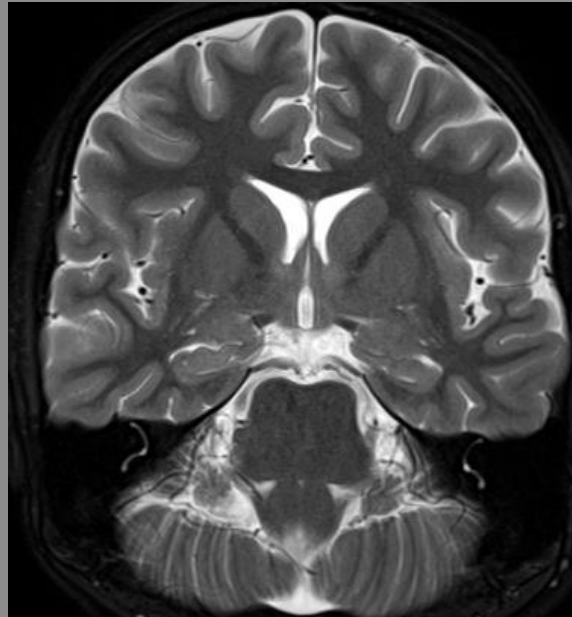
\* Right mesial temporal sclerosis.



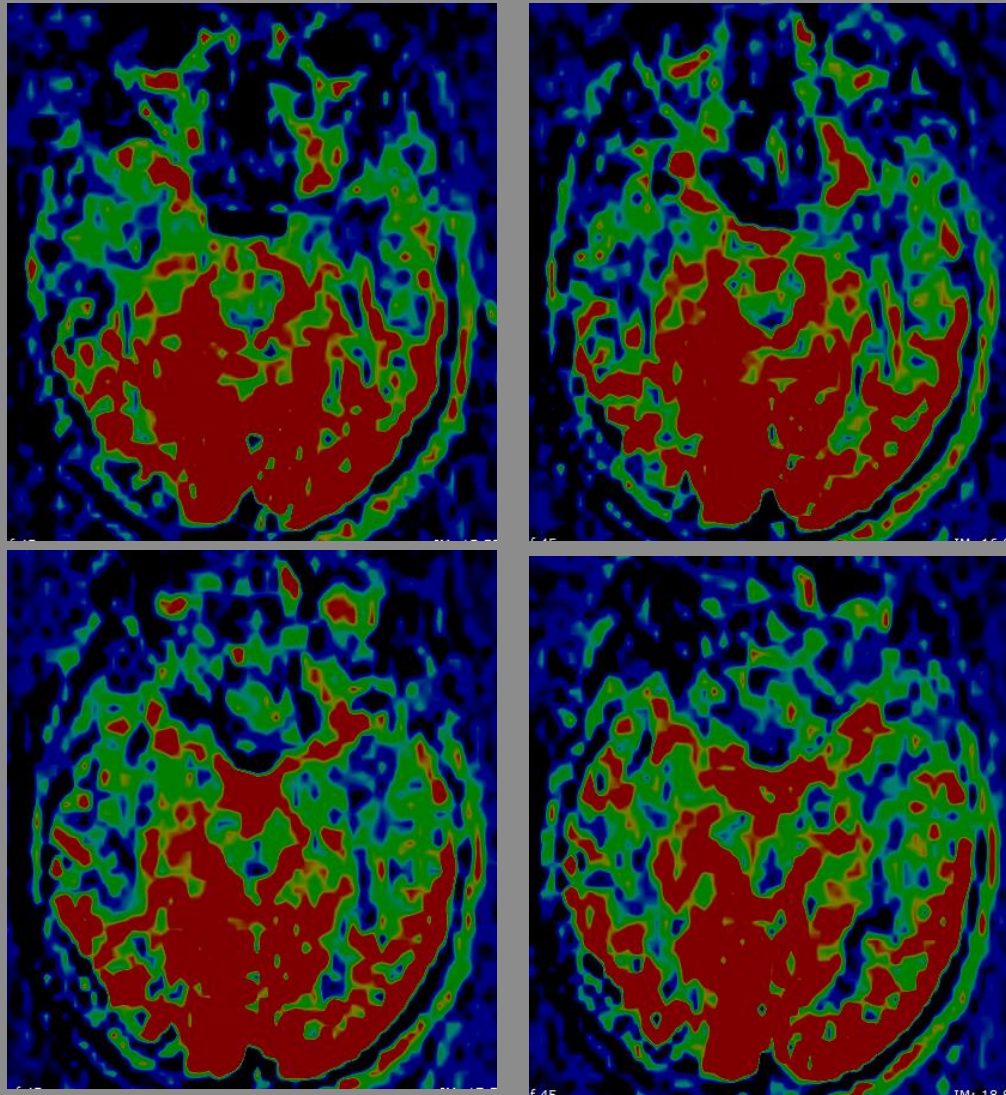
DTI - Fractional Anisotropy (FA) Maps



# \* Left Mesial Temporal sclerosis



A 9 year-old girl had complex partial seizure.  
Seizure started from vomiting and then absence.  
EEG – abnormal epileptic discharge from left temporal lobe.



Perfusion Study  
with 3D ASL

\* Left Mesial Temporal sclerosis

*\*Malformation of  
cortical development*

# \* Malformation of cortical development

- \* MCD is characterized by an abnormal structure of the cerebral cortex.
- \* Malformation Secondary to Abnormal Neuronal and Glial Proliferation or Apoptosis, Malformation Due to Abnormal Neuronal Migration, and Malformation Secondary to Abnormal Postmigration Development.
- \* MCD is an important cause of developmental delay and epilepsy.

- \*Cortical thickening
- \*Abnormal gyration
- \*Blurring of gray-white junction
- \*T2 prolongation in the cortex or subjacent white matter
- \*Decreased white matter volume
- \*Heterotopic gray matter
- \*CSF cleft
- \*Cortical dimple

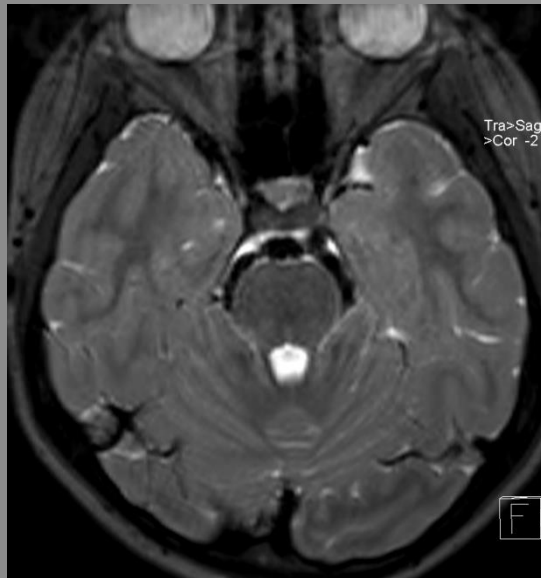
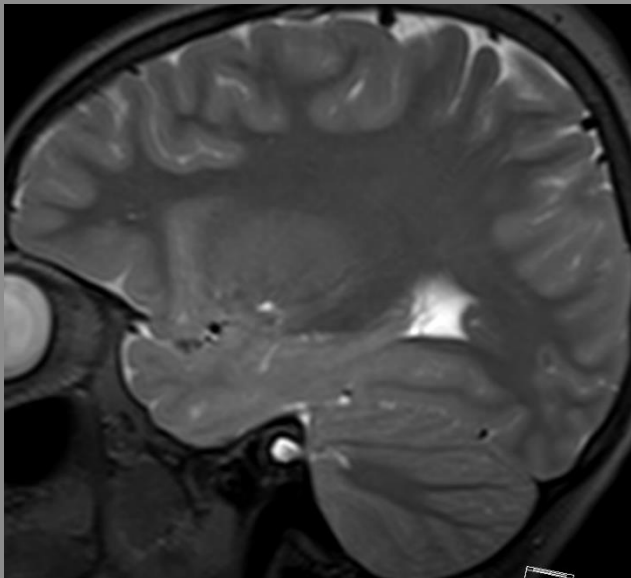
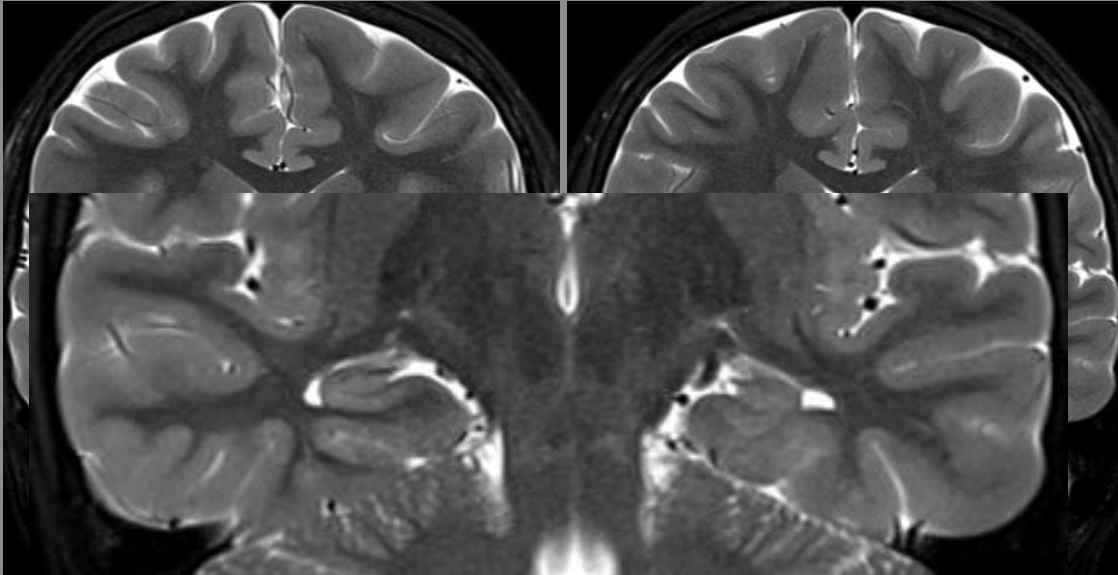
## \*Focal Cortical Dysplasia (FCD): Imaging Findings



**Table 2.** New classification system of focal cortical dysplasia by Blumcke et al. 2011.

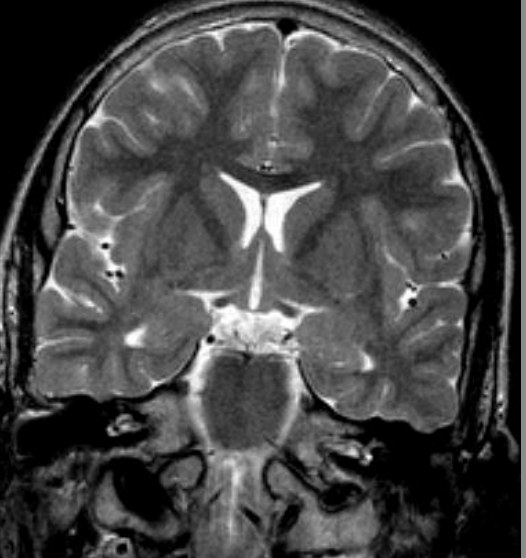
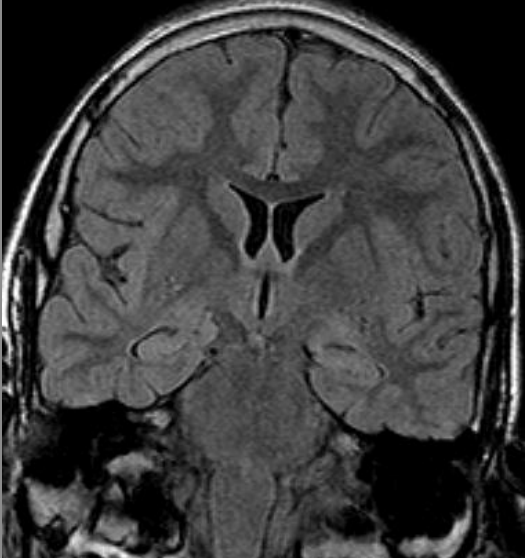
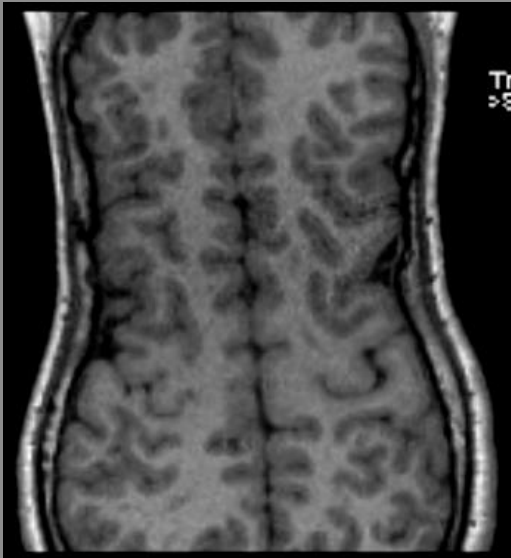
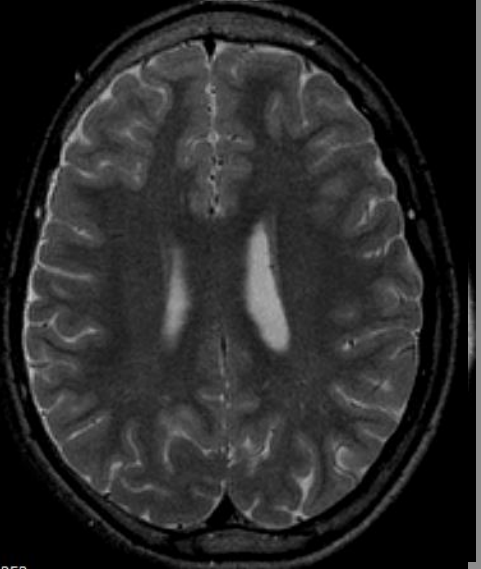
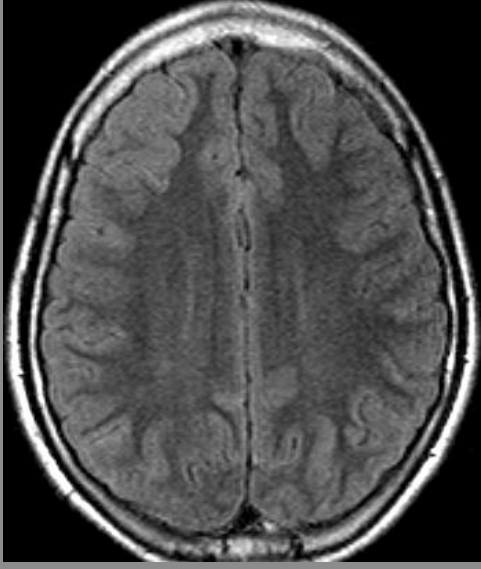
Type	Characteristic features
I	a – focal cortical dysplasia with abnormal radial cortical lamination b – focal cortical dysplasia with abnormal tangential 6-layer cortical lamination c – focal cortical dysplasia with abnormal radial and tangential cortical lamination
II	a – focal cortical dysplasia with dysmorphic neurons b – focal cortical dysplasia with dysmorphic neurons and balloon cells
III	a – architectural distortion of cortical layer in temporal lobe with hippocampal atrophy b – architectural distortion of cortical layer adjacent to glial or glioneuronal tumor c – architectural distortion of cortical layer adjacent to vascular malformation d – architectural distortion of cortical layer adjacent to other lesions acquired in early childhood such as trauma, ischemic event, encephalitis

# \* FCD type I

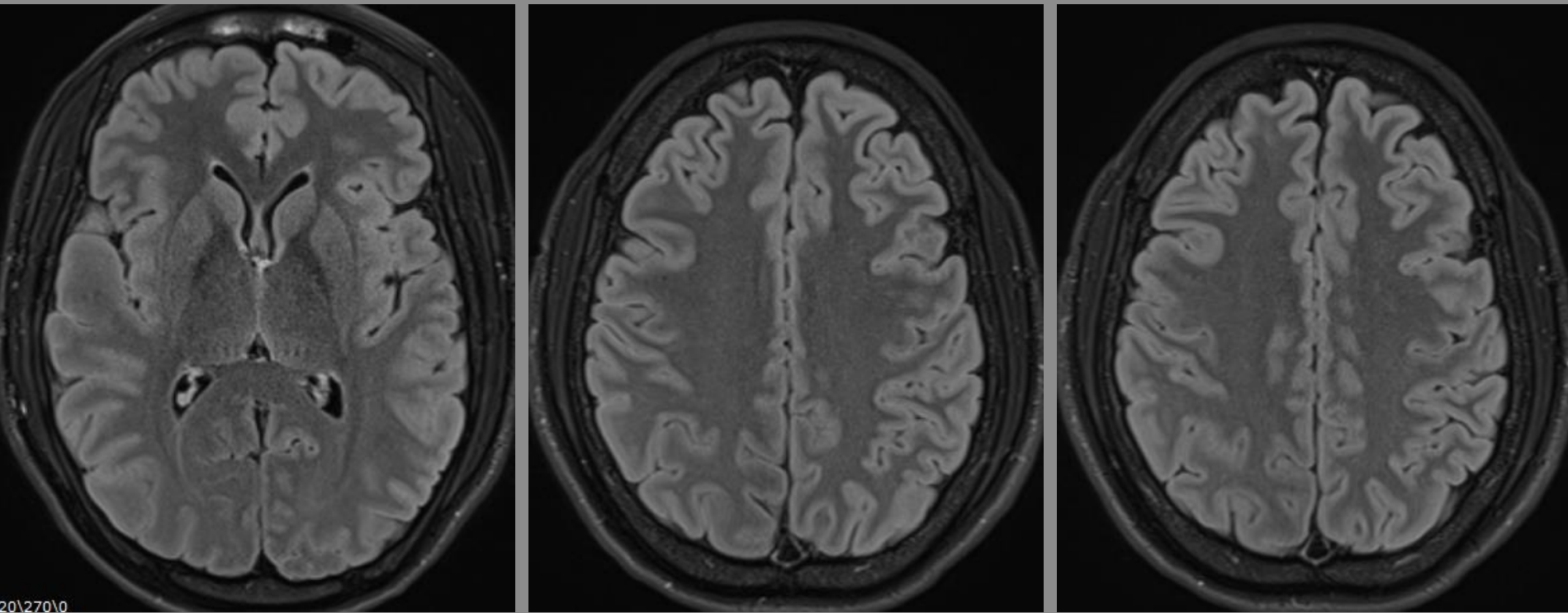


# \* FCD type Ia

A 13 year-old boy had seizure since 3 years of age.  
EEG – Bisynchronous sharp-slow activity over bilateral frontal regions with right predominance.



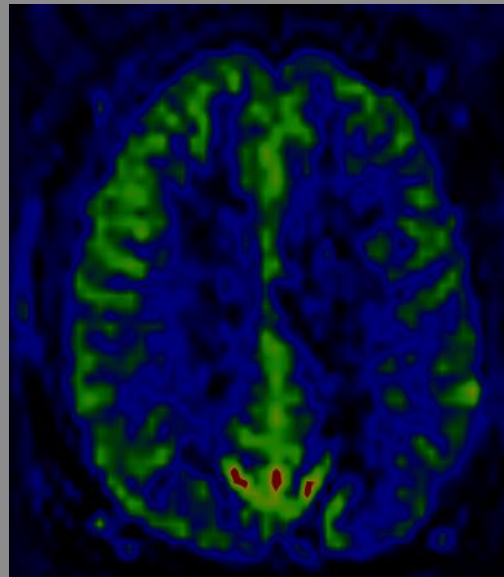
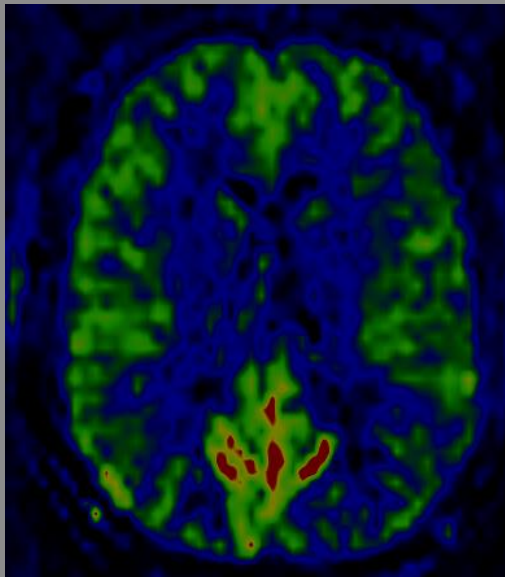
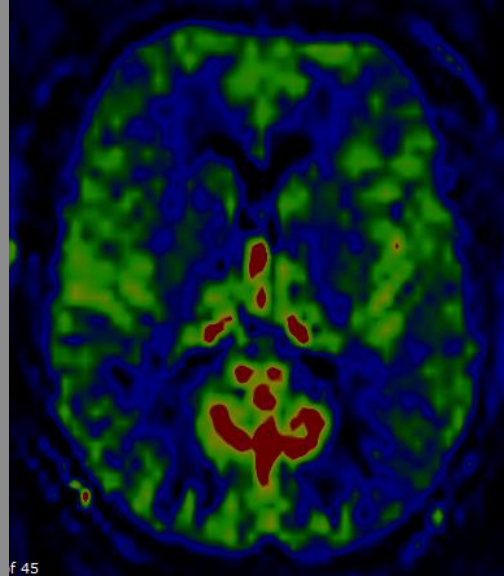
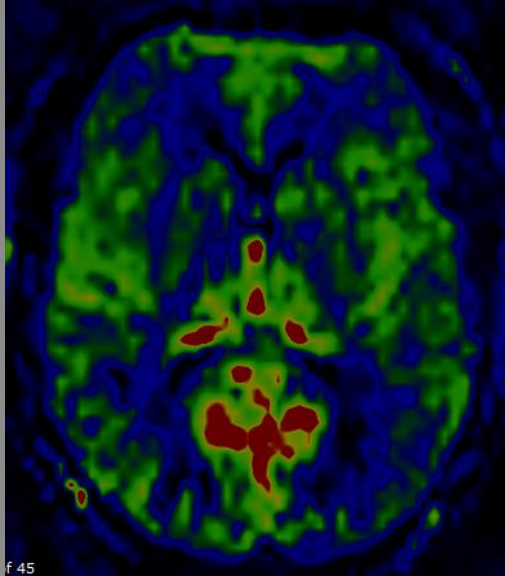
A 20 year-old female had seizure since 9 years of age. Seizure started from feeling of palpitation, followed by loss of awareness and whole body stiffening/jerking.



\* Microdysgenesis

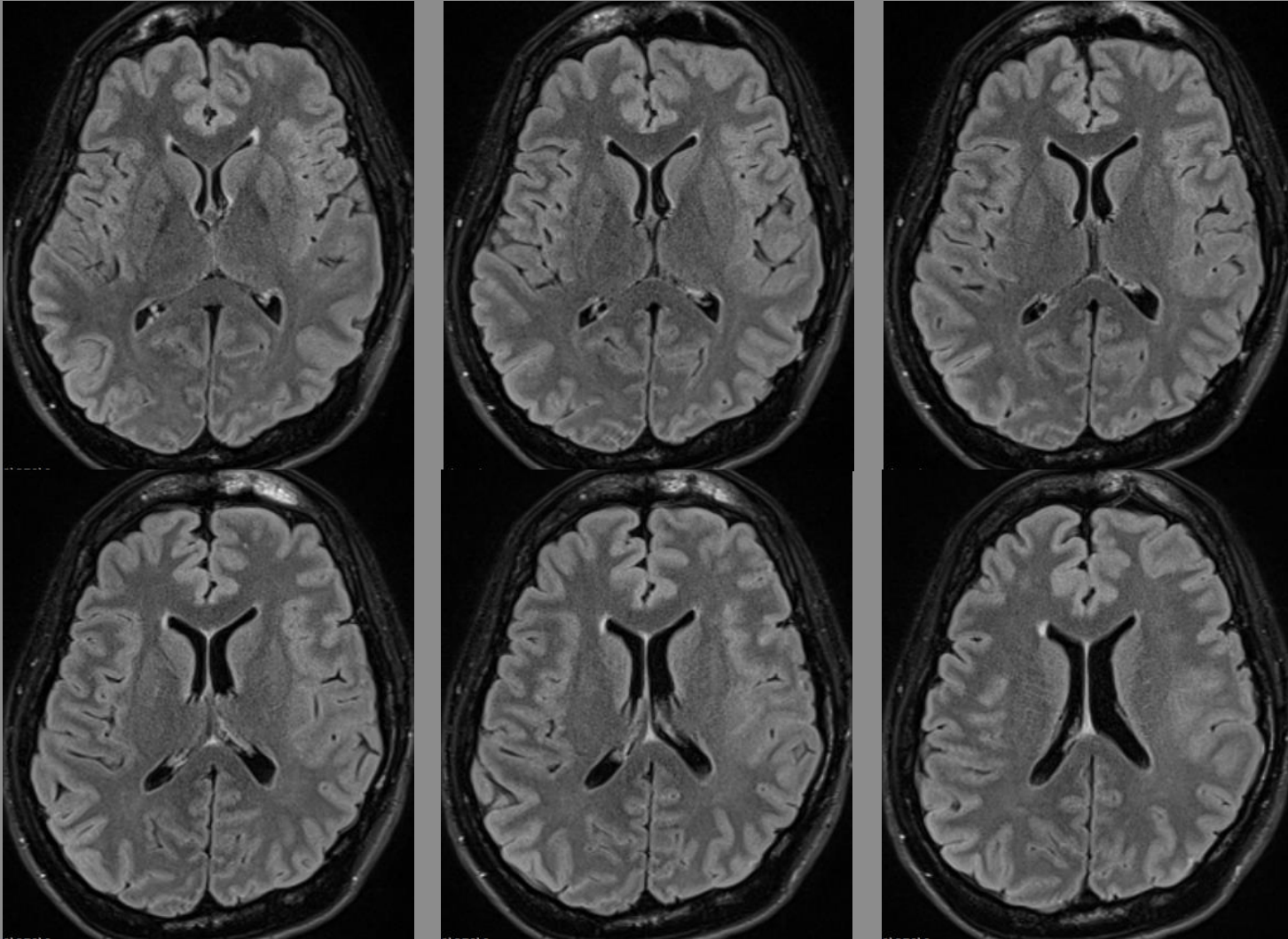


# \*Microdysgenesis



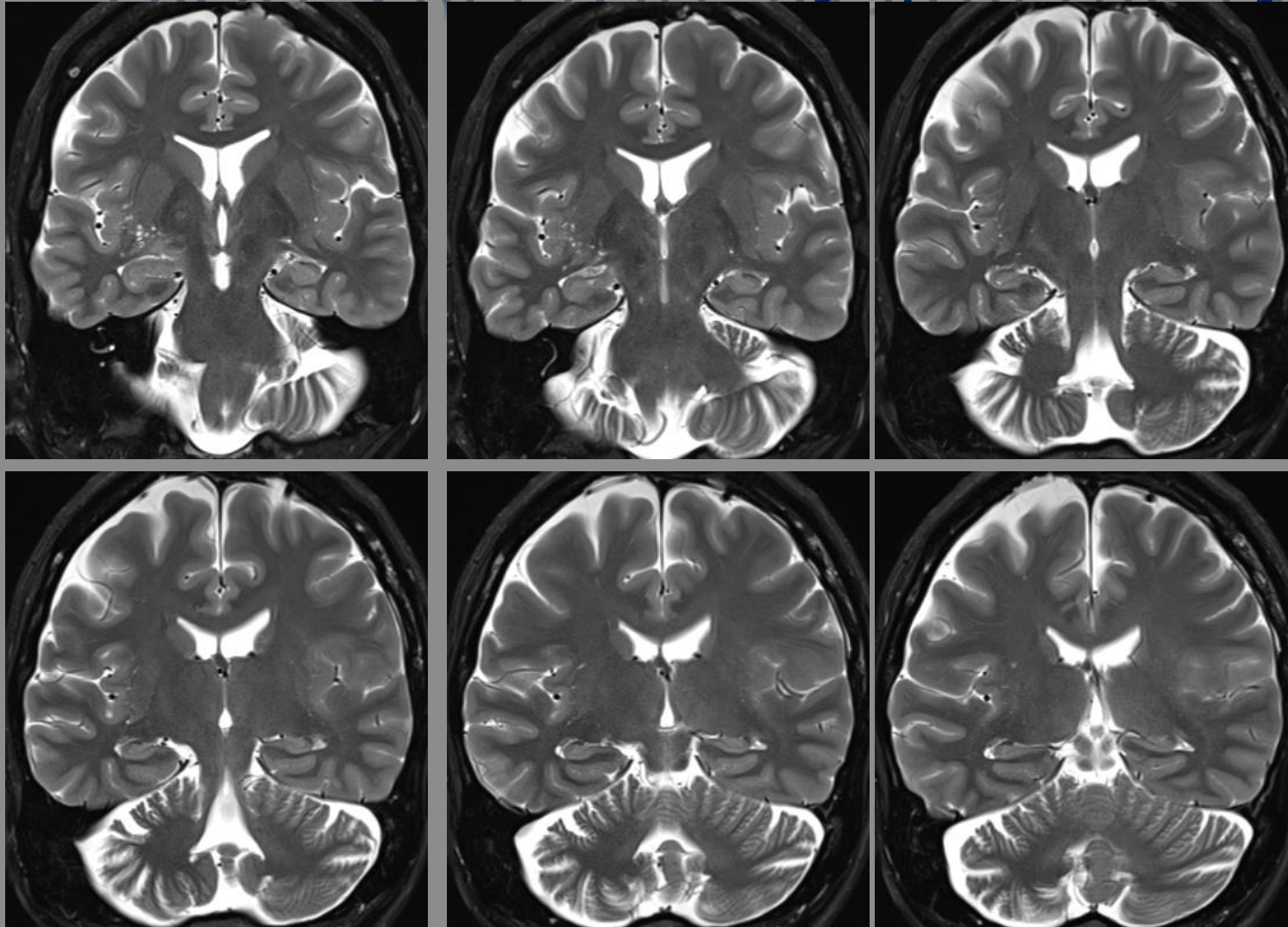
Perfusion Study  
with 3D ASL

# Focal Cortical Dysplasia type IIa



\* A 37 year-old female had seizure onset since 6 year of age. VEEG monitoring has a diagnosis of a focal epilepsy arising from the left mid temporal area.

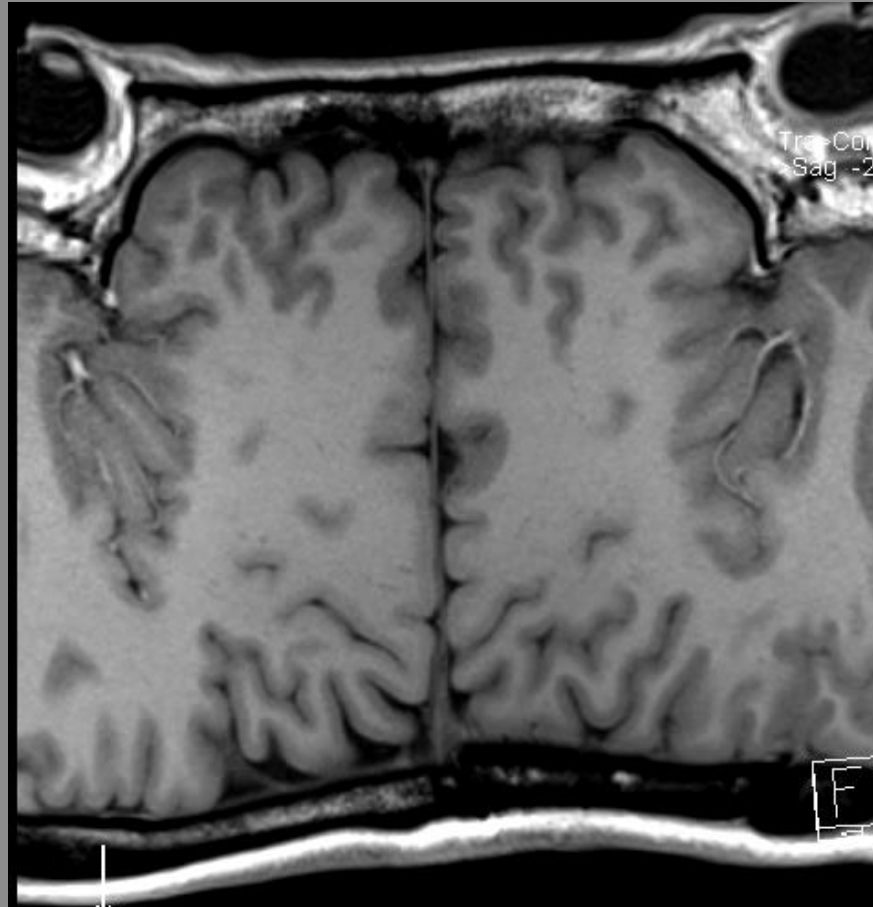
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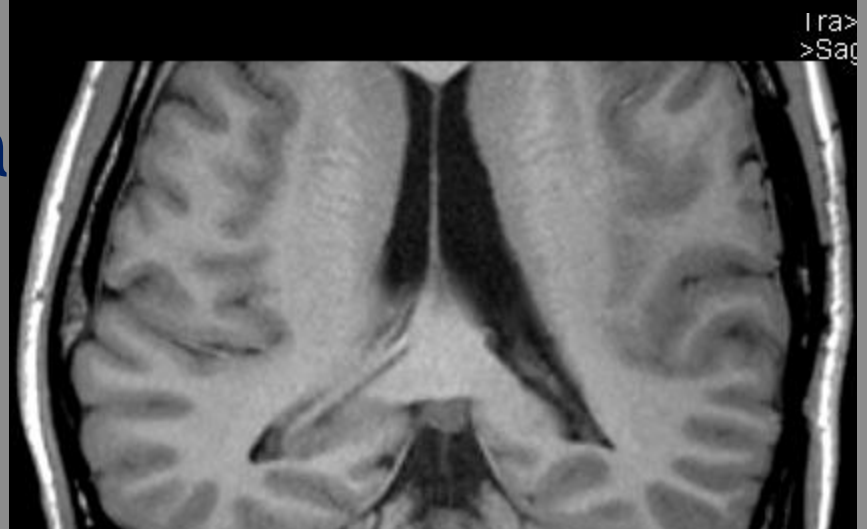
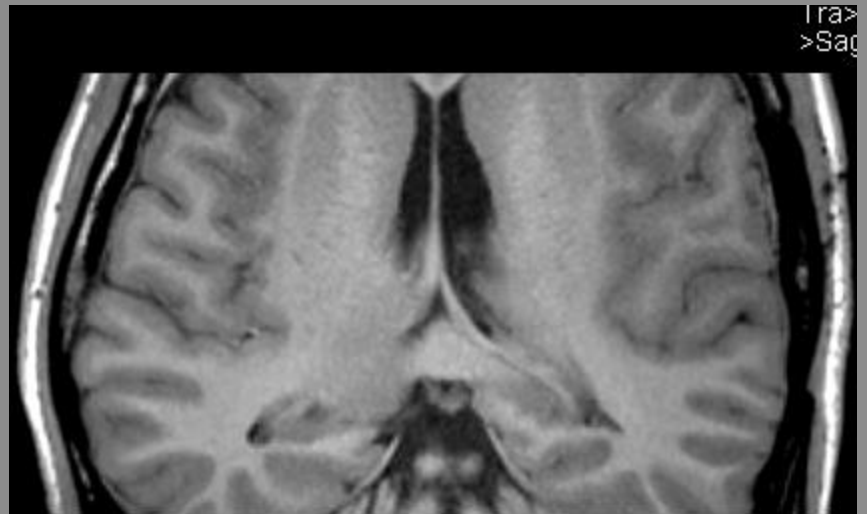
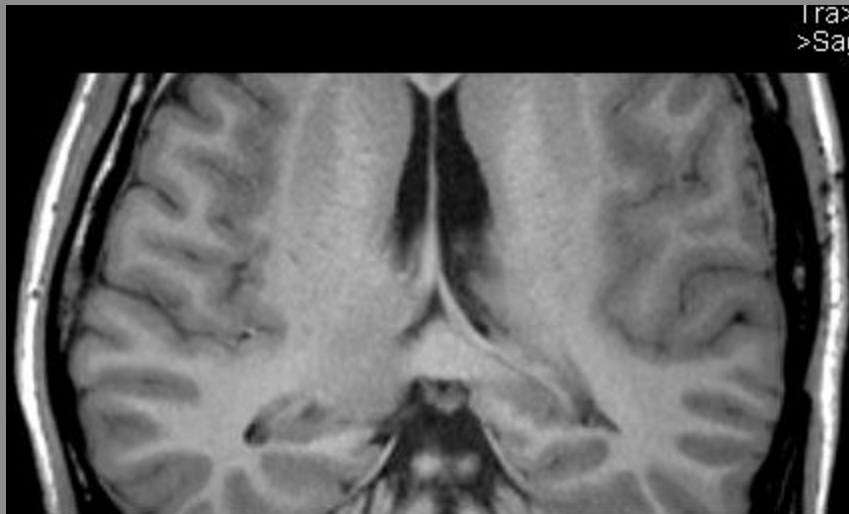


# \* FCD type IIa



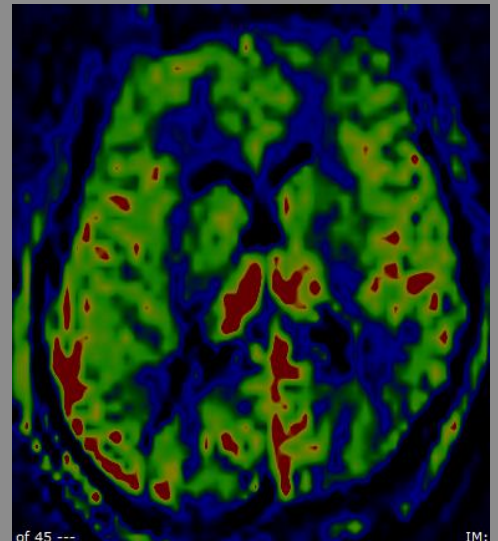
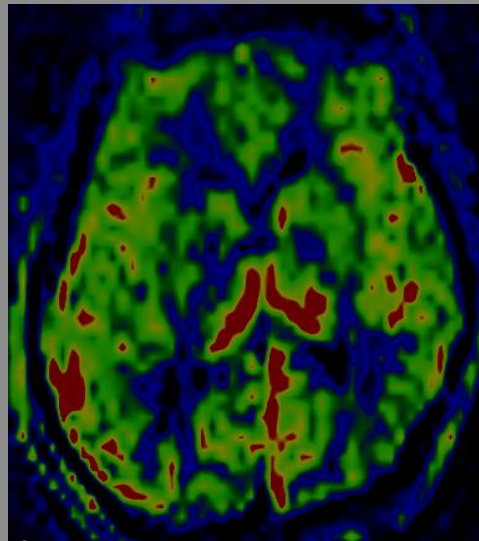
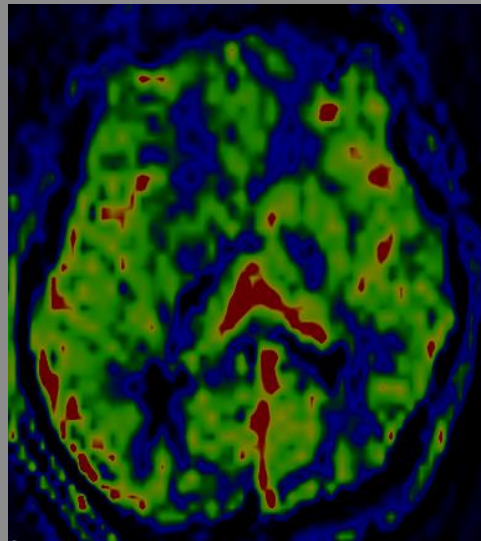
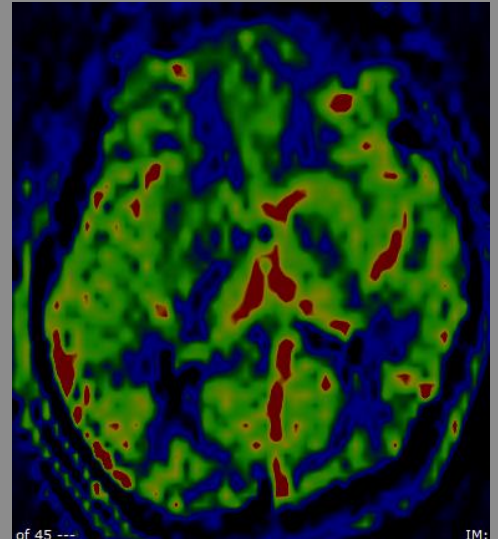
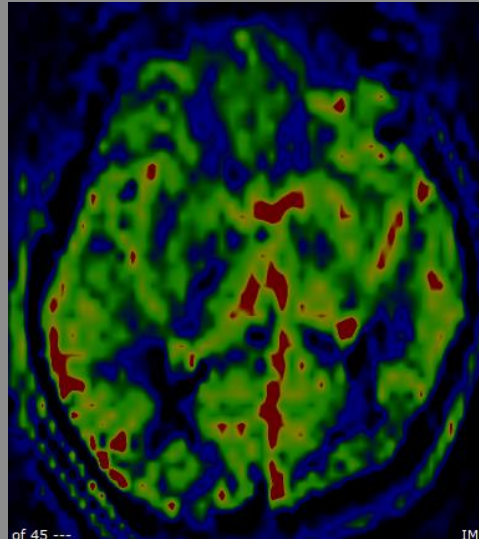
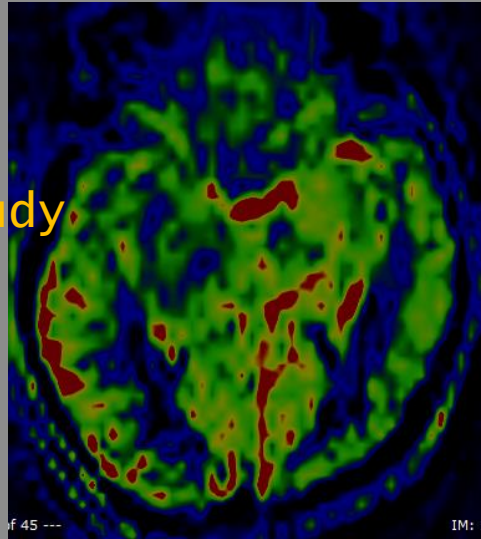


# \* FCD type IIa



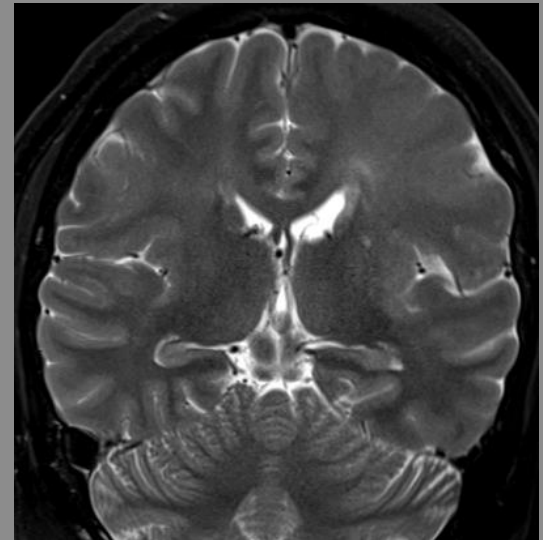
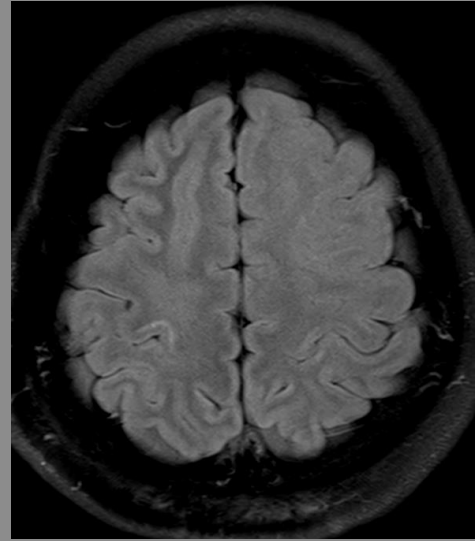
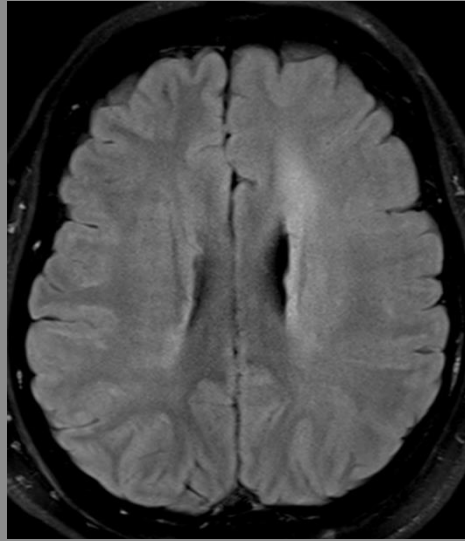
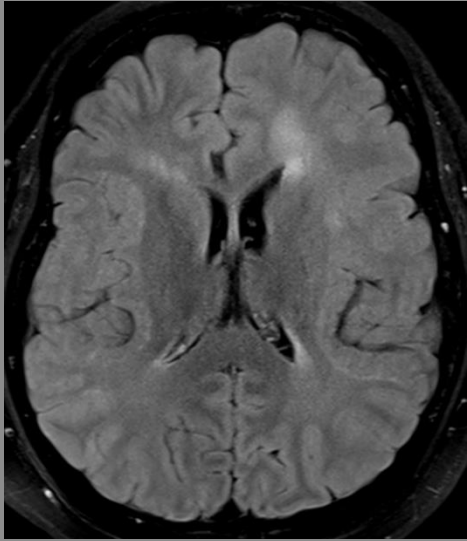
# \* FCD type IIa

Perfusion Study  
with 3D ASL



A 24 year-old female had mental retardation and had GTC seizure since 15 years of age.

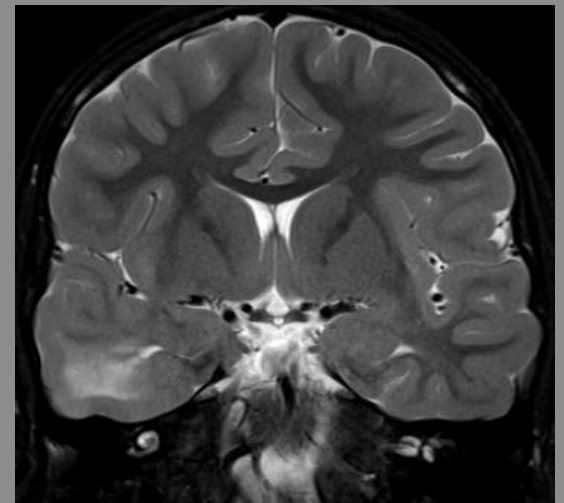
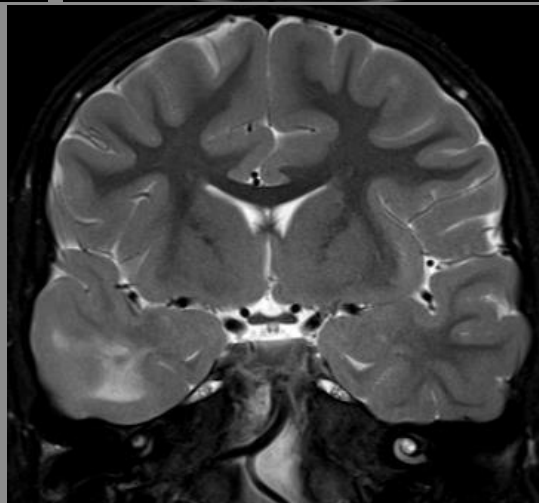
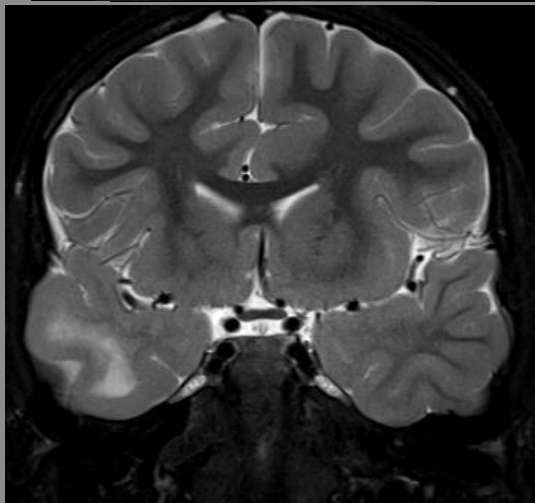
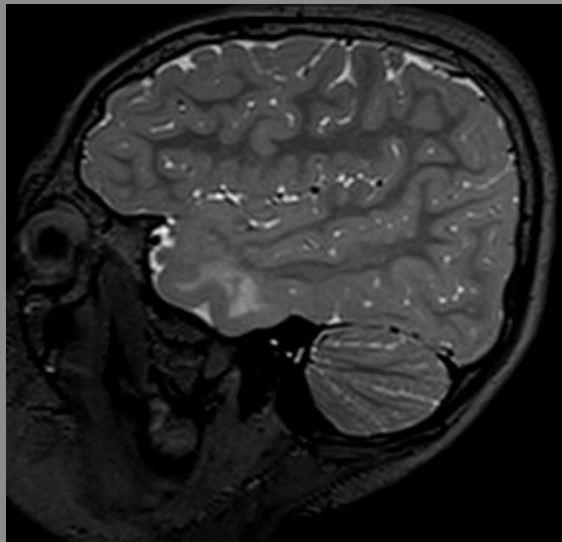
\* FCD type IIa





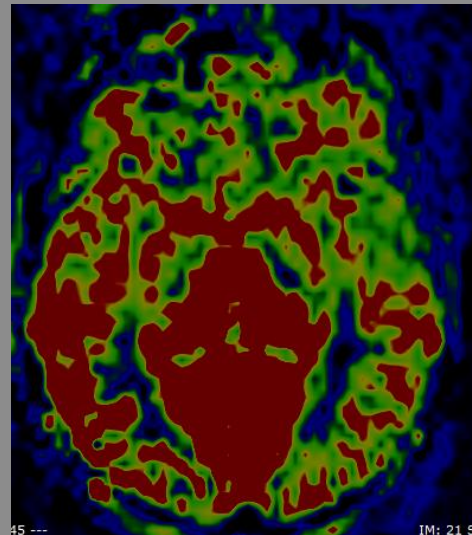
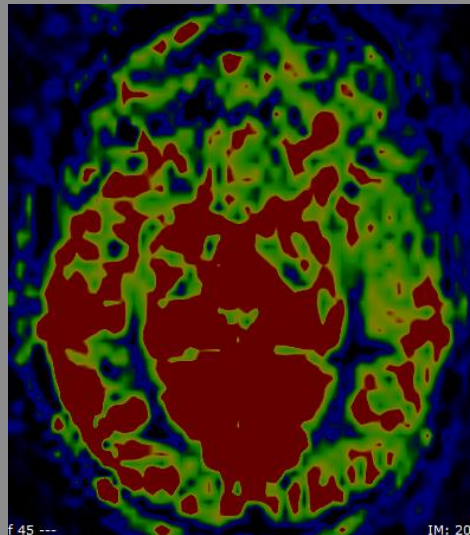
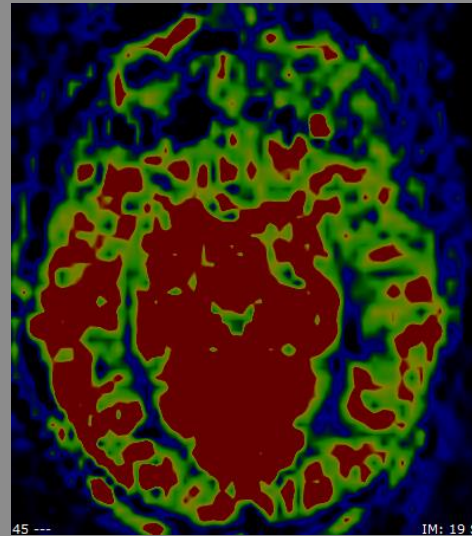
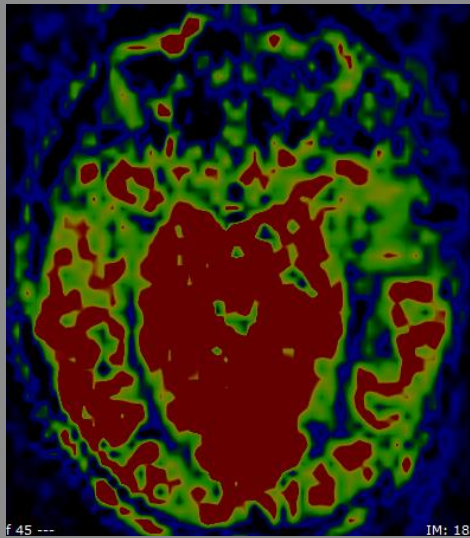
# \*FCD type IIa

A 9 year-old boy, right handedness, had seizure since 2 ½ years of age and had intractable seizure.



# \*FCD type IIa

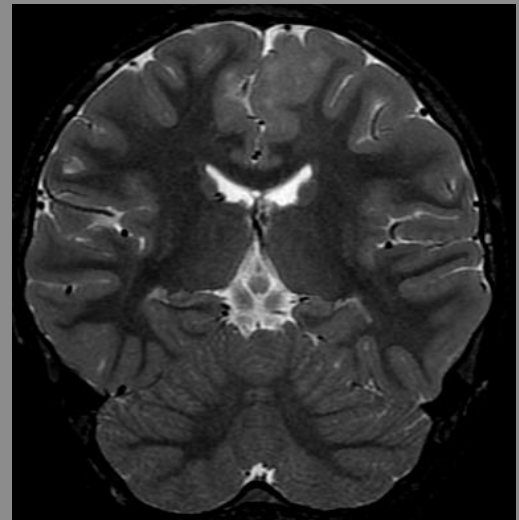
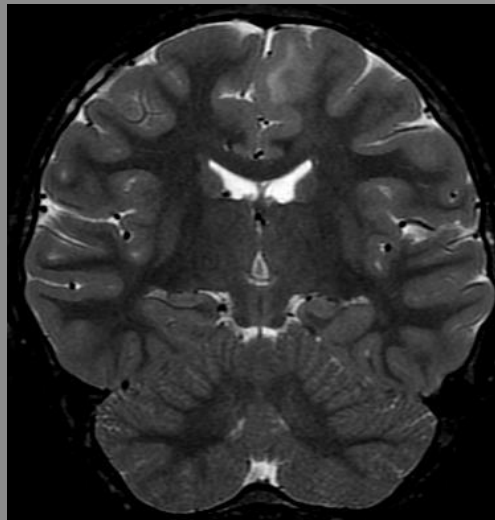
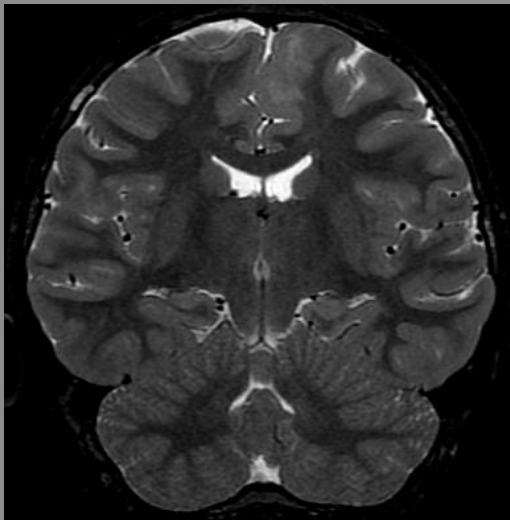
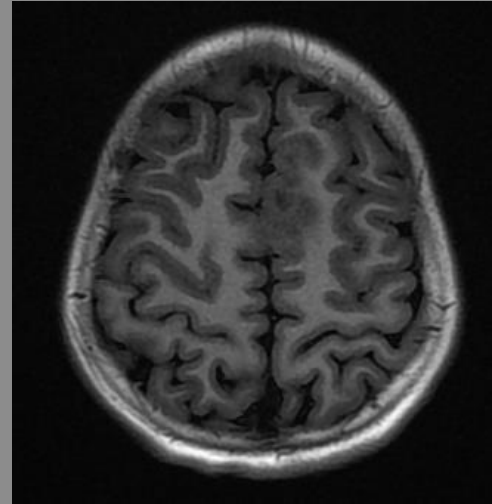
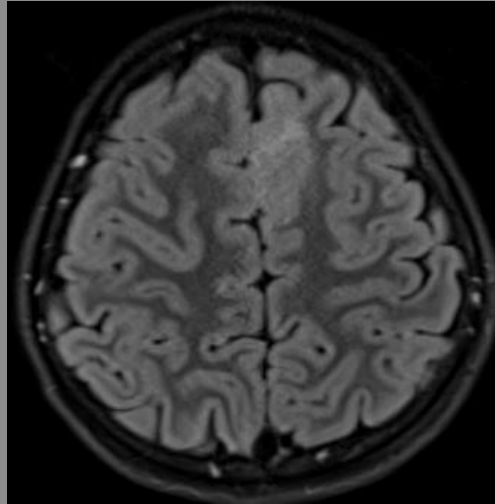
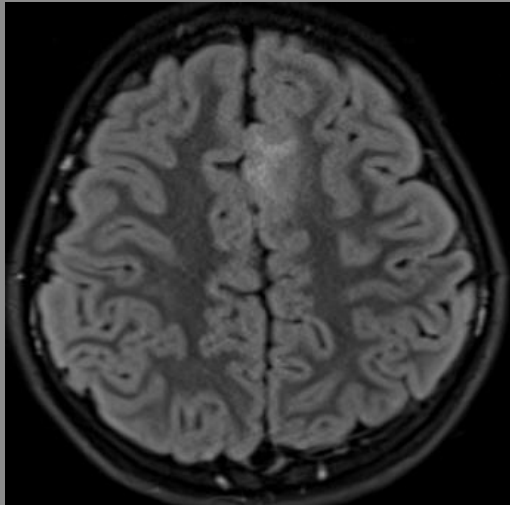
A 9 year-old boy, right handedness, had seizure since 2 ½ years of age and had intractable seizure.



Perfusion Study  
with 3D ASL

## \*FCD type IIb

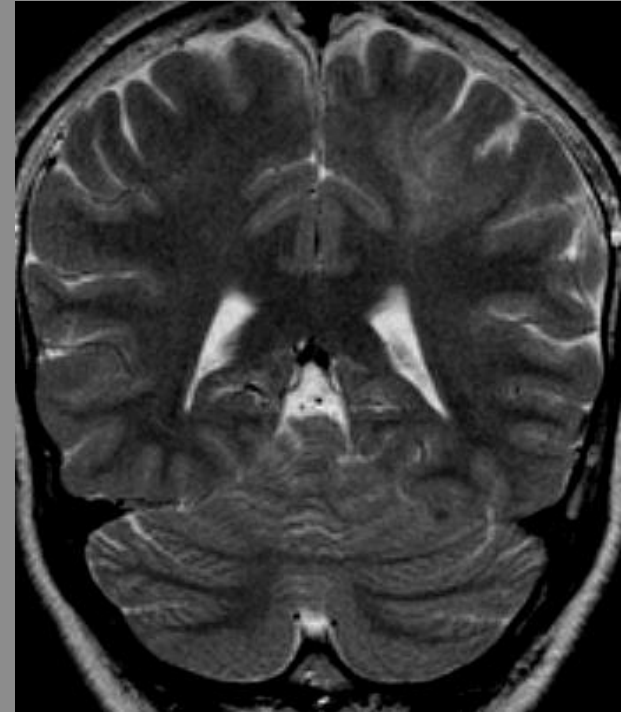
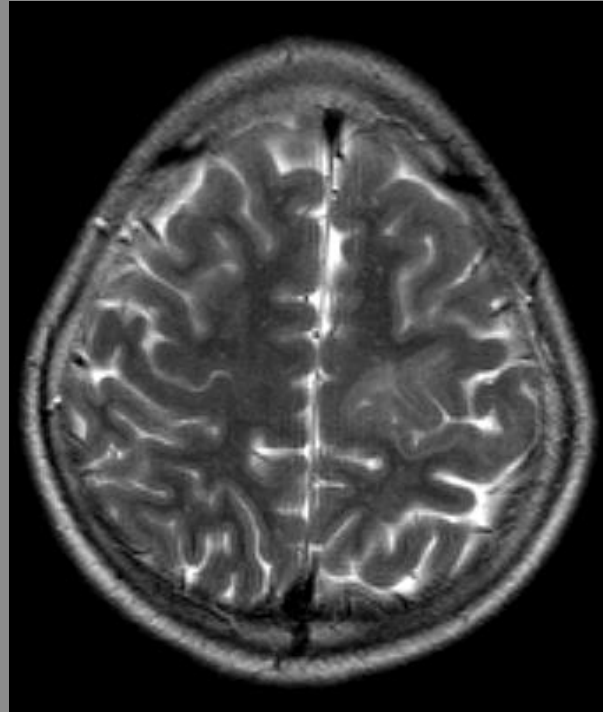
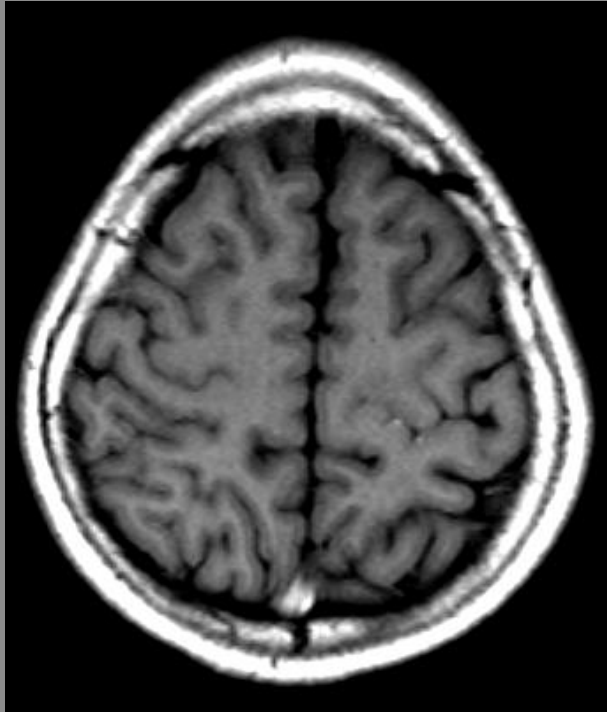
A 7 year-old boy had seizure since 3 years of age. He had seizure starting from chewing and turning to the right side, followed by generalized seizure.







## FCD type IIb

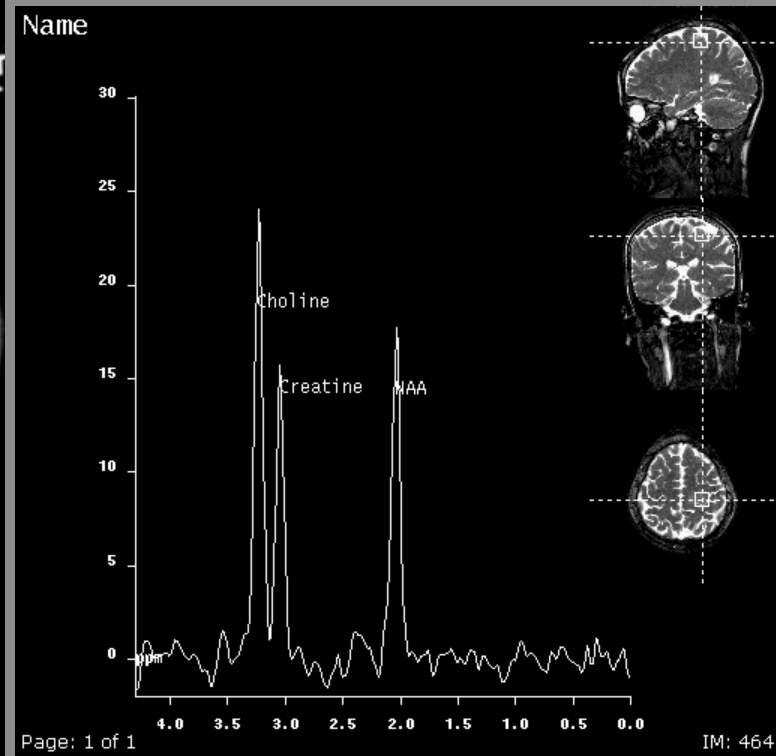
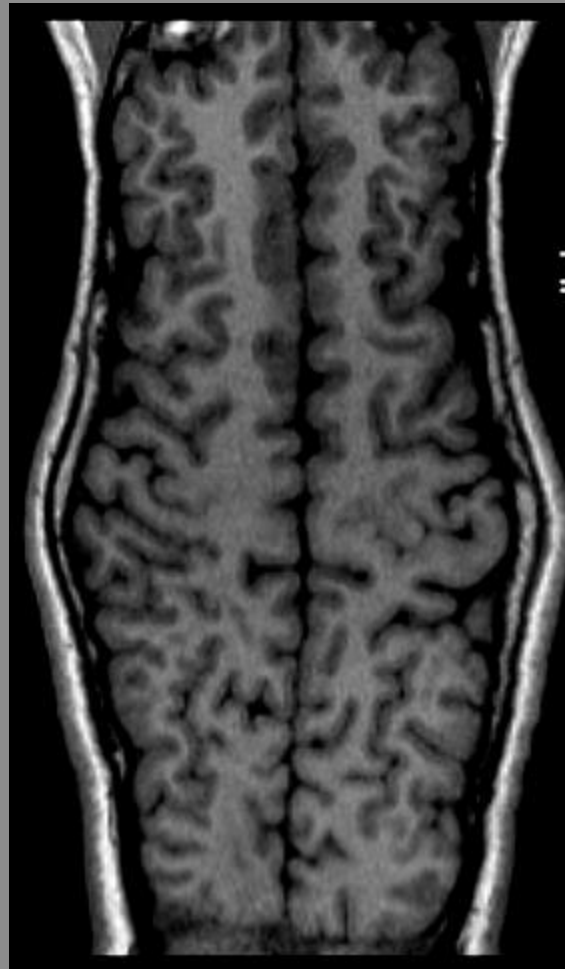
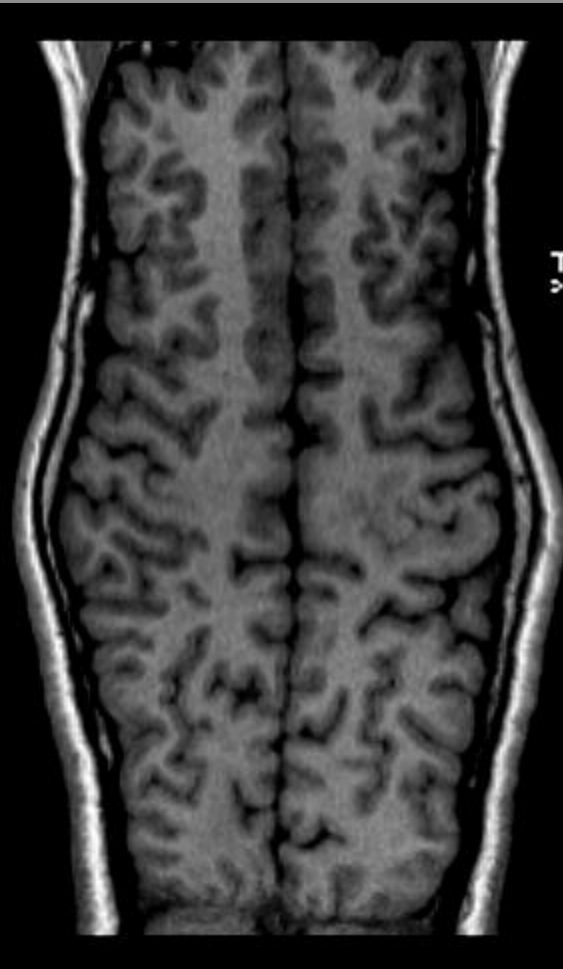


A 12 yr-old girl had complex partial seizure with secondary generalized tonic-clonic seizure since 3 years of age.

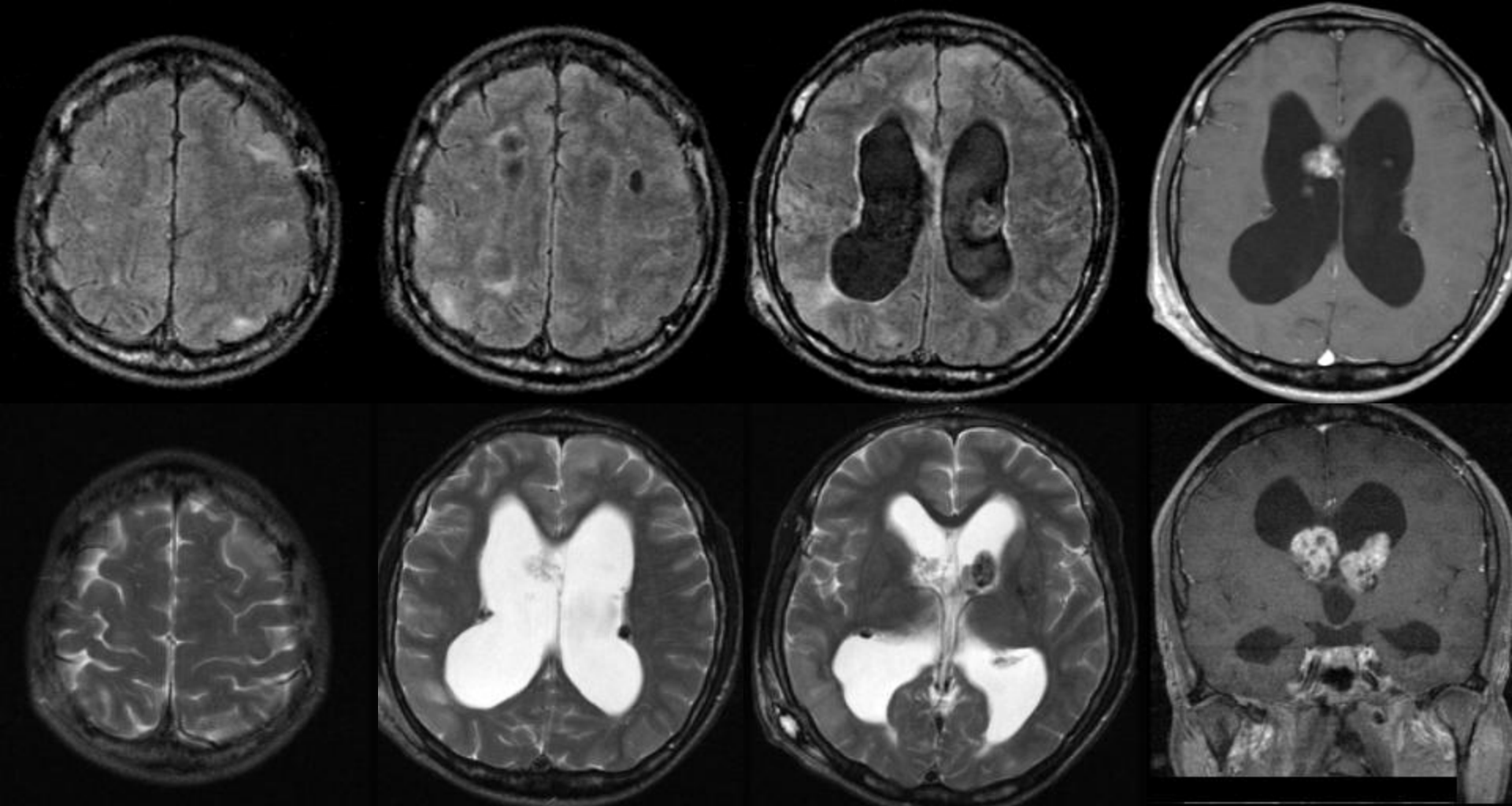




# FCD type IIb

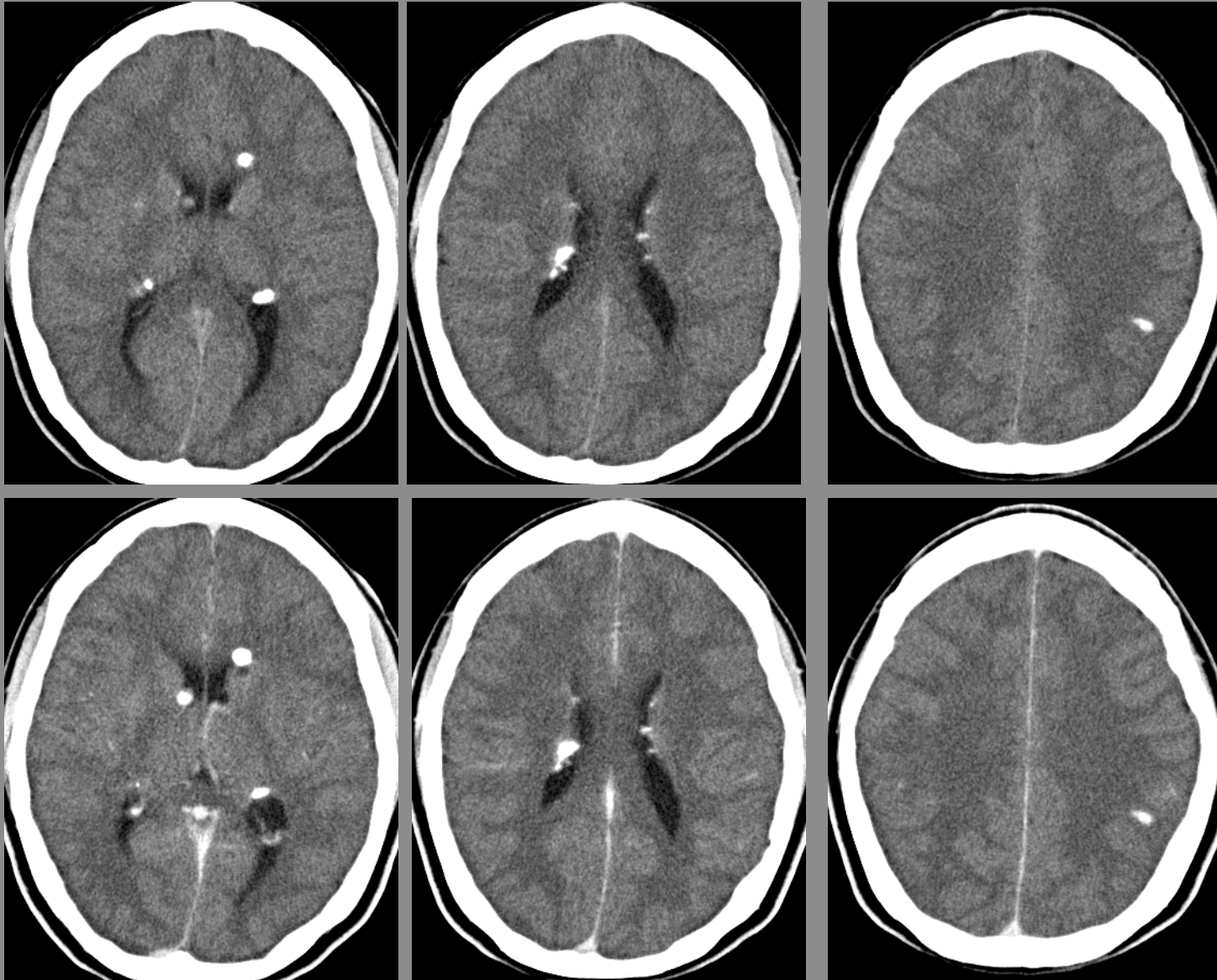


# \*Tuberous Sclerosis Complex



# \*Tuberous Sclerosis Complex

A 10 year-old girl had complex partial seizure.

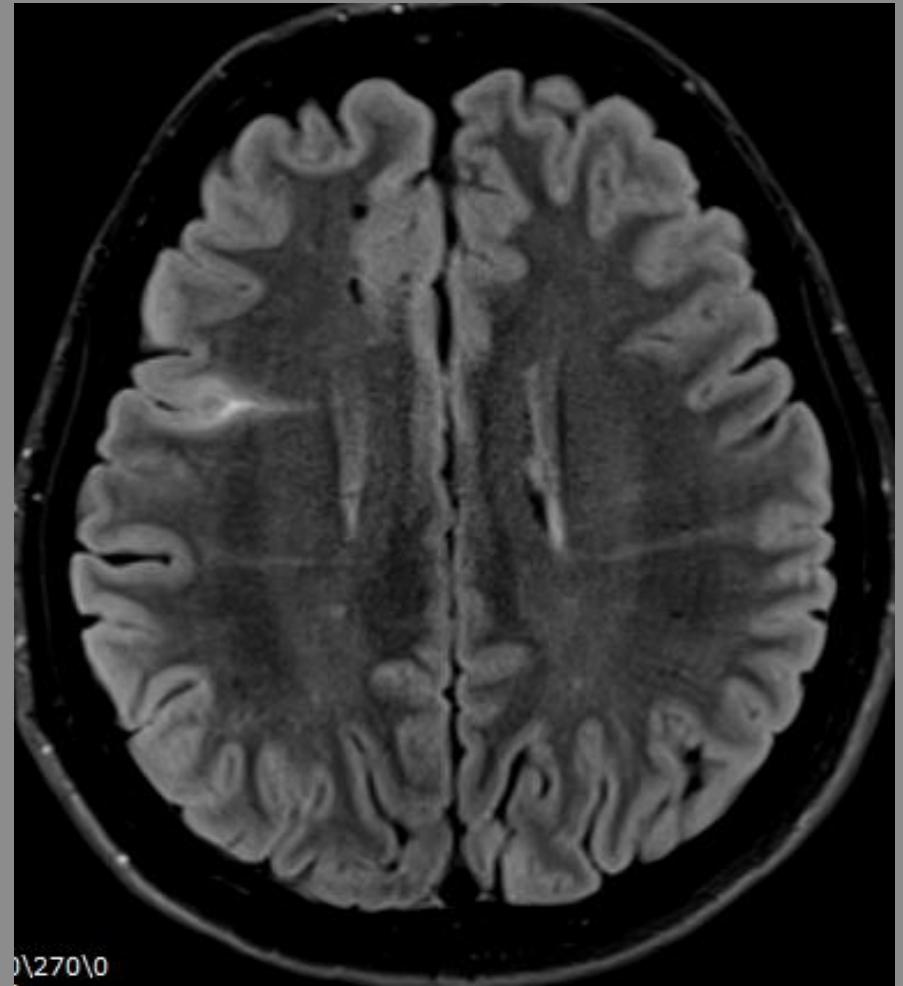
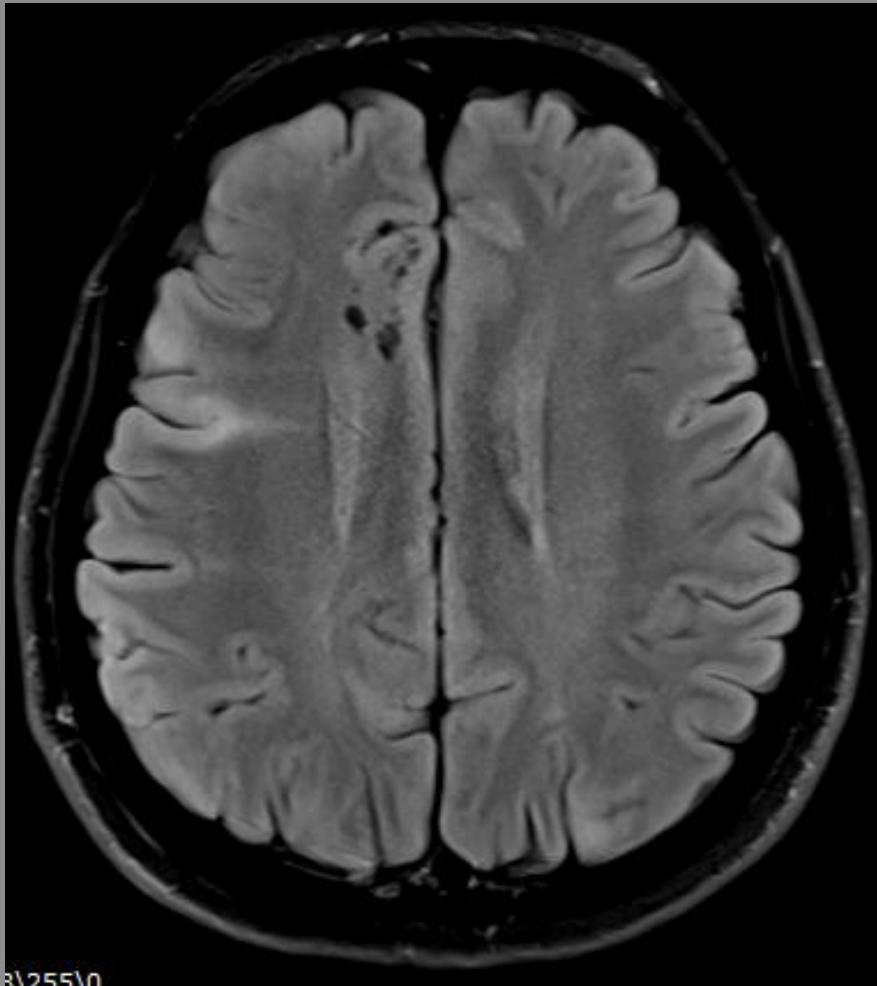


# \*Tuberous Sclerosis Complex: Imaging Findings\*

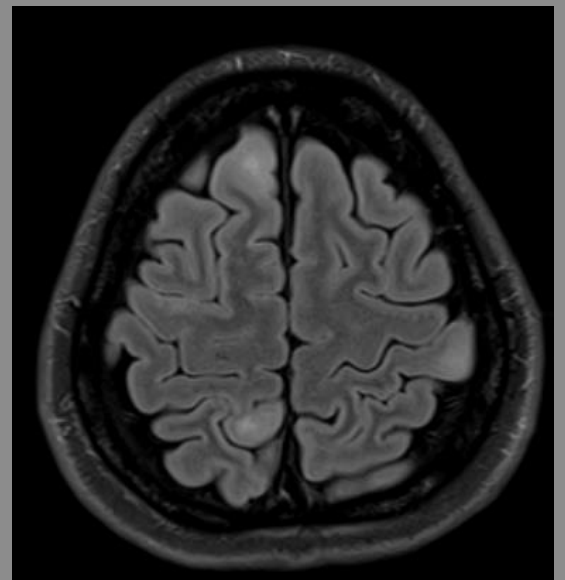
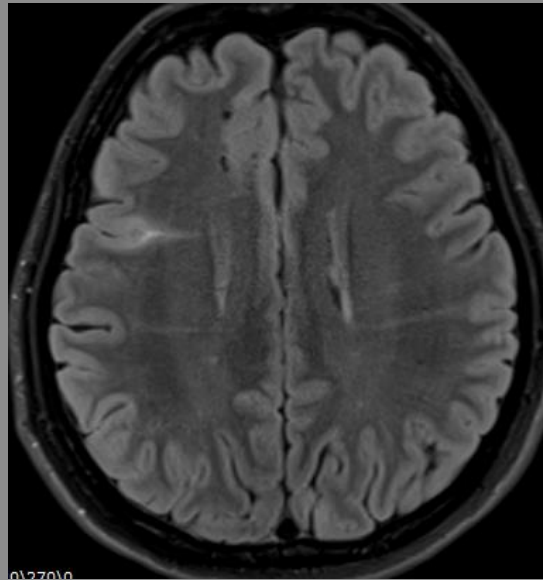
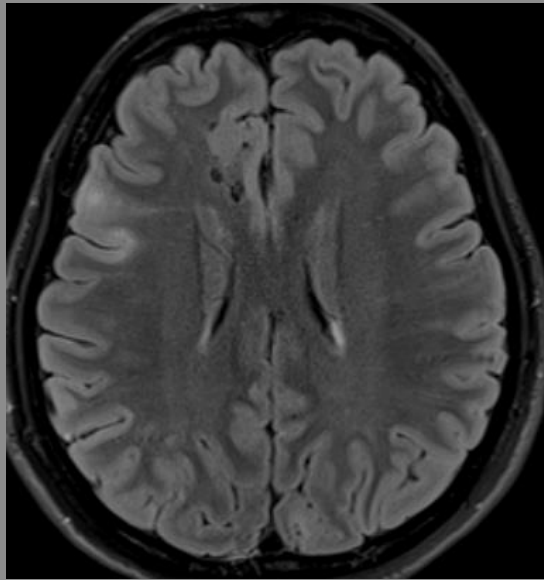
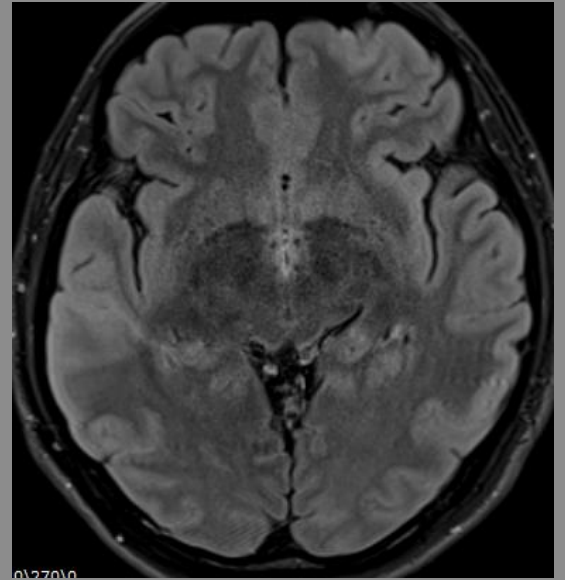
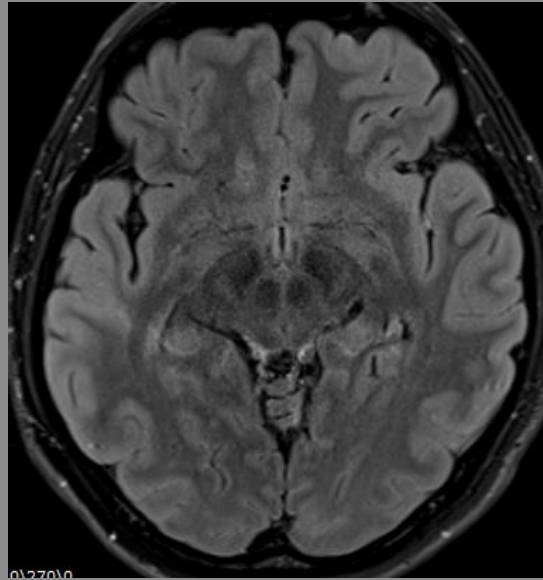
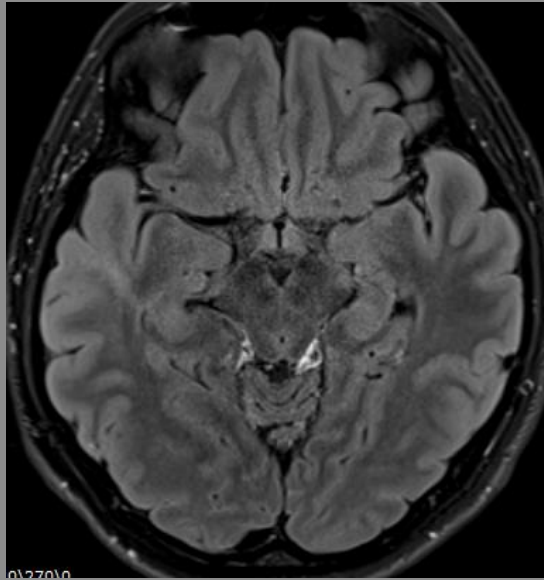
- \*Cortical/subcortical tubers
- \*Calcified subependymal nodule (hamartoma)
- \*Subependymal giant cell astrocytoma
- \*White matter lesions along lines of neuronal migration
- \* Diagnostic Imaging: Pediatric Neuroradiology by Barkovich



# \*Tuberous Sclerosis



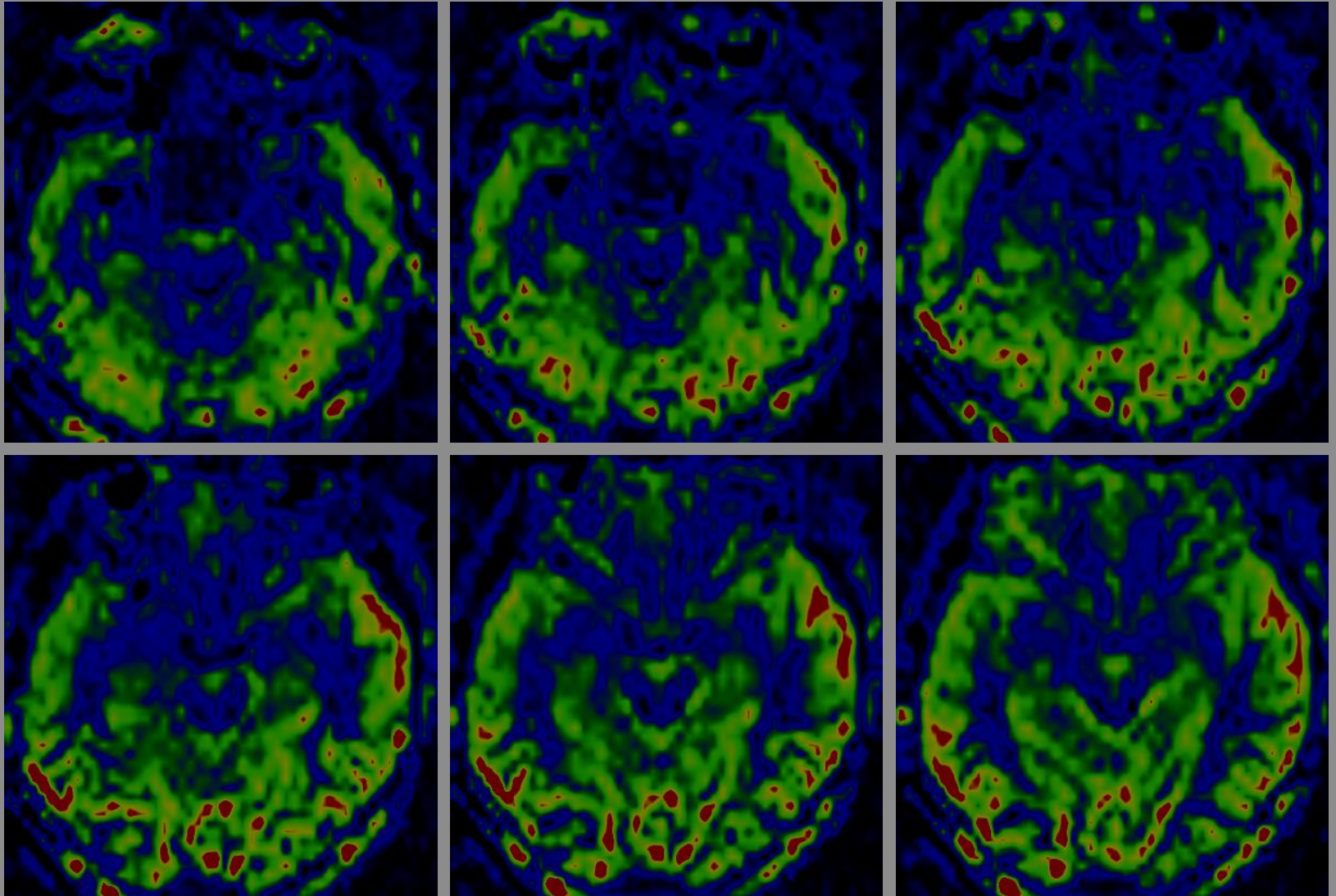
# \*Tuberous Sclerosis



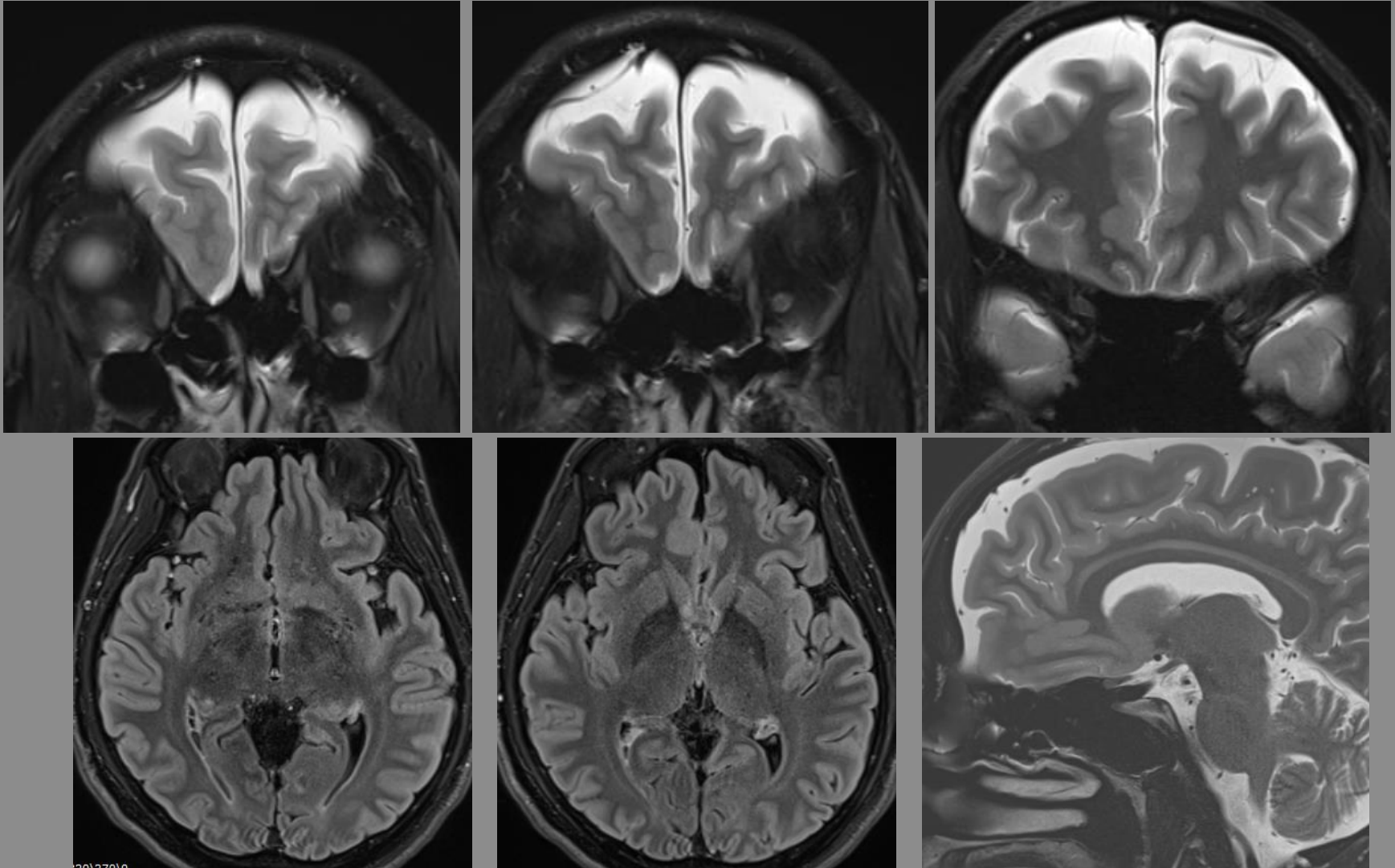


Perfusion Study  
with 3D ASL

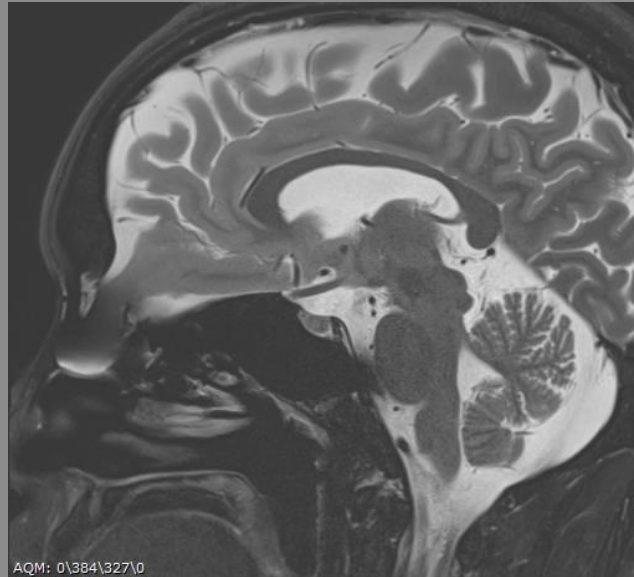
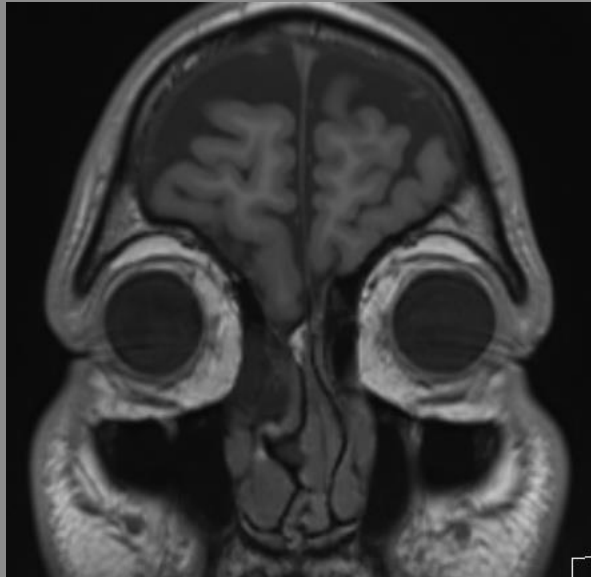
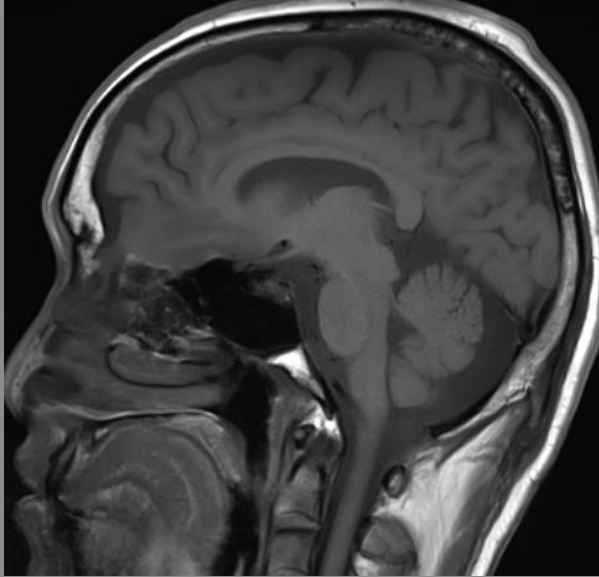
# \*Tuberous sclerosis



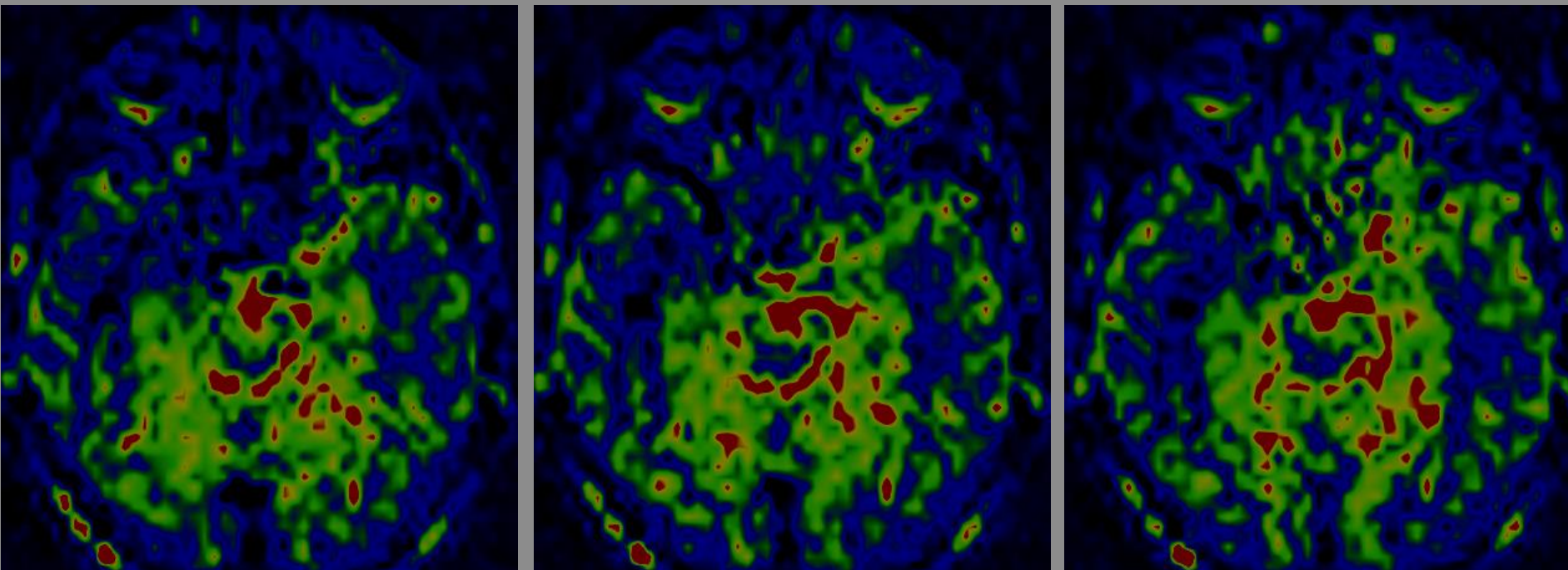
M 34 years had dialeptic/automatism seizure. Rountine EEG revealed spike wave at right fronto-temporal region and video EEG monitoring demonstrated spike wave at the left fronto-temporal region.



# \* Right Nasoethmoidal Encephalomeningocele







Perfusion Study with 3D ASL

# \*Heterotopia

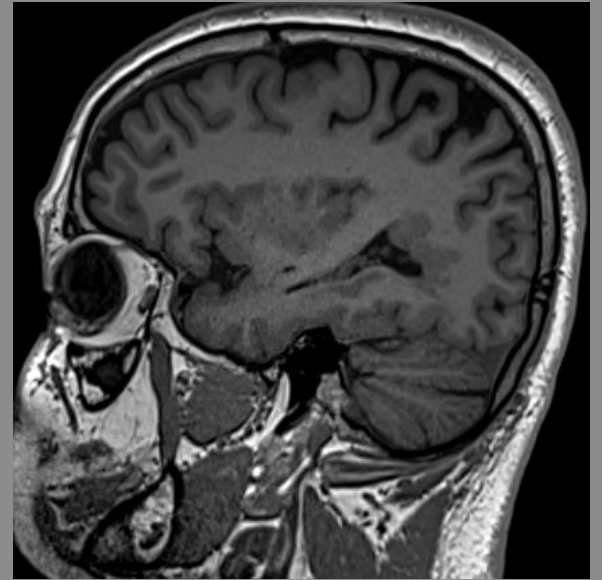
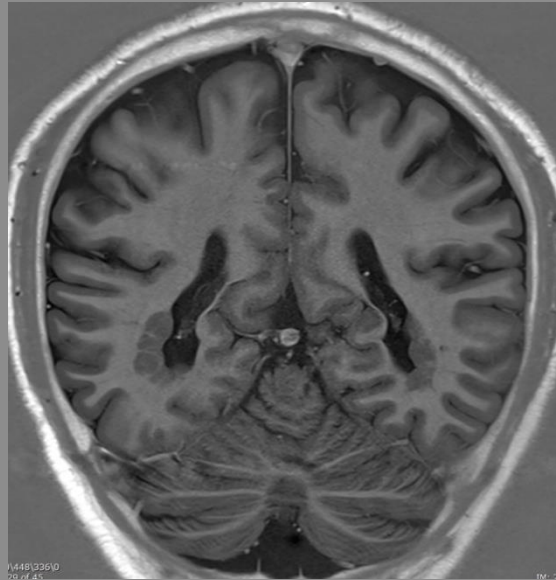
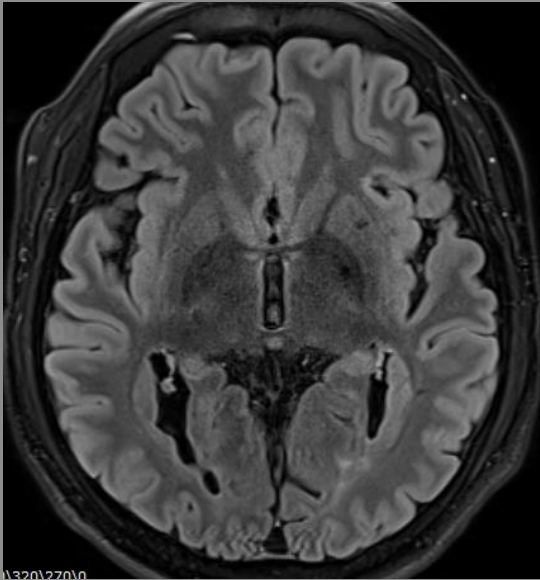
- \*Subependymal heterotopia
- \*Band (laminar) heterotopia
- \*Subcortical heterotopia

- \*Heterotopia represents collections of **normal neurons** situated in abnormal locations.
- \*Heterotopia is isointensity to GM in all MRI sequences and reveals no contrast enhancement.

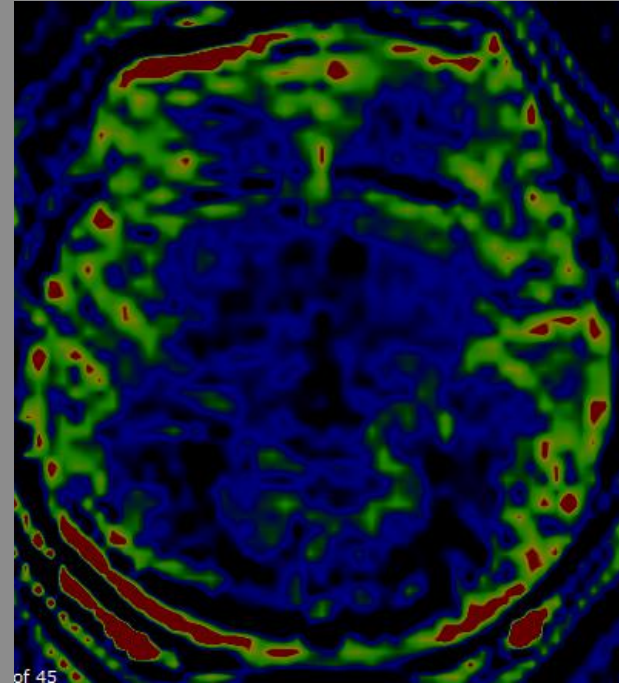
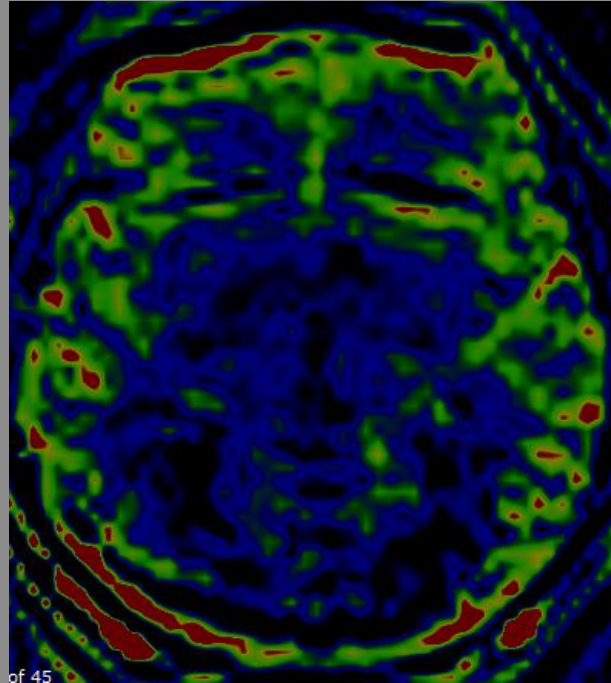
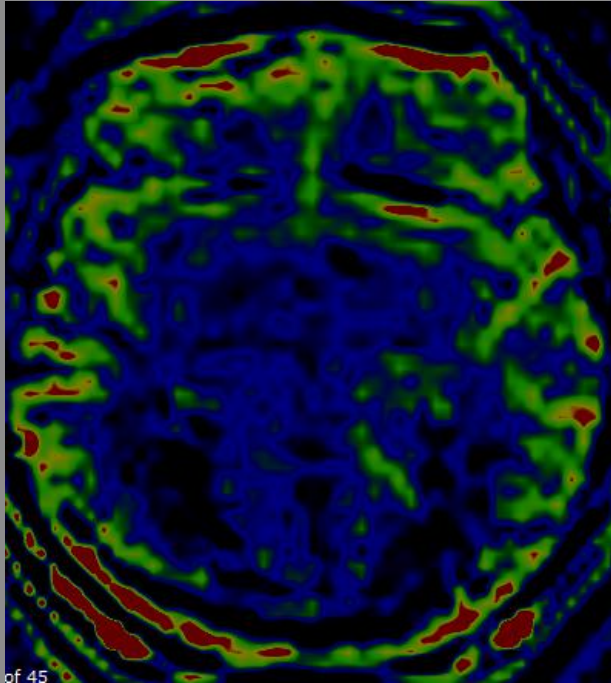
\*Heterotopia



# \* Subependymal Heterotopia

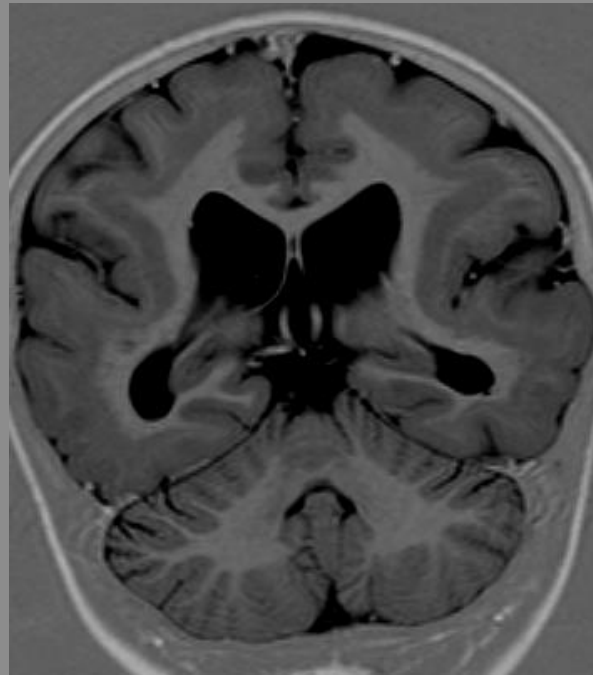
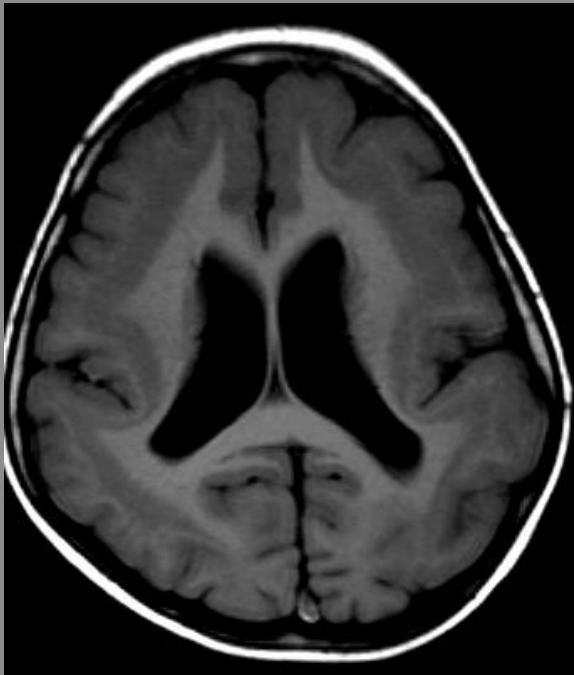


# \* Subependymal Heterotopia



Perfusion Study  
with 3D ASL

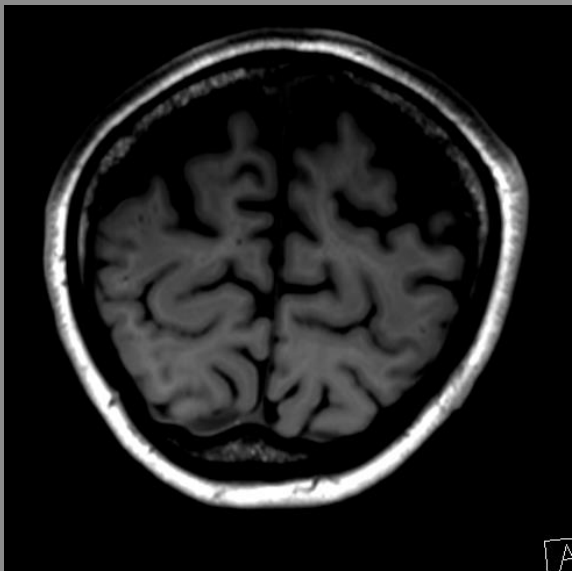
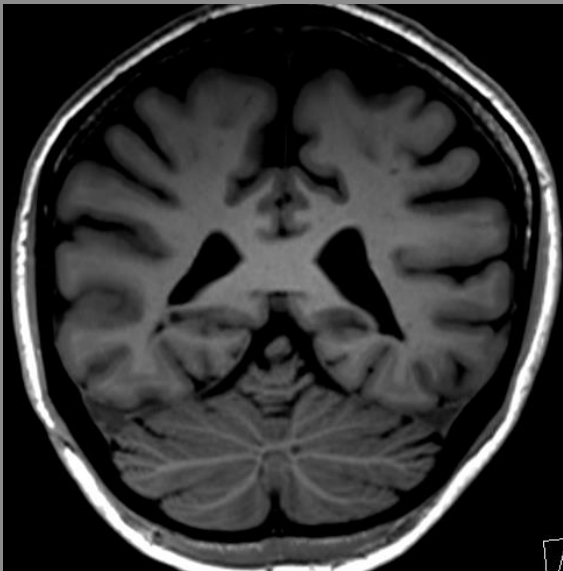
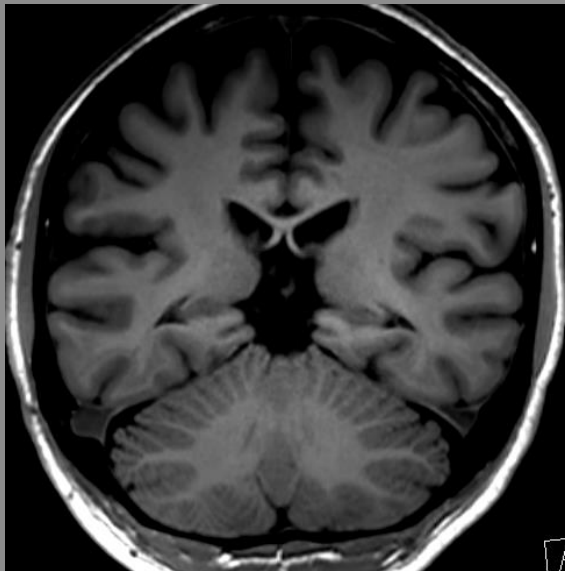
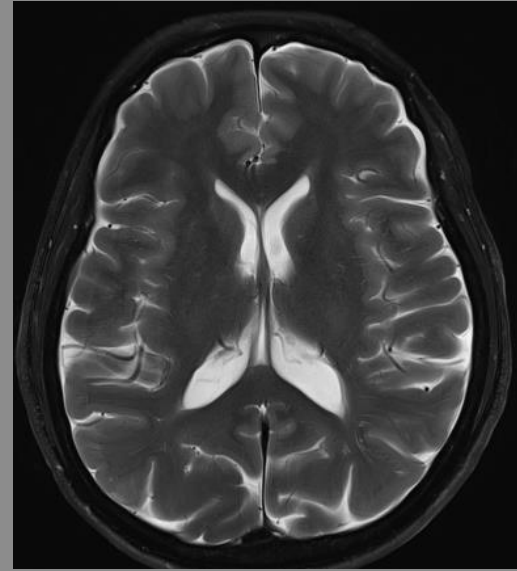
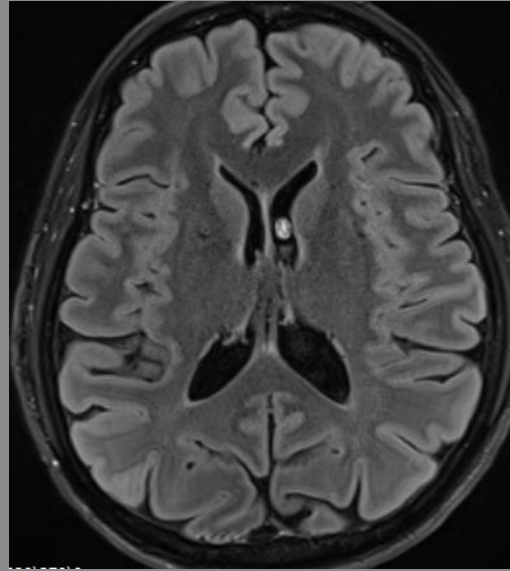
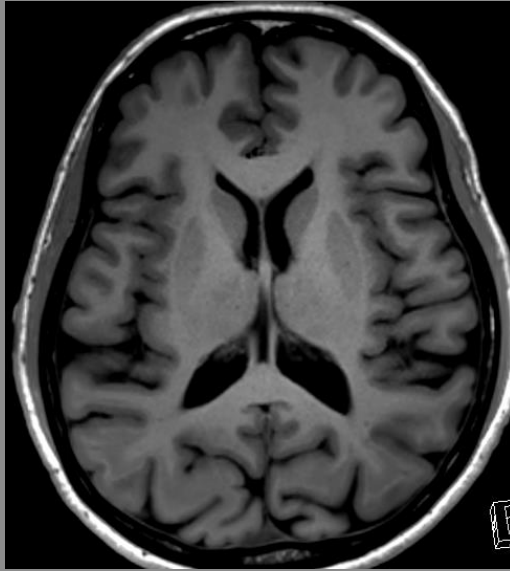
\* Band (laminar) heterotopia:  
A mild form of classic lissencephaly



*Girl 8 Yr*

# \* Band Heterotopia

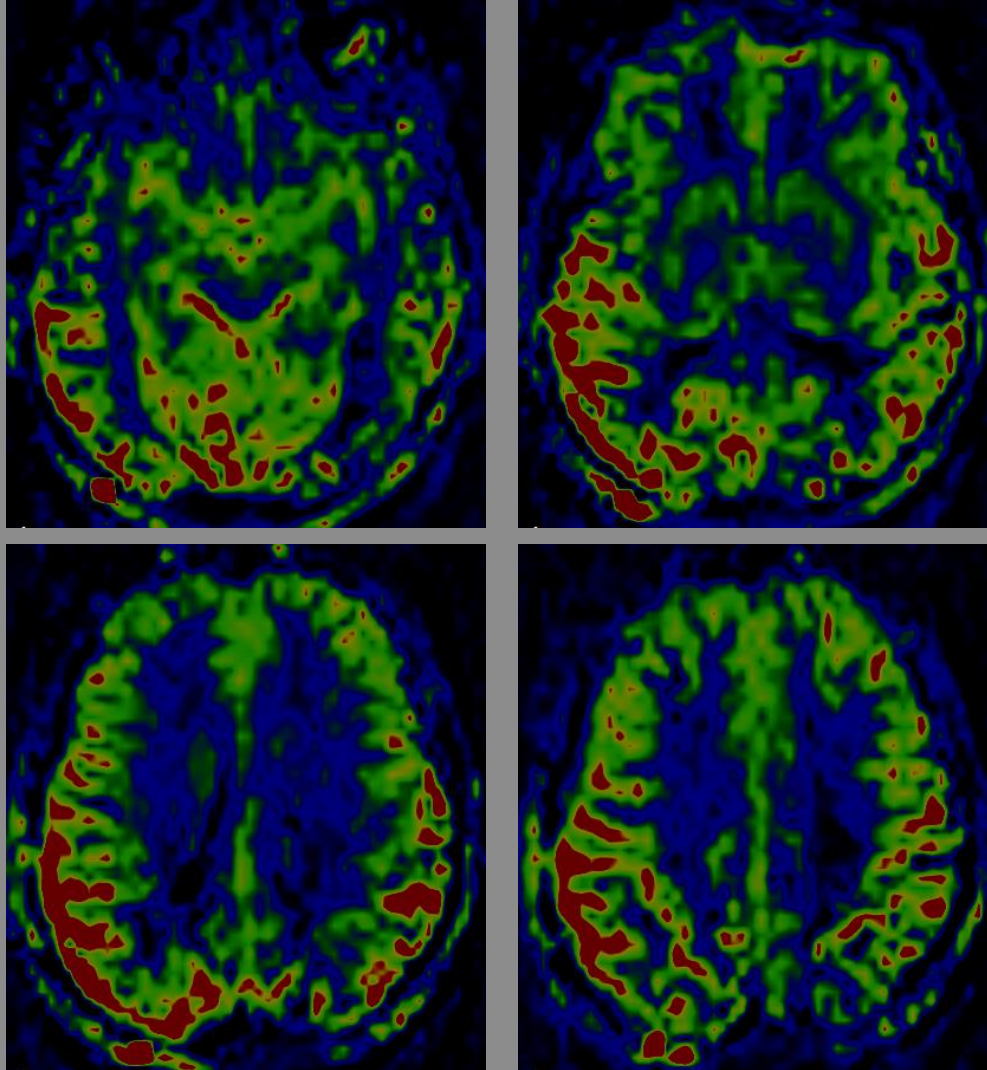
A 53 year old female, case of focal epilepsy for 20 years with typical temporal lobe seizure. EEG monitoring revealed seizure foci from both sides.





# \* Band Heterotopia

A 53 year old female, case of focal epilepsy for 20 years with typical temporal lobe seizure. EEG monitoring revealed seizure foci from both sides. She had seizure 15-20 min. before MRI study.



- \*Subcortical heterotopia:

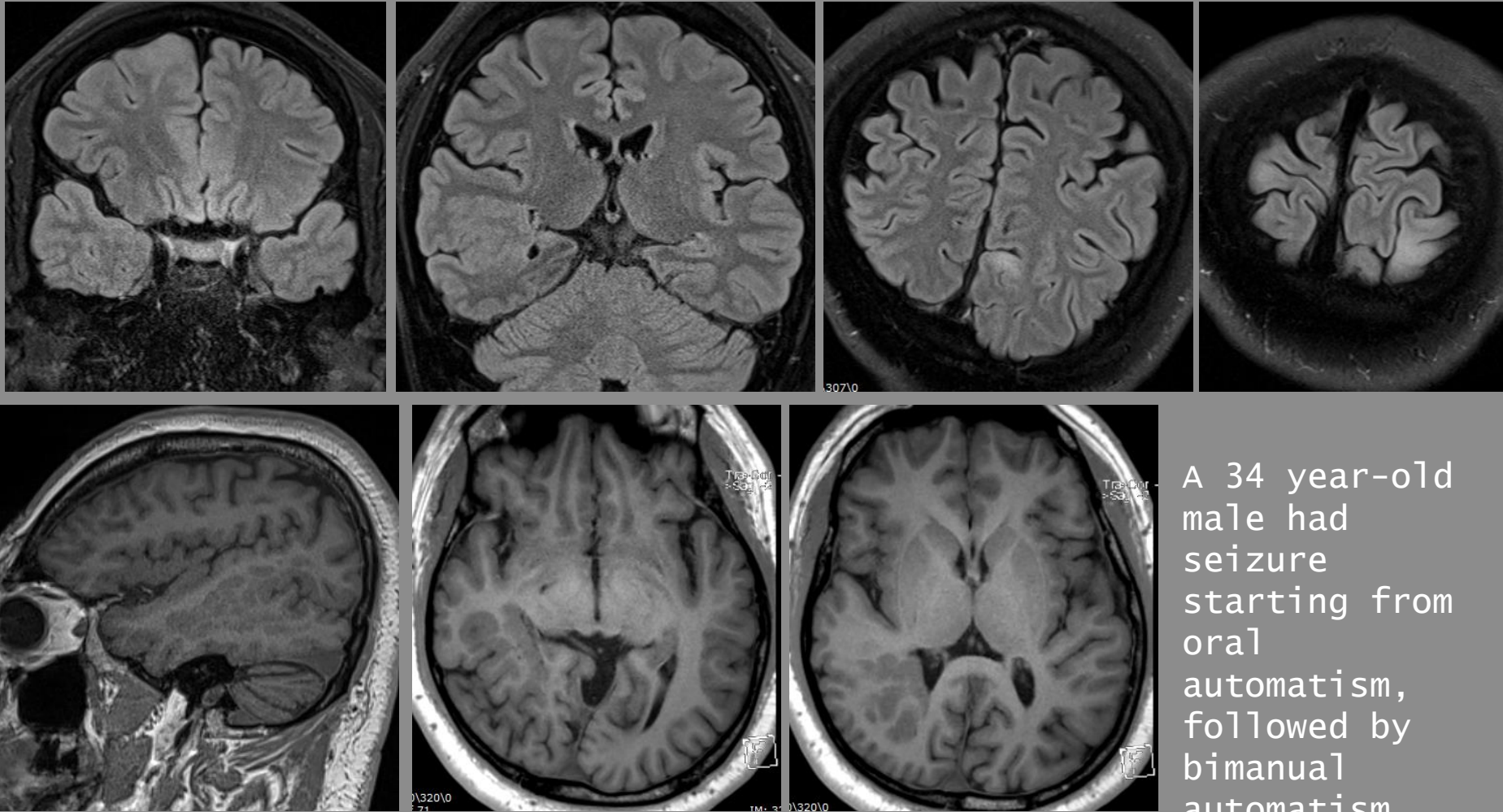
- \*Nodules or nodular curvilinear bands of GM typically extending from the ventricular wall through the cerebral mantle.

- \*The affected region of the brain is usually small with thin overlying cortex and shallow sulci.

**\*Heterotopia**



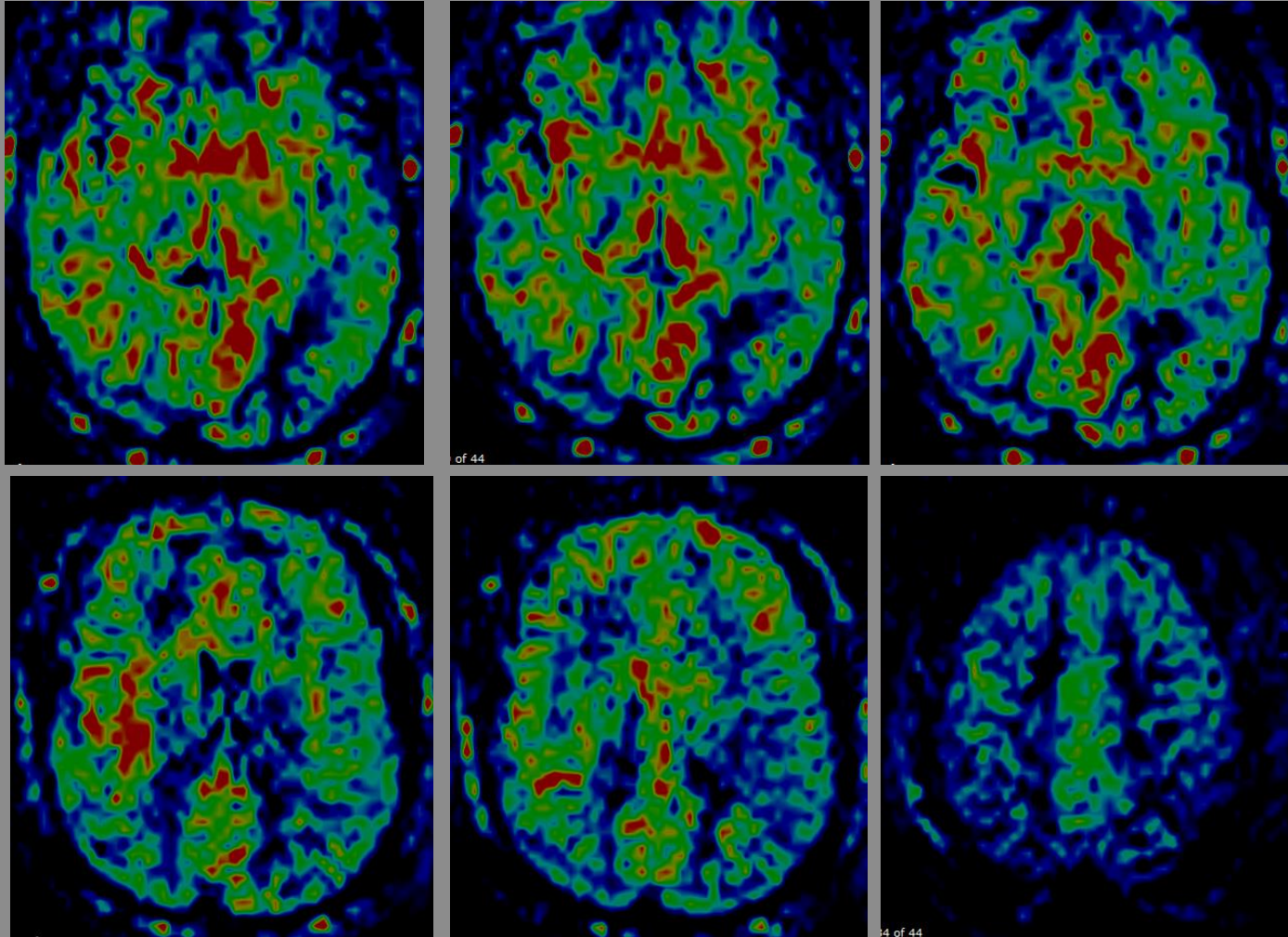
# \*Subcortical Heterotopia



A 34 year-old male had seizure starting from oral automatism, followed by bimanual automatism.

# \* Subcortical Heterotopia

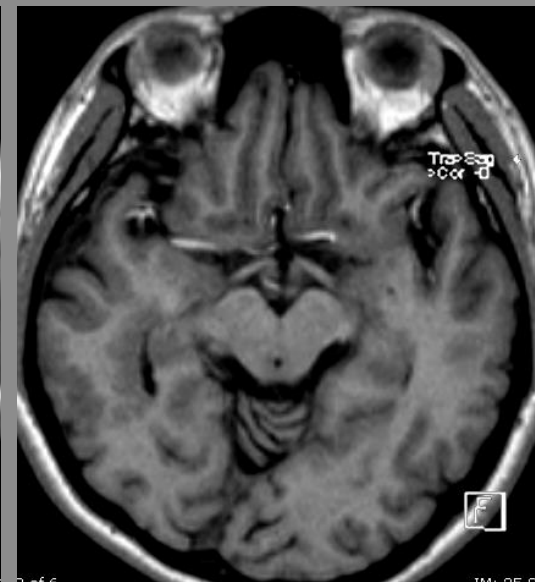
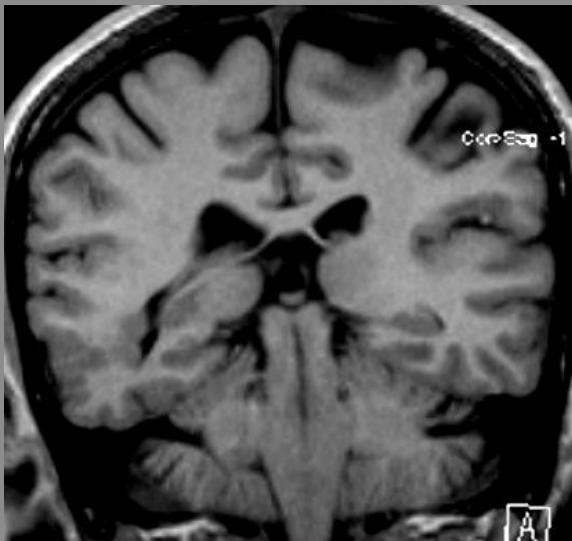
He had seizure 15-20 minutes before MRI.



Perfusion Study  
with 3D ASL



# \* Subcortical Heterotopia



# \* Malformation Secondary to Abnormal Postmigration Development

\*Polymicrogyria (PMG)

\*Schizencephaly

# \*Polymicrogyria (PMG)

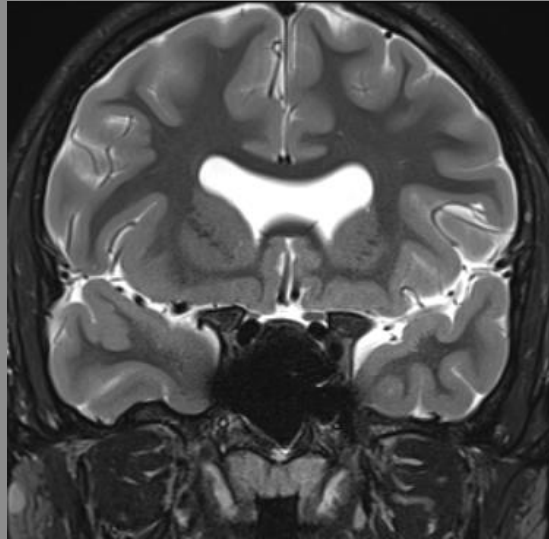
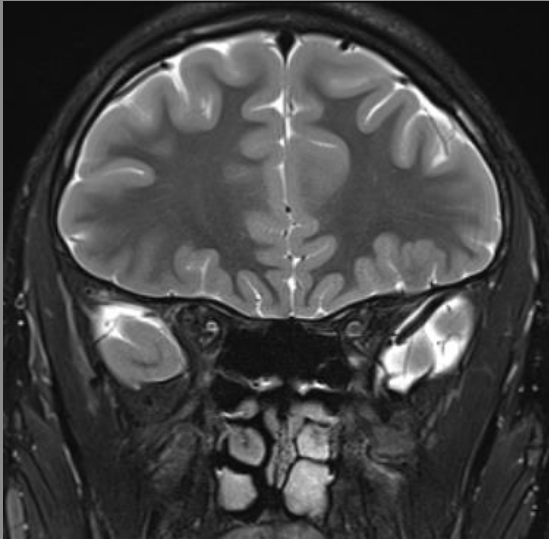
- \*Causes of PMG include prenatal infection, prenatal ischemia or exposure to toxins and chromosomal abnormalities.
- \*PMG is commonly located in perisylvian regions.



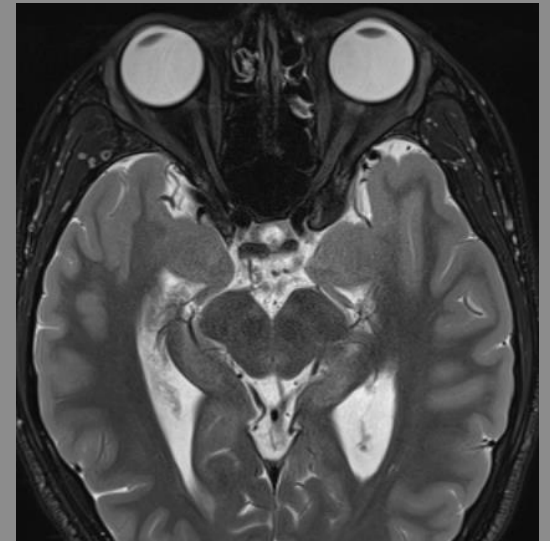
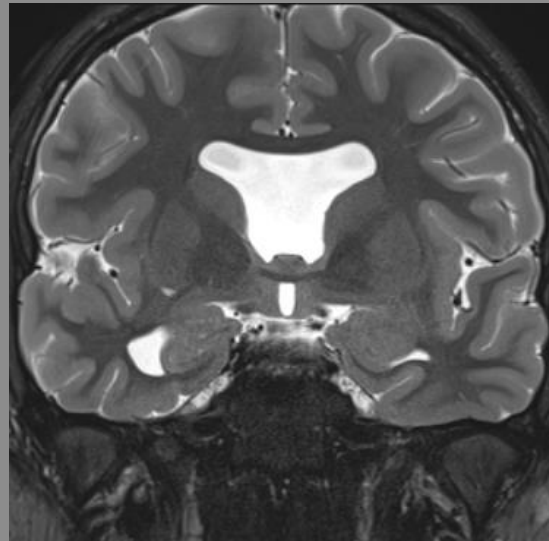
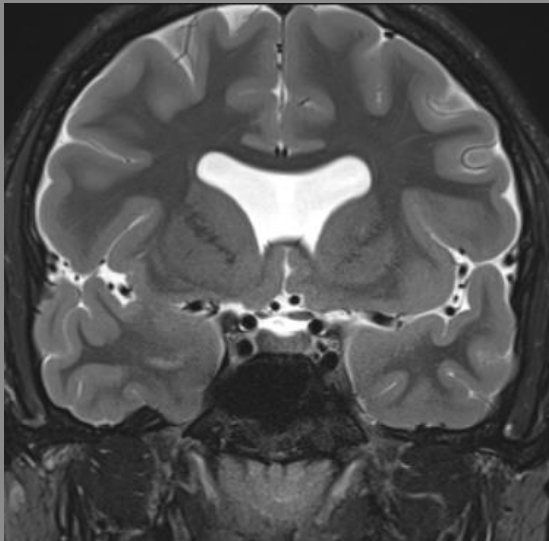
# \* Polymicrogyria (PMG)

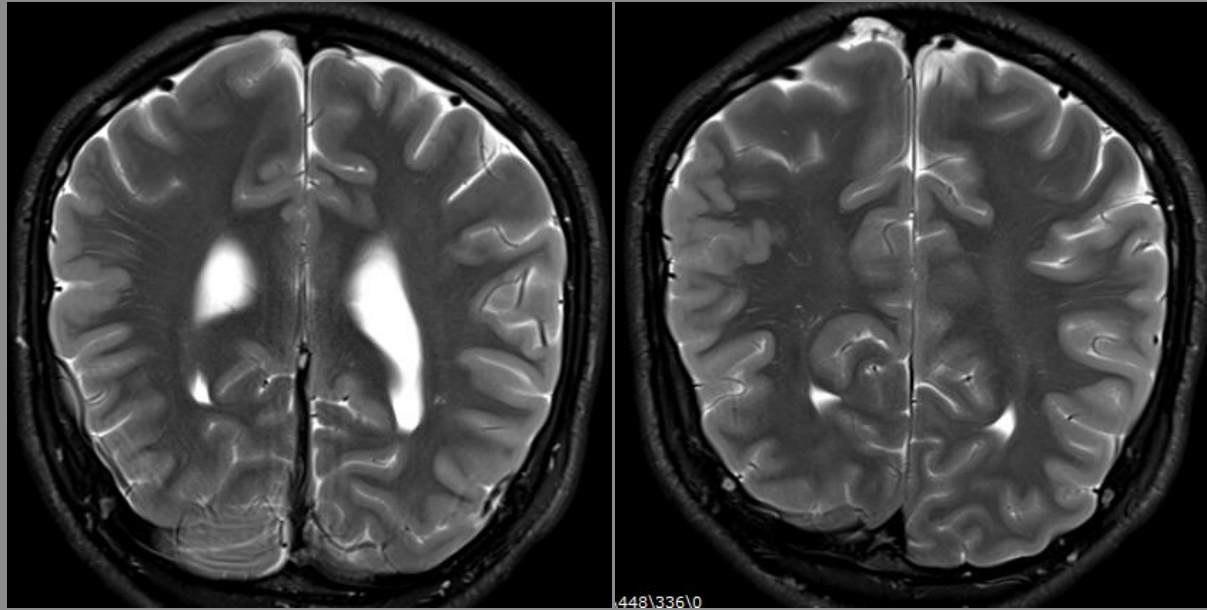
## \* Imaging findings

- \* PMG may have a smooth surface, or multiple deep infoldings of the cortex with irregular G-W junction.
- \* Reduced WM volume in the affected region.



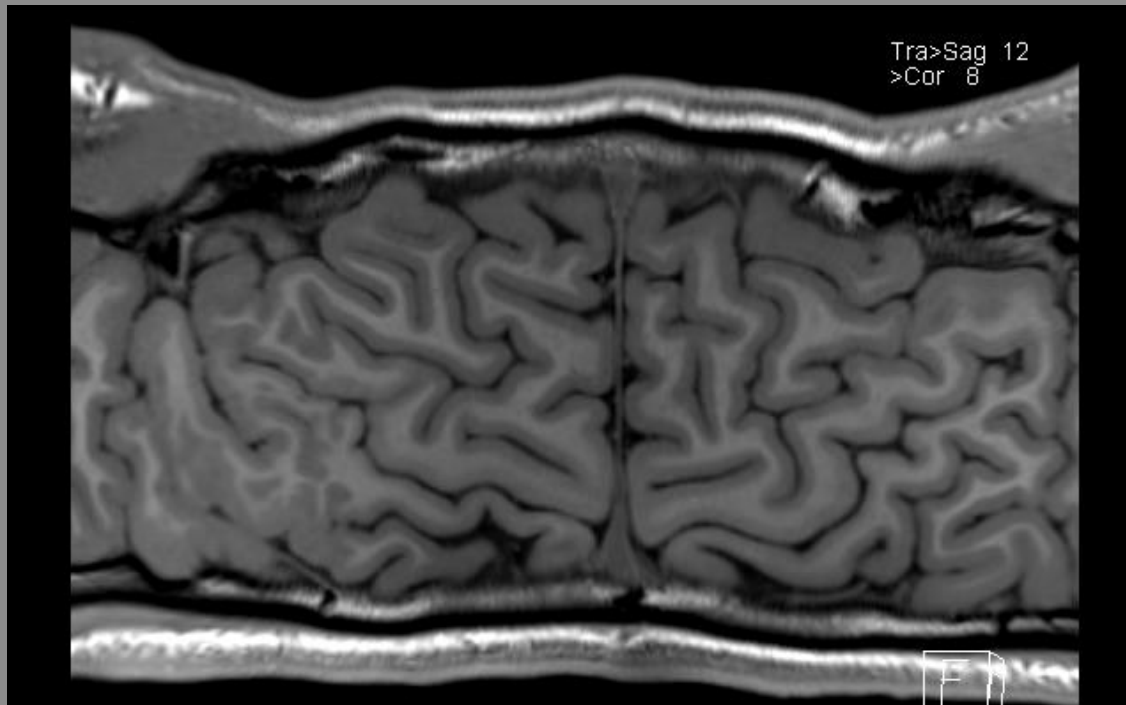
\* Septo-optic  
dysplasia



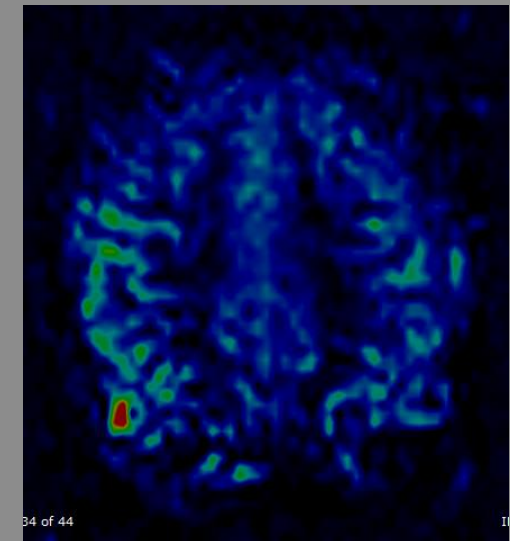
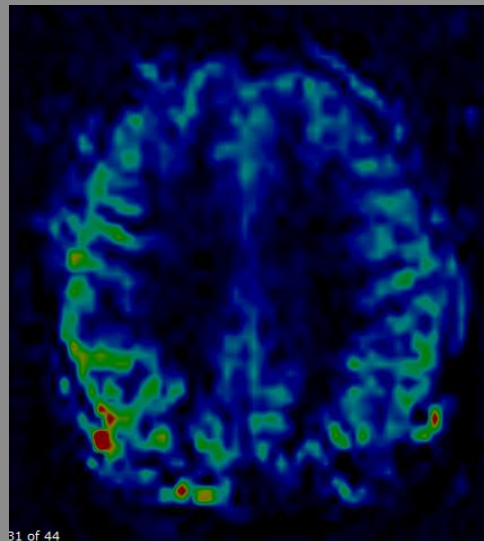
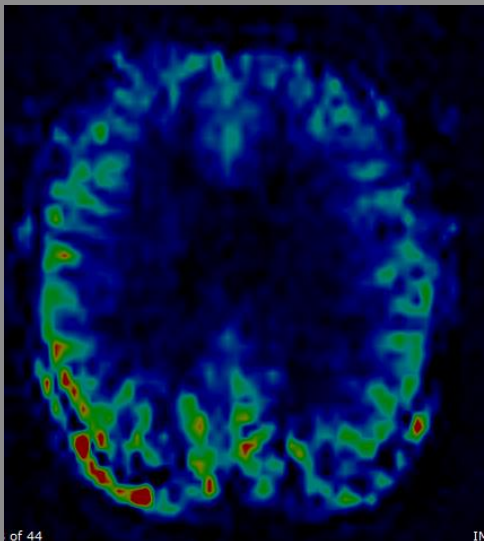
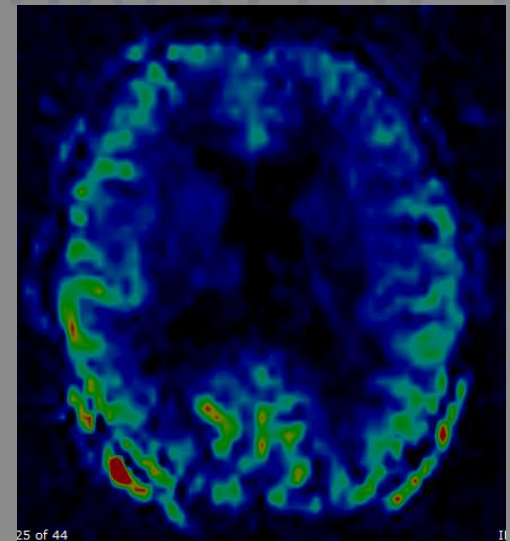
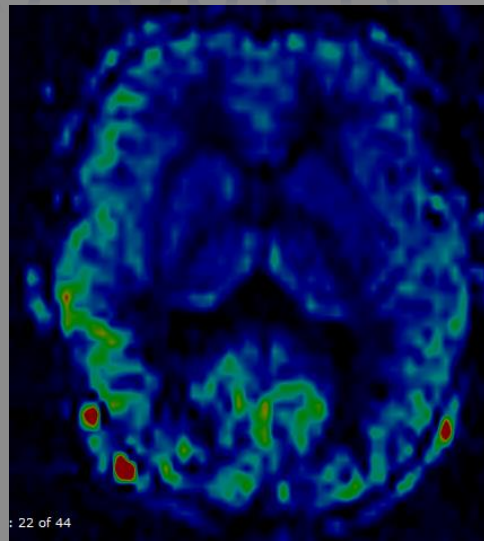
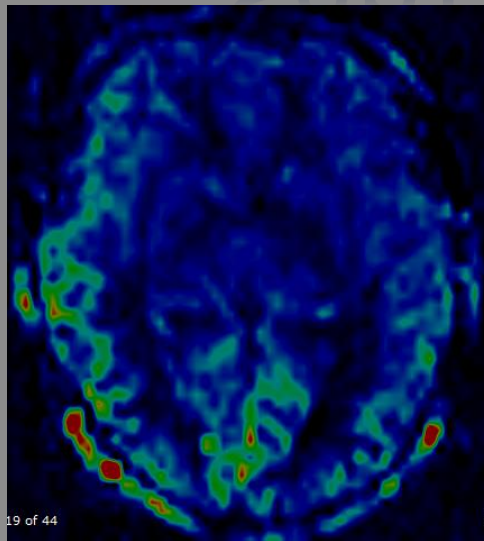


# \* Septo-optic dysplasia

A 14 year-old boy, case of epilepsy, had epileptical discharge from bilateral centrotemporal regions and VF defect and decreased VA right eye.

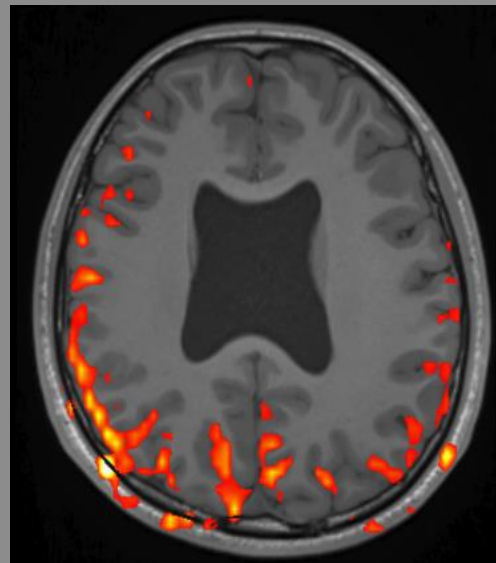
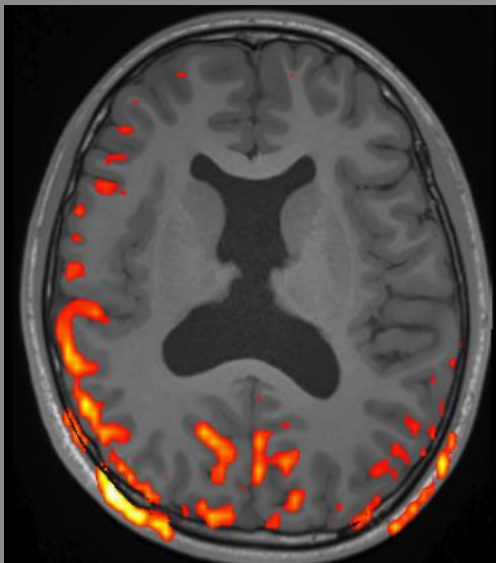
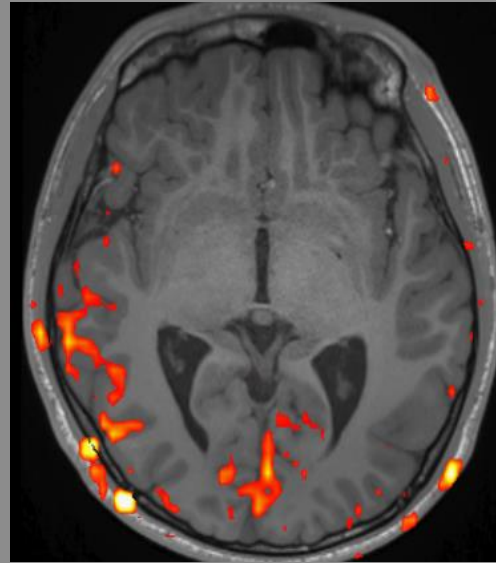
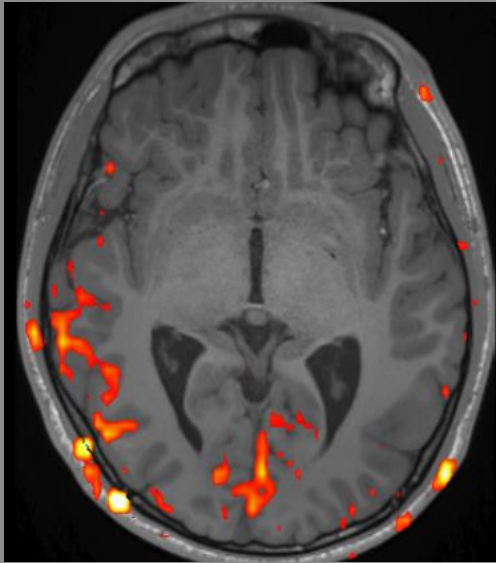


# \*Septo-optic dysplasia



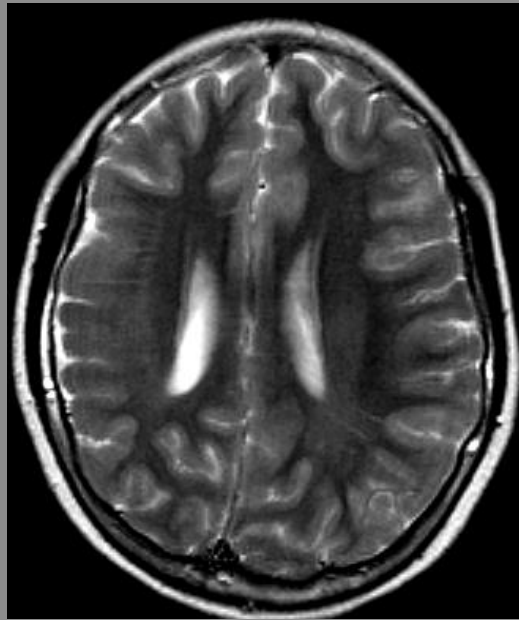
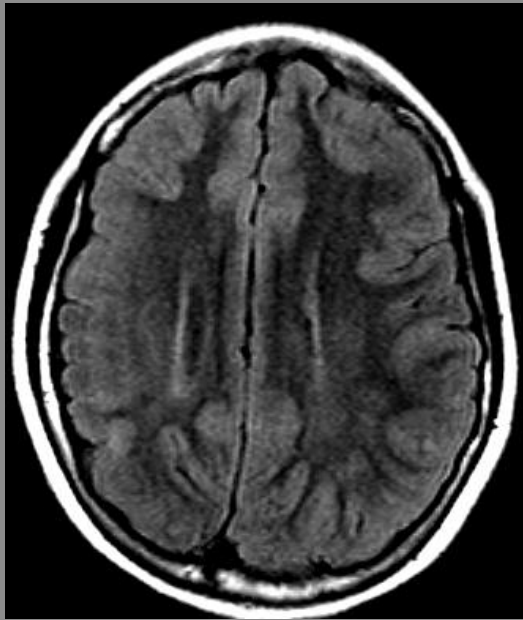
Perfusion Study  
with 3D ASL



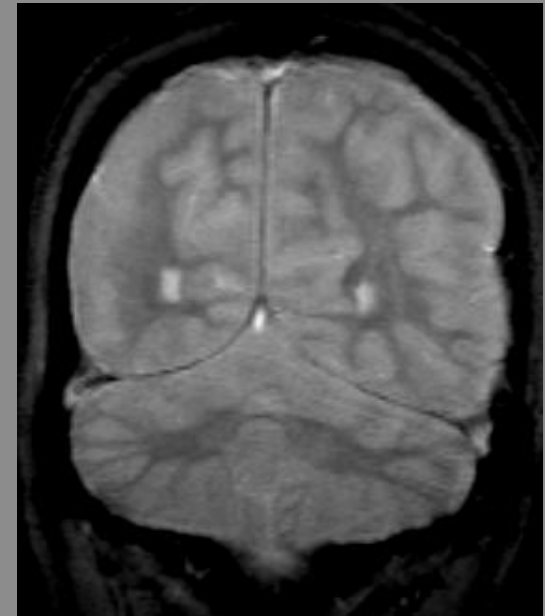
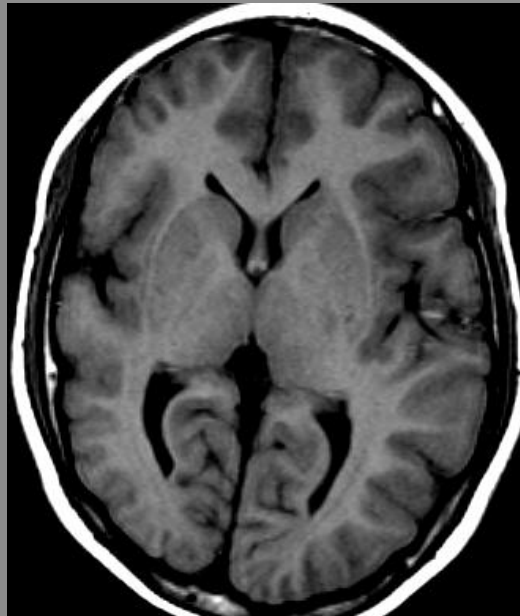
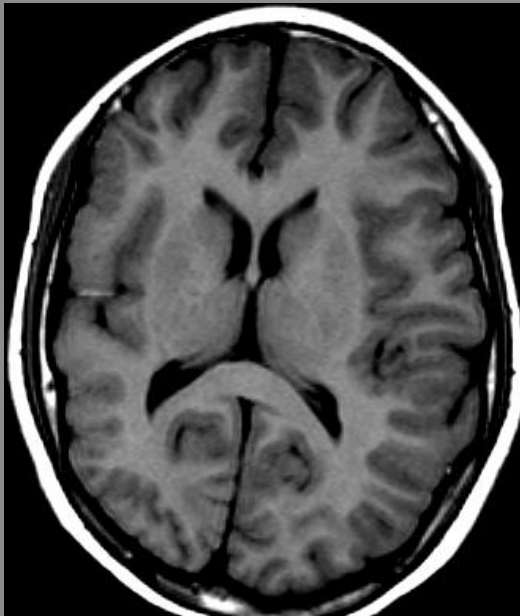


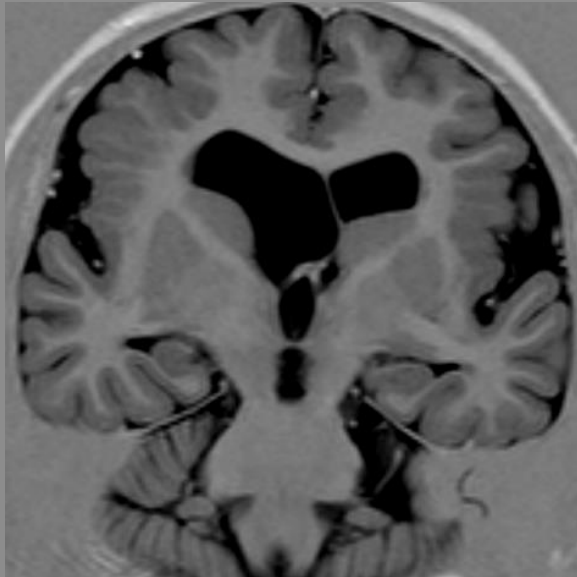
Perfusion Study  
with 3D ASL





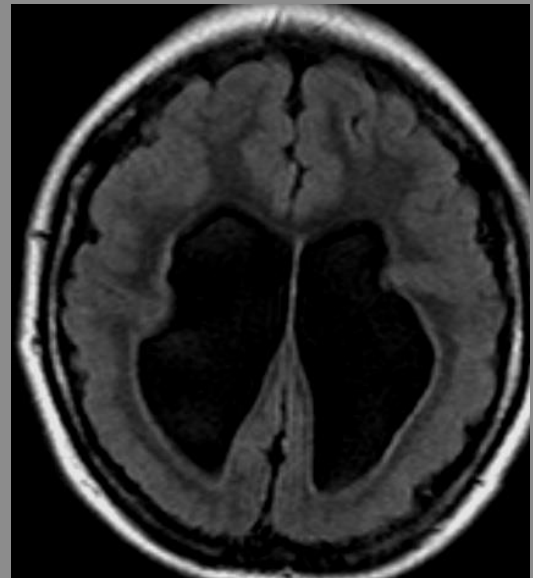
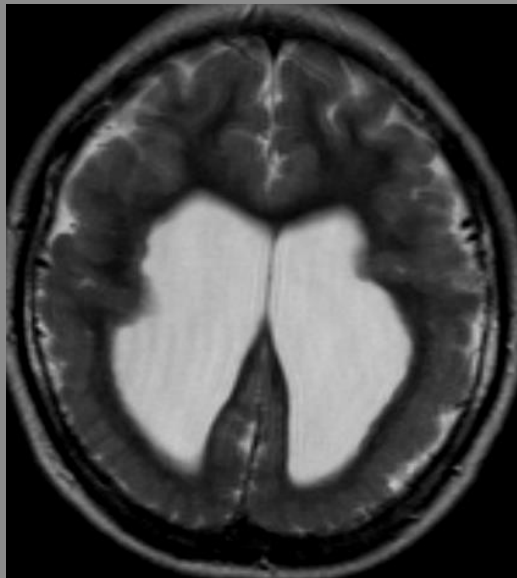
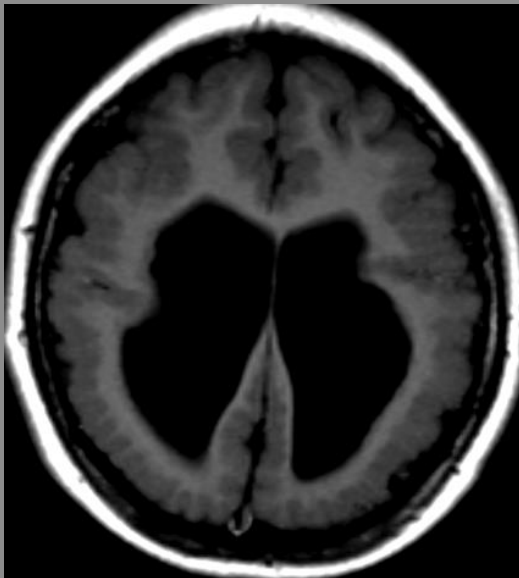
A 10 year-old girl had complex partial seizure since 2 years of age and revealed left monoplegia on neurological Examination. EEG revealed frequent sharp slow wave at right cerebral hemisphere





## \*Bilateral PMG

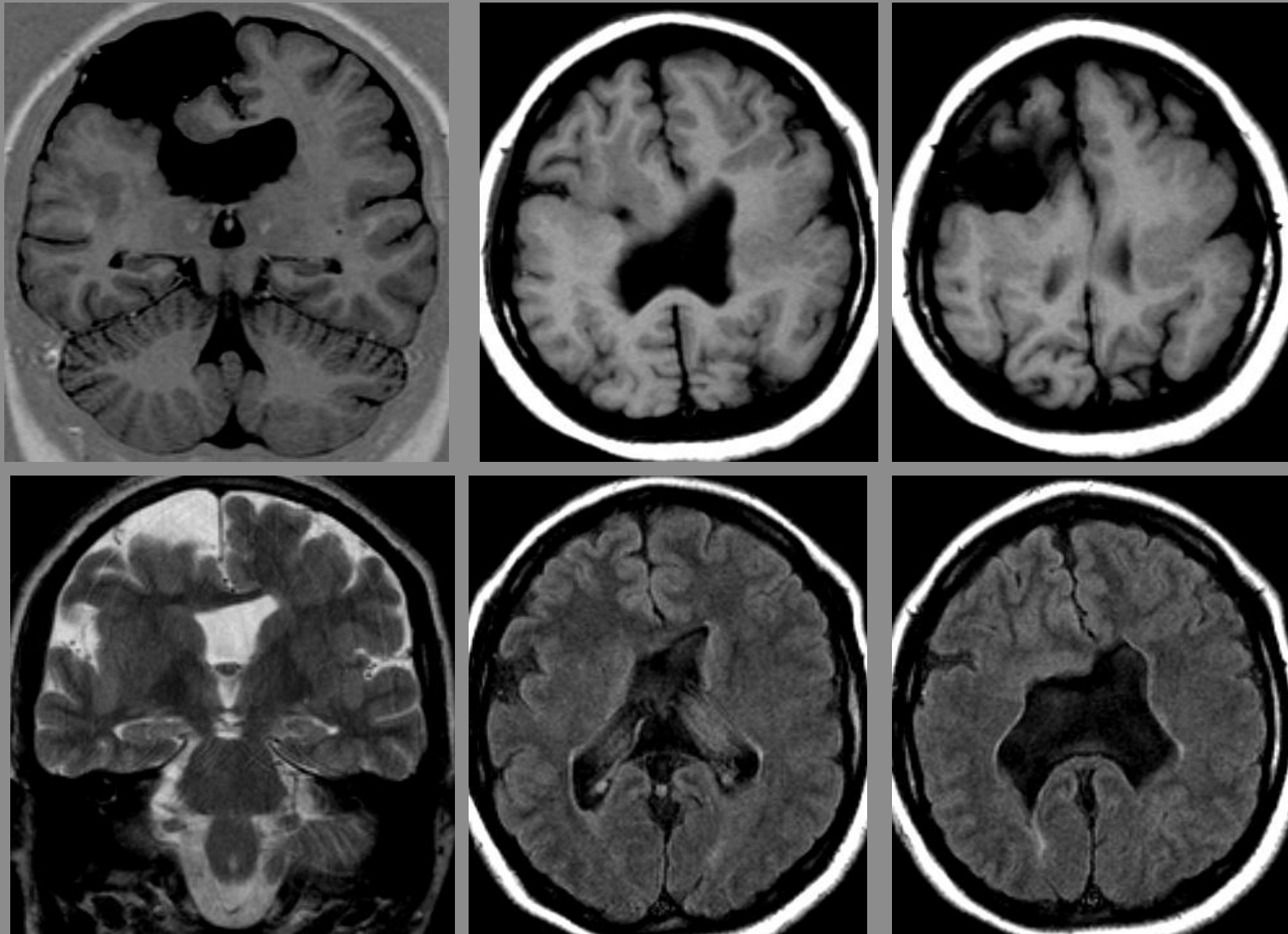
A 9 year-old boy had  
Lennox-Gastaut syndrome.



- \*Schizencephaly is a cleft lined with GM and connecting subarachnoid space with the ventricular system.
- \*The wall of the cleft is lined by dysmorphic GM.
- \*Schizencephaly is divided into open-lip or closed-lip type.

## \*Schizencephaly

# \* Open lip Schizencephaly



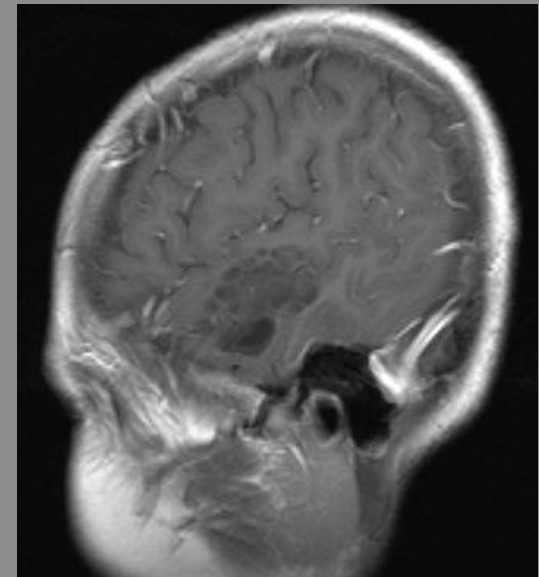
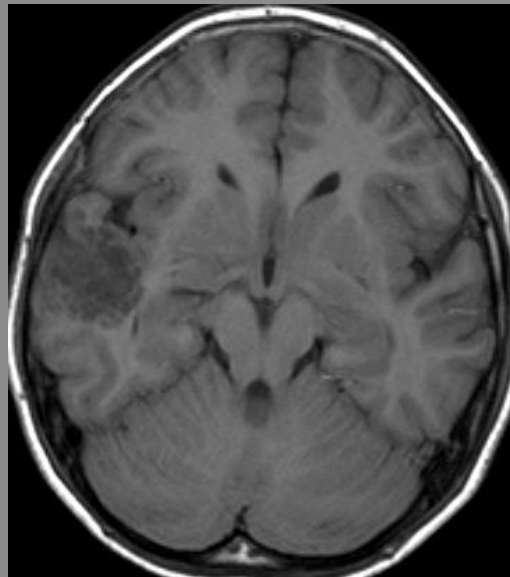
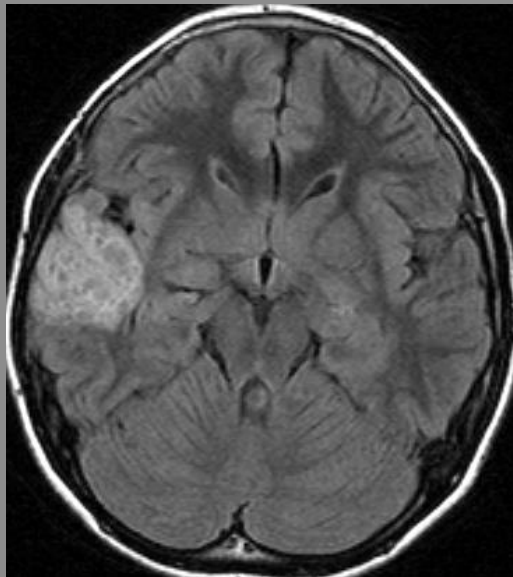
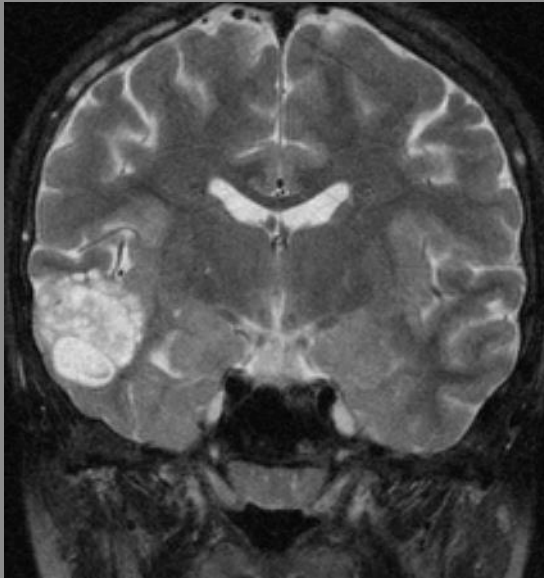
A 22 year-old female seizure since childhood,  
slow speech and poor development.

\**Tumour*



# \* Dysembryonic Neuroepithelial Tumour (DNET)

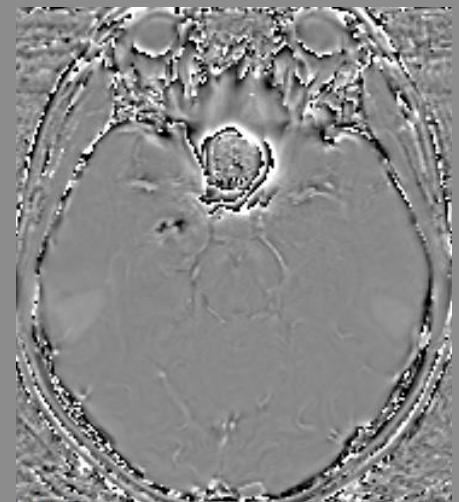
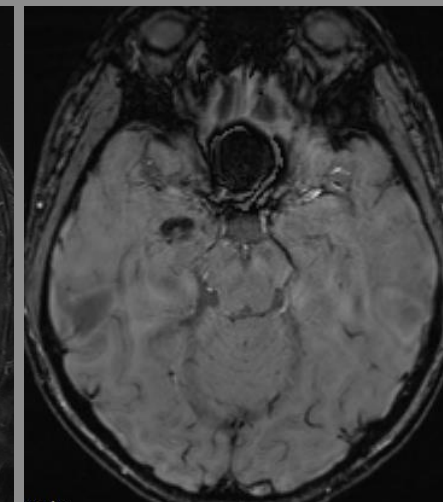
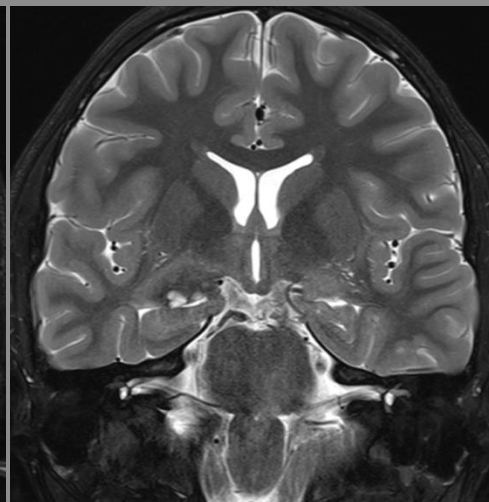
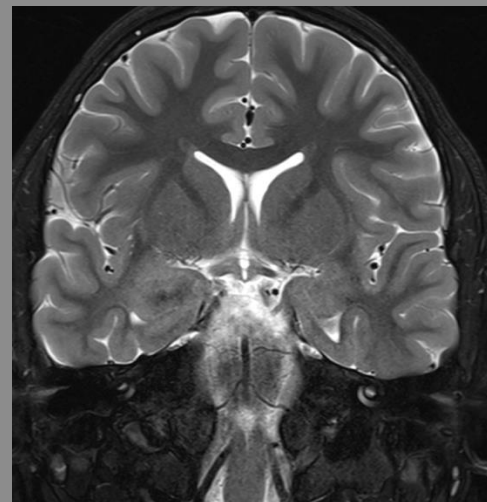
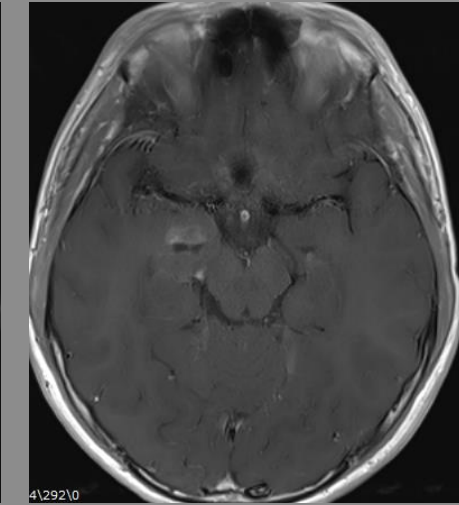
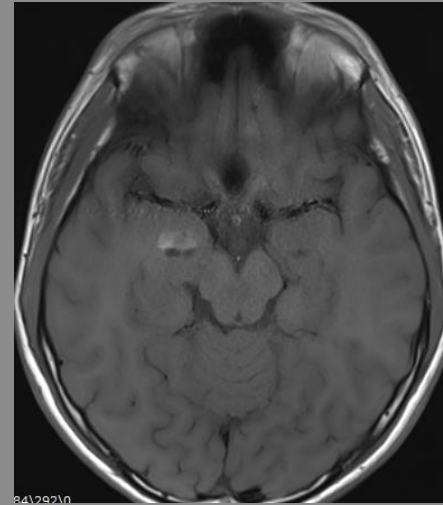
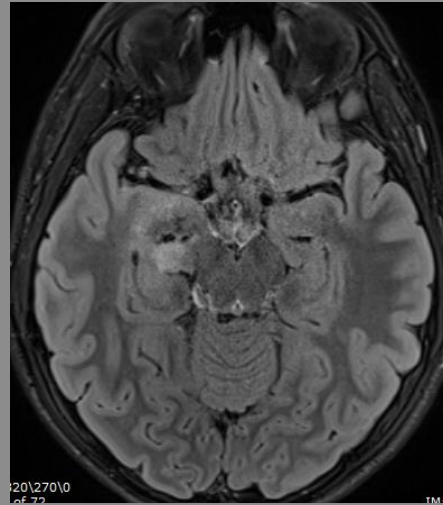
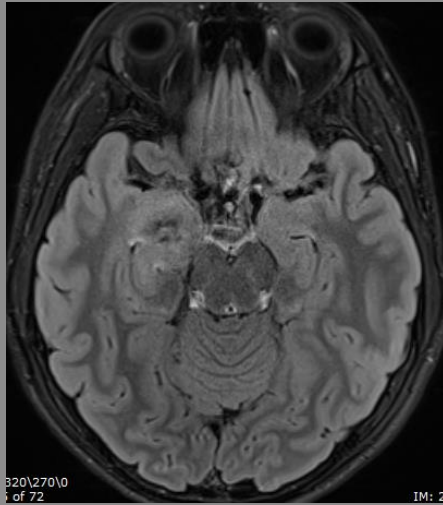
\*A multicystic cortically based tumour, calvarial remodeling.



A 11 year-old boy complex partial seizure for 1 6/12 years.

# \*DNET

A 13 year-old boy had complex partial seizure during sleep.

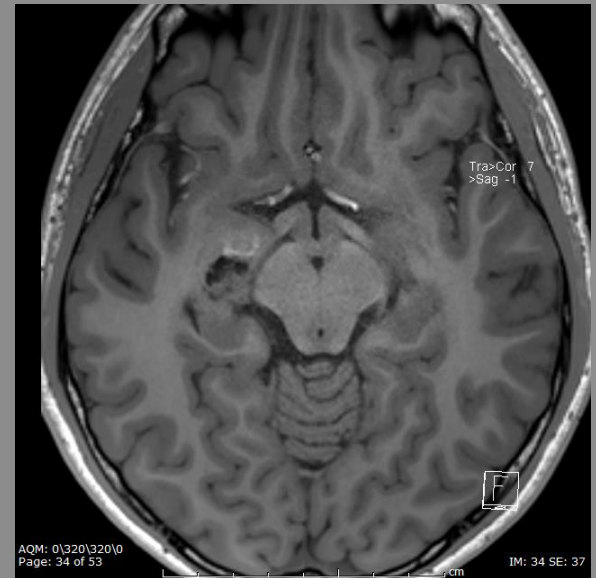
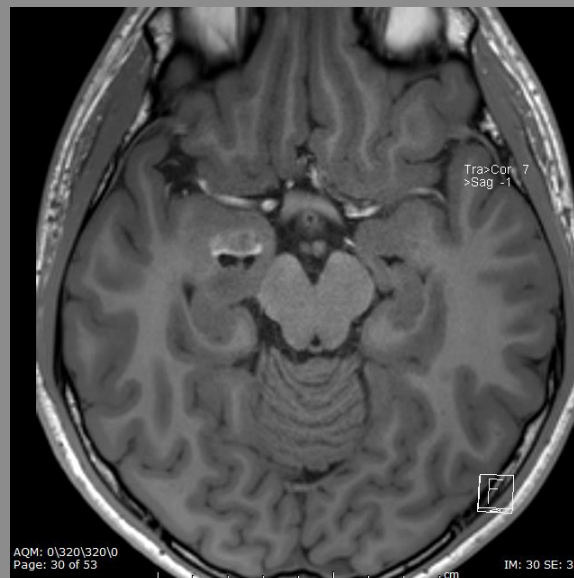
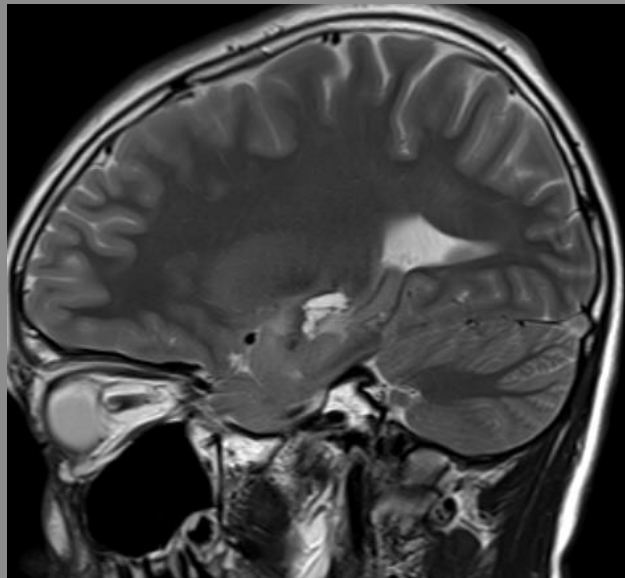
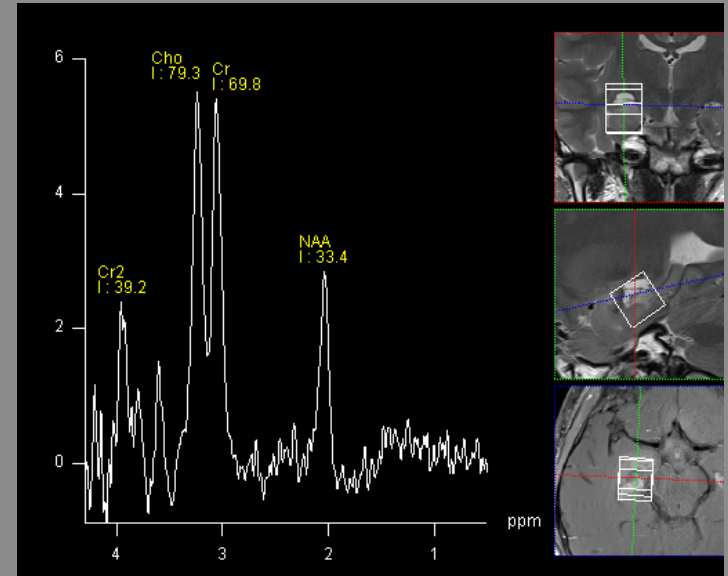
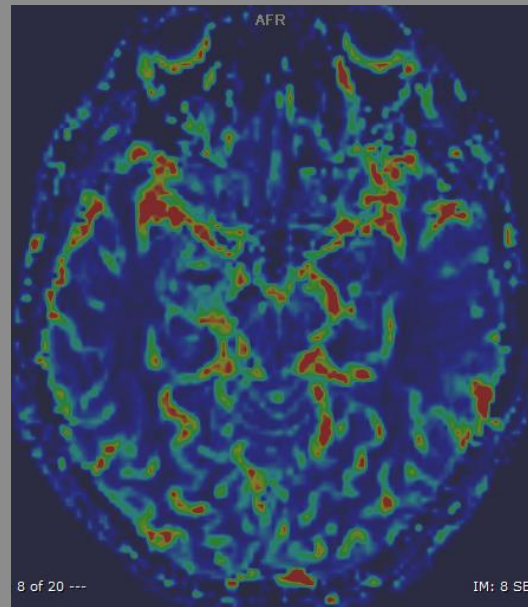


SWI-SOURCE IMAGE

SWI-PHASE IMAGE

# \*DNET

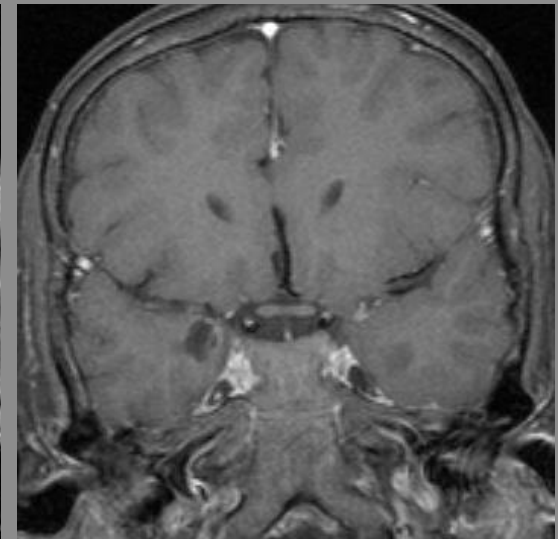
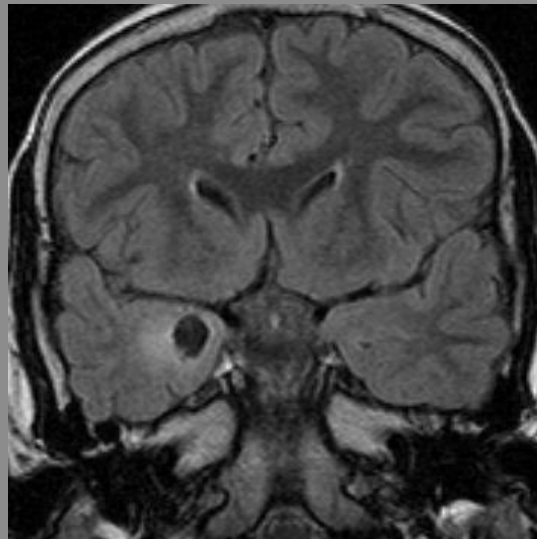
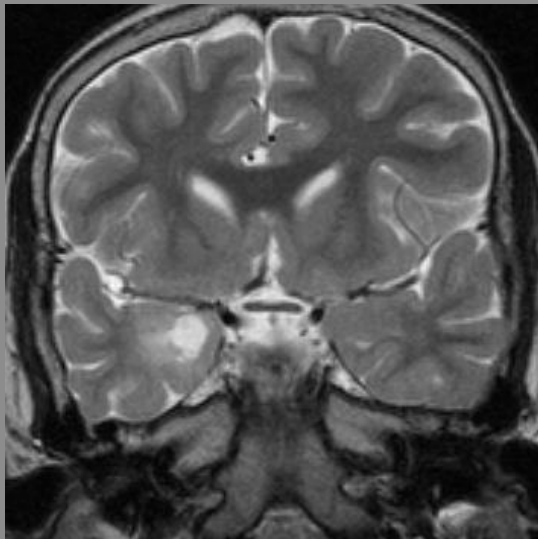
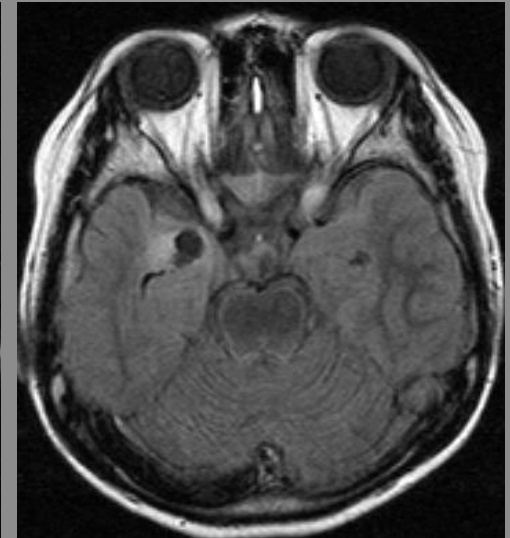
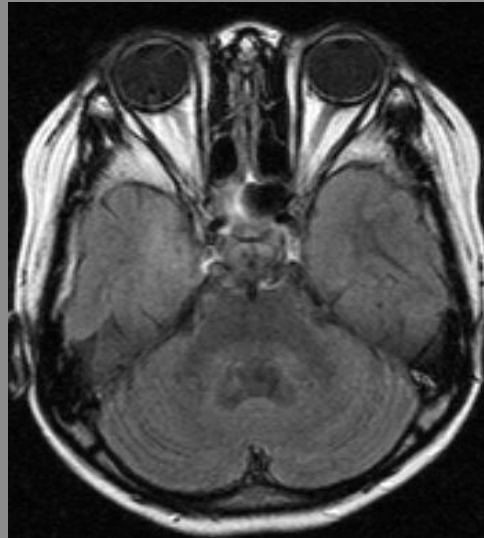
A 13 year-old boy had complex partial seizure during sleep.





# \* Ganglioglioma

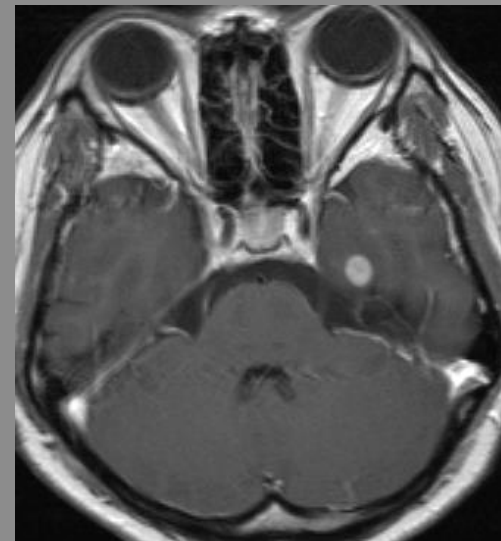
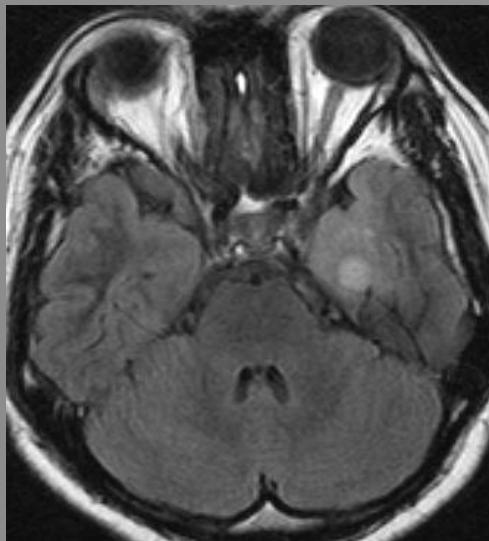
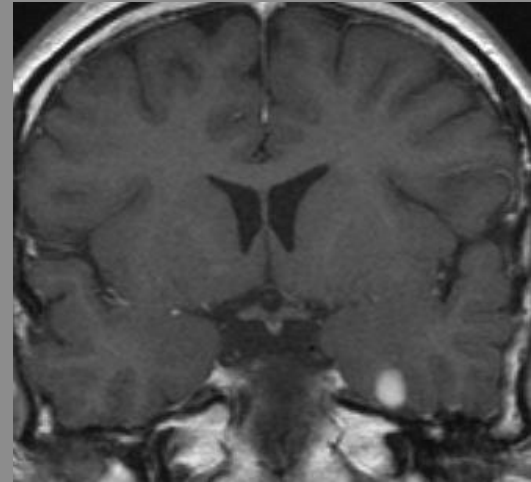
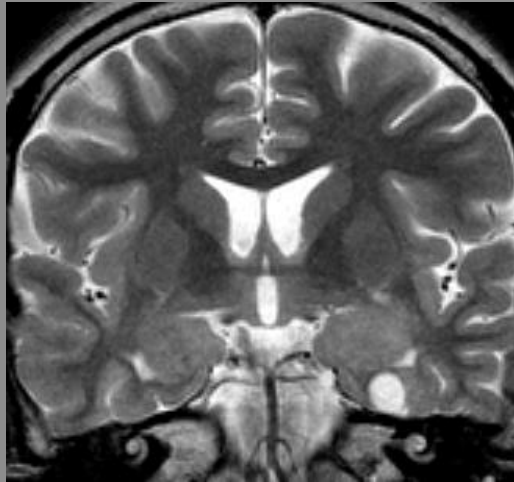
- Benign mixed solid&cystic cortically based lesion, often calcification, variable enhancement, common location, temporal lobe.



A 8 year-old girl intractable seizure for 3 years.

# \* Pilocytic Astrocytoma

- ▣ Age of onset : 8-13 years
- ▣ The mesial temporal lobe is classical location.
- ▣ Imaging: A cyst with an enhancing nodule. Variable enhancement of cyst wall.

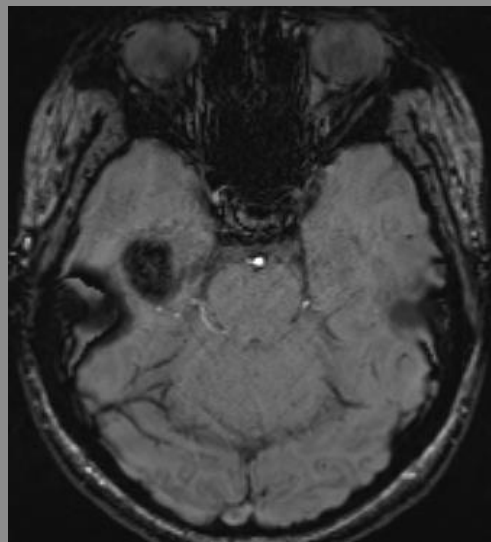
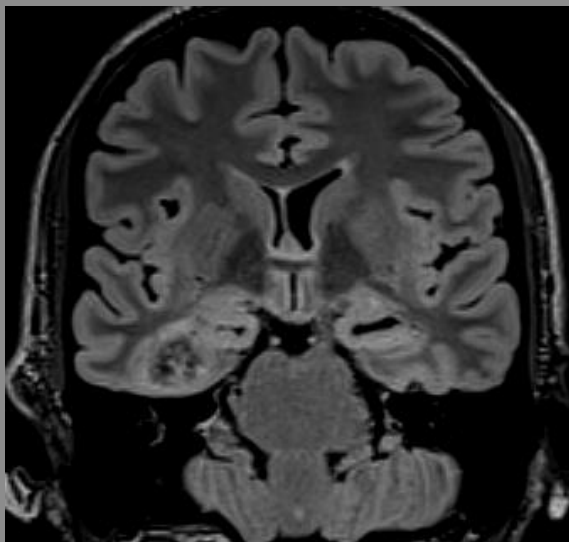
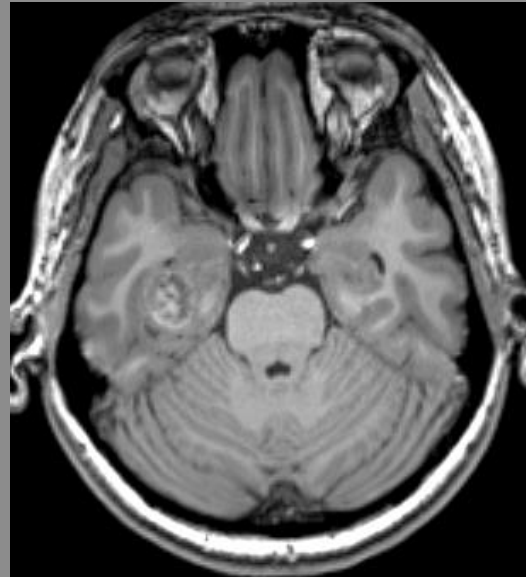


A 17 year-old female complex partial seizure for 5 years.

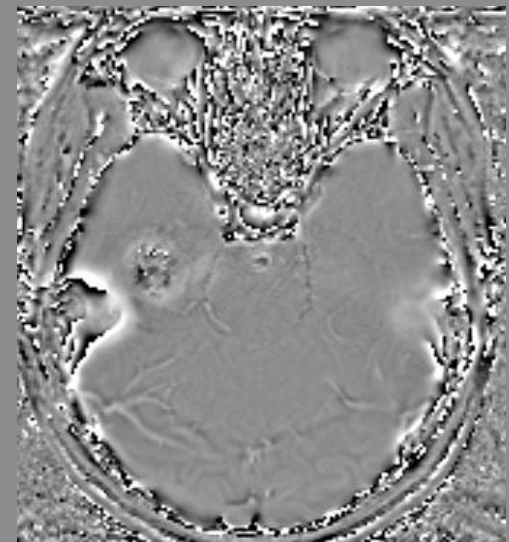


# \*Oligodendroglioma

A 26 year-old female had seizure for 9 months.



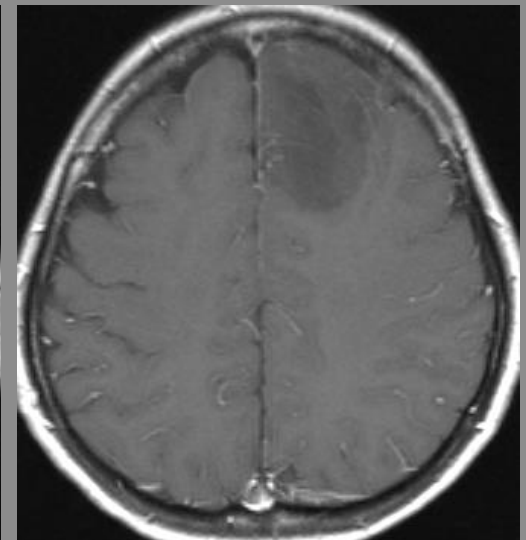
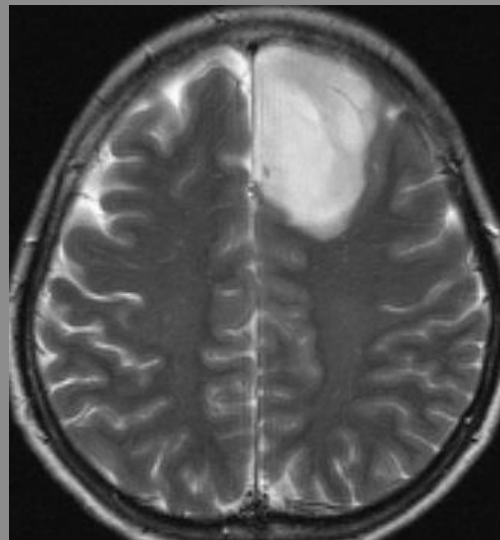
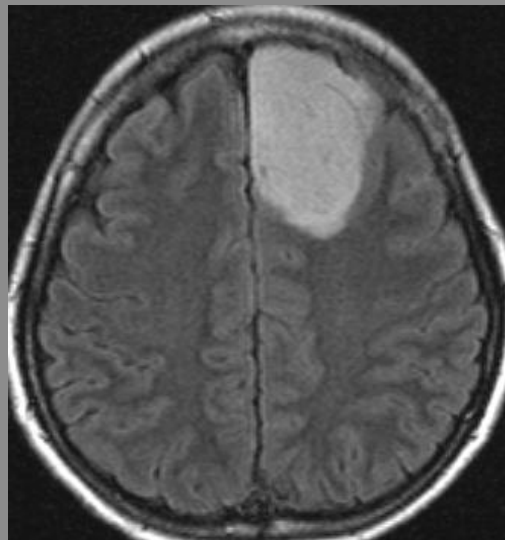
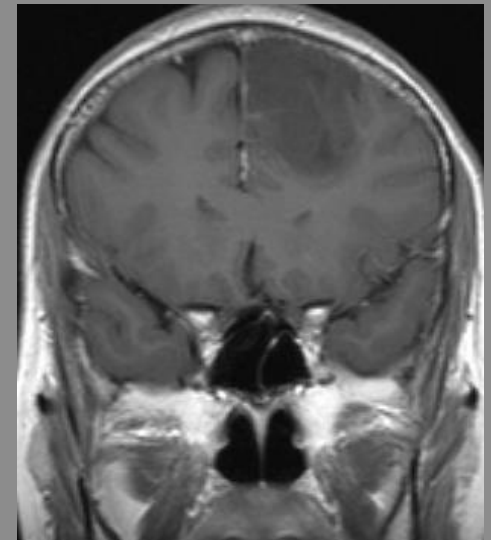
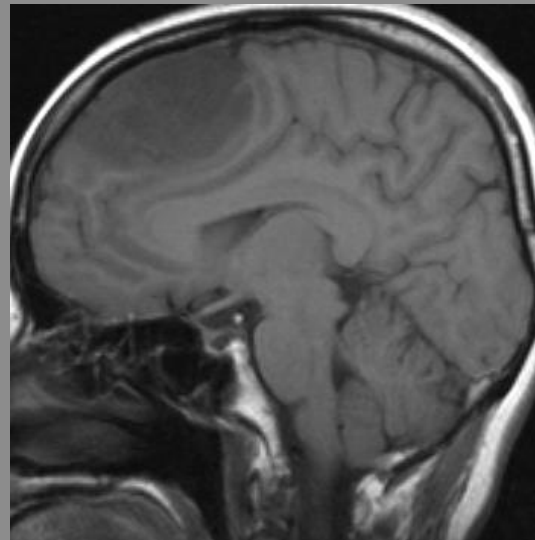
SWI-SOURCE IMAGE



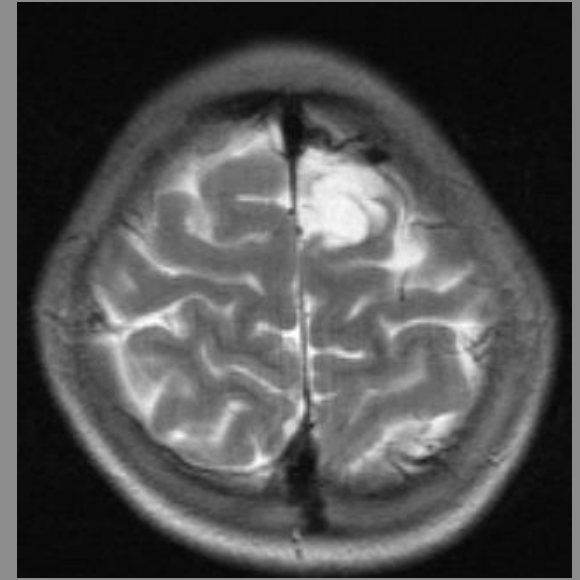
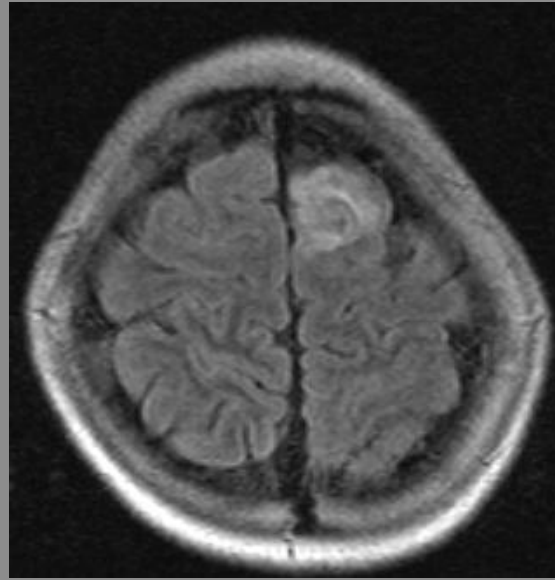
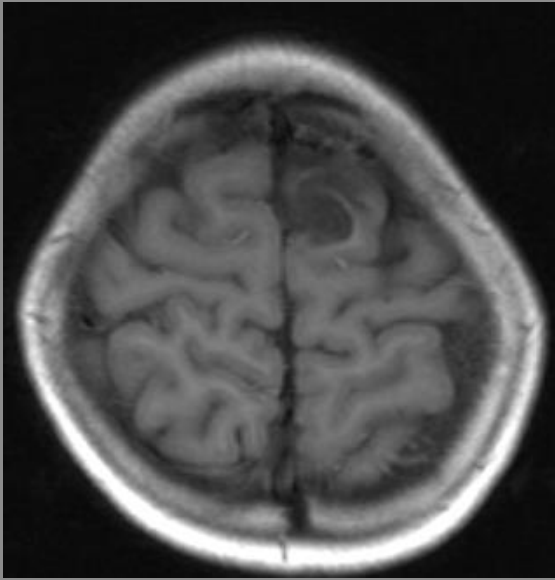
SWI-PHASE IMAGE

# \* oligodendroglioma

- \* Cortical-based lesion with calcification
- \* Variable enhancement
- \* Common to frontal or fronto-temporal cortex

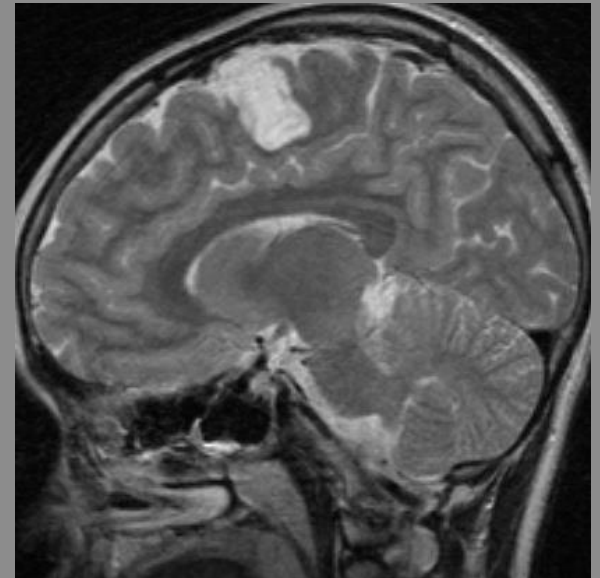
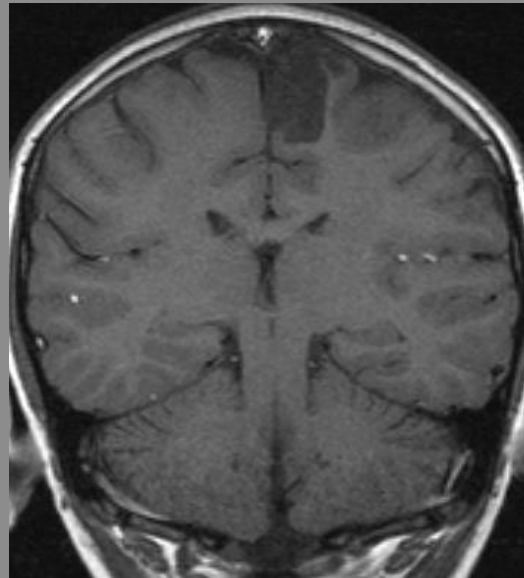


A 42 year-old female seizure for 1 year.



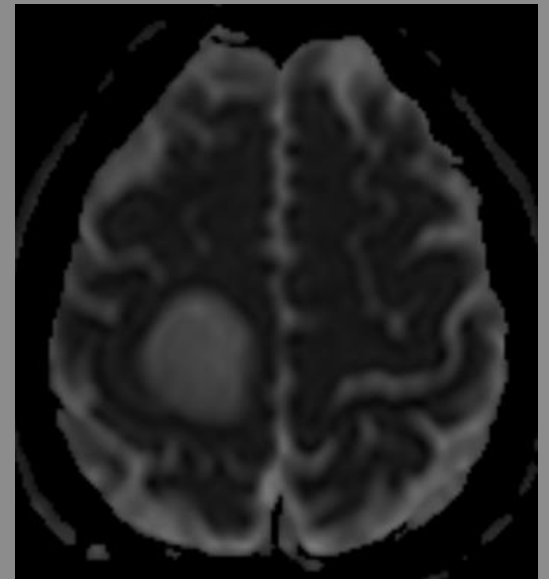
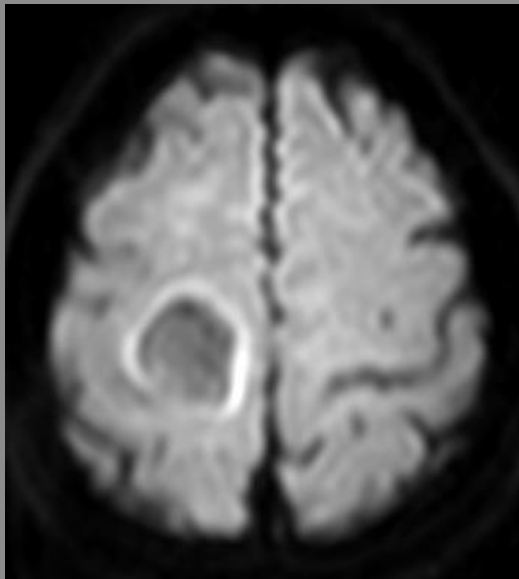
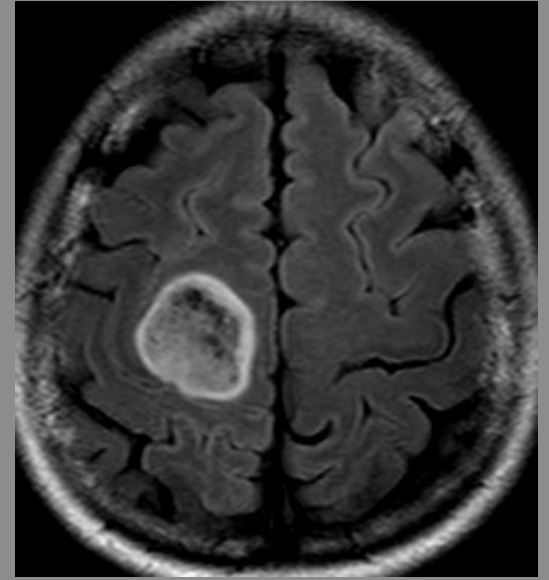
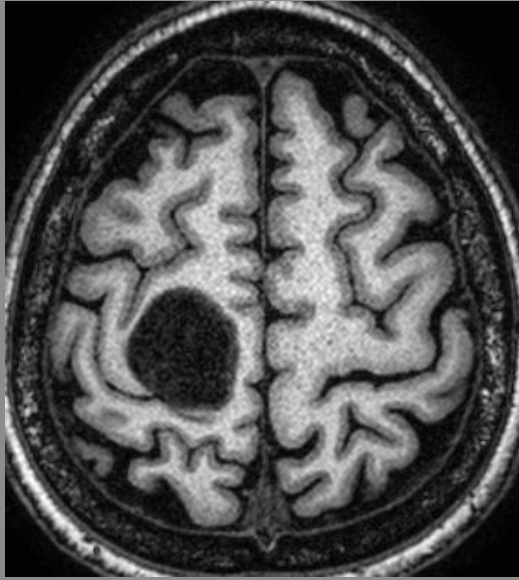
## \*Astrocytoma

A 10 year-old girl  
had complex partial  
seizure for 3  
years.



# \*Astrocytoma

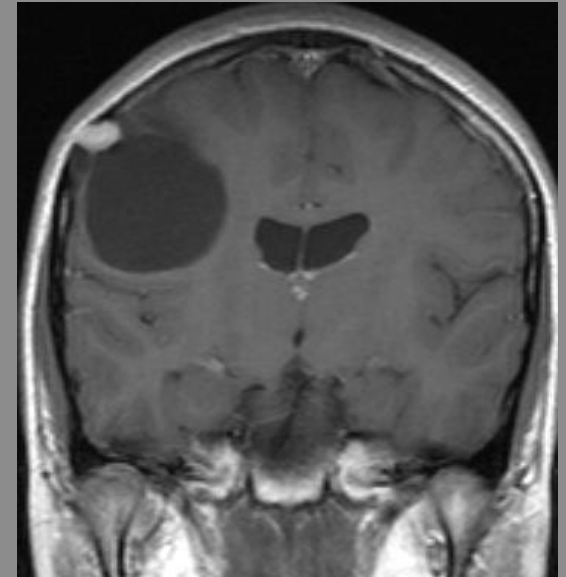
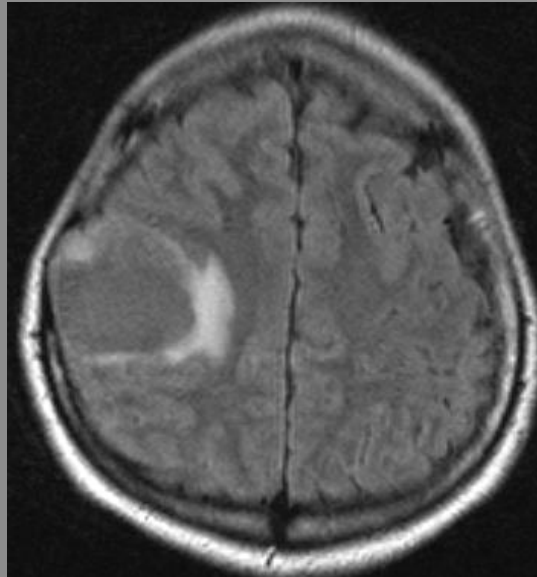
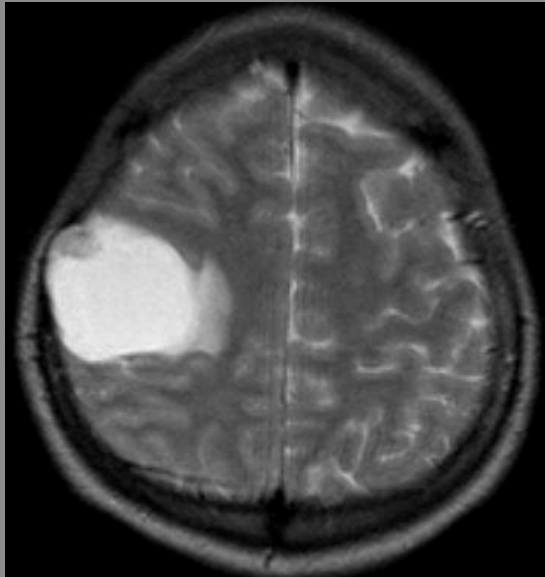
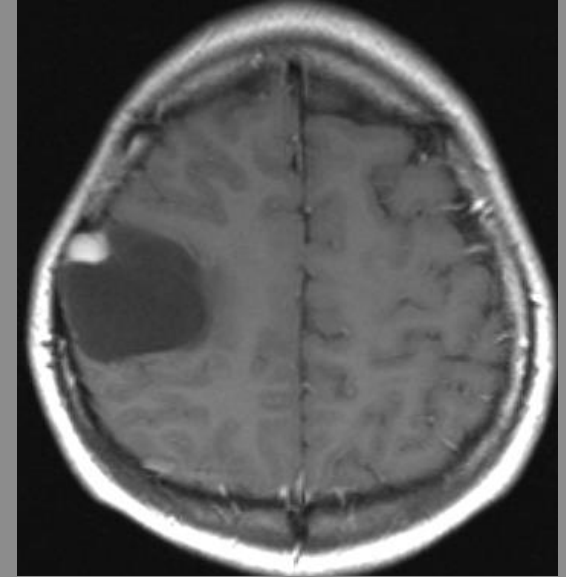
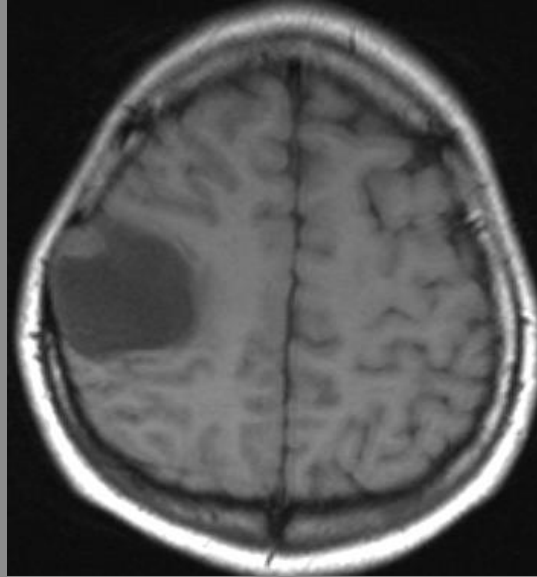
A 40 year-old female had focal seizure of left upper limbs for ½ year.





# \* Pleomorphic xanthoastrocytomas

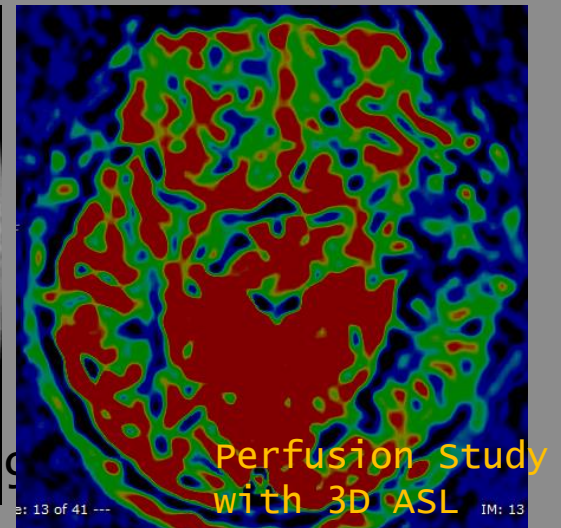
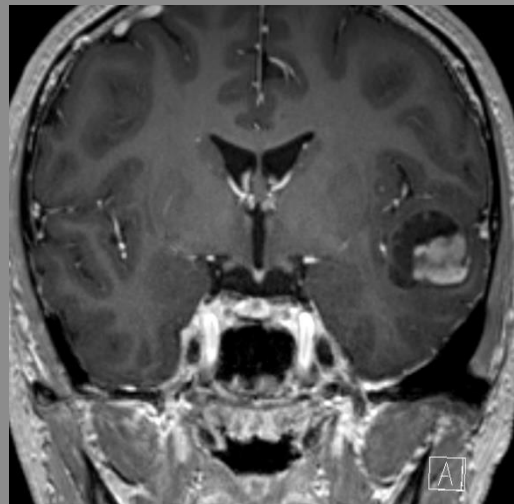
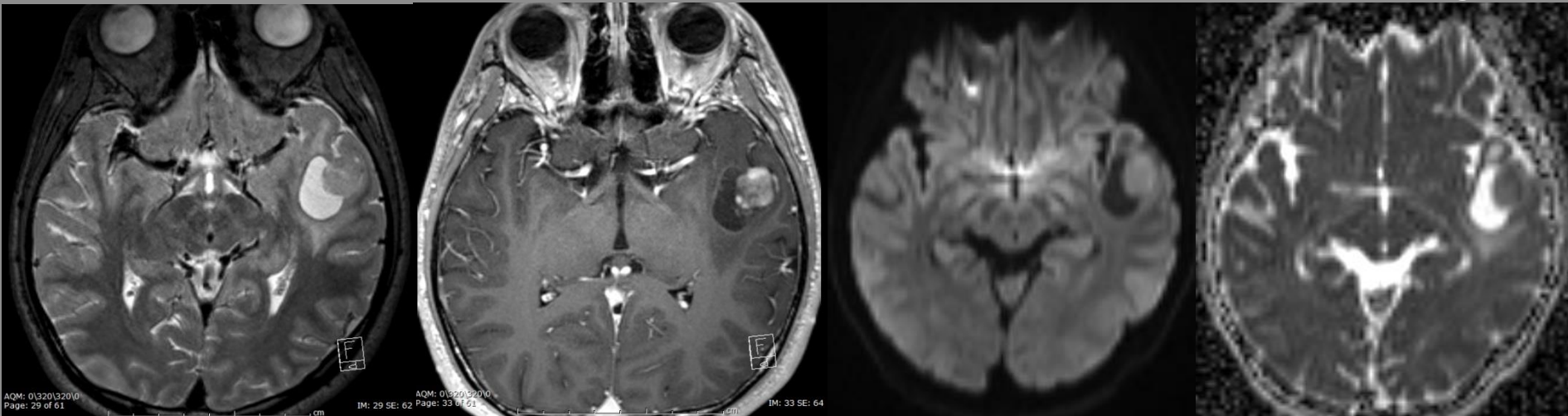
- ▣ PXA are peripherally located cystic lesions with enhancing mural nodule.
- ▣ Involvement of leptomeninges is the characteristic of this tumour





# \* Pleomorphic xanthoastrocytoma

A 16 year-old male had first seizure attack 10 months ago.



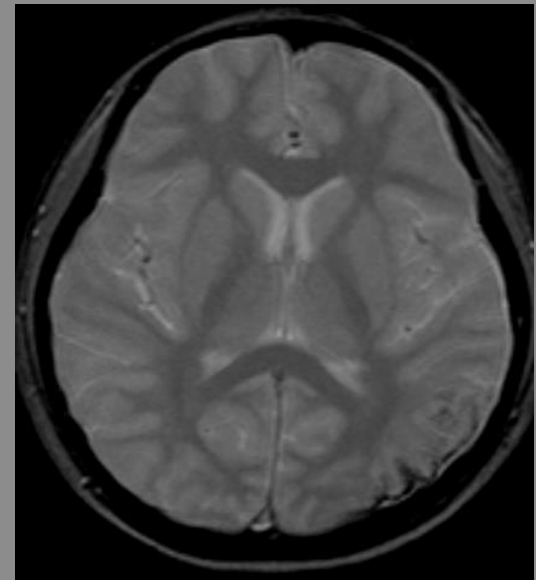
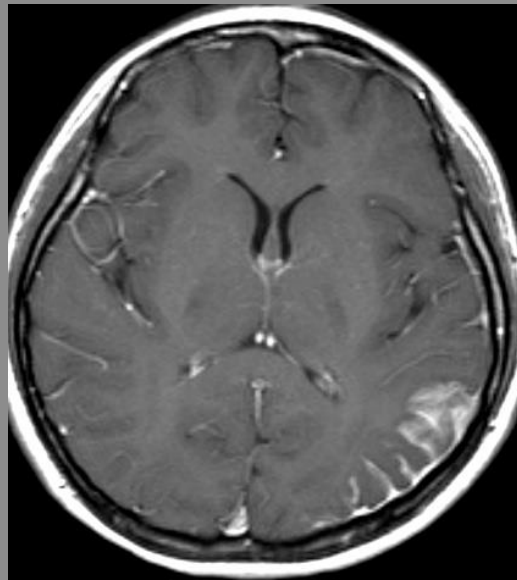
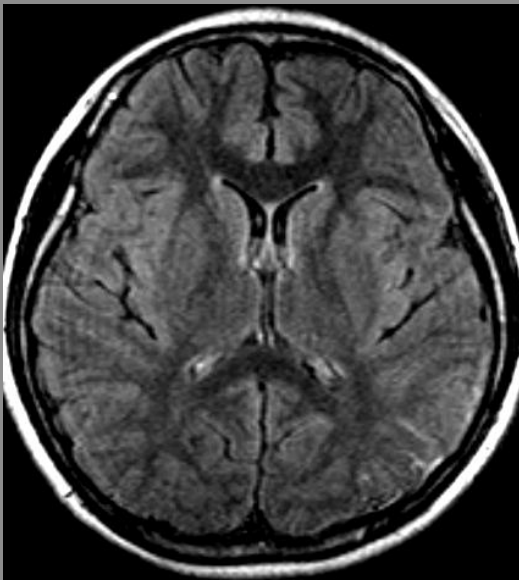
# *\* Vascular Malformation*

# \* Sturge-Weber syndrome

\* SWS is a neurocutaneous syndrome characterized by ipsilateral facial angioma in CN V distribution and angiomatosis of the leptomeninges

## \* Imaging findings

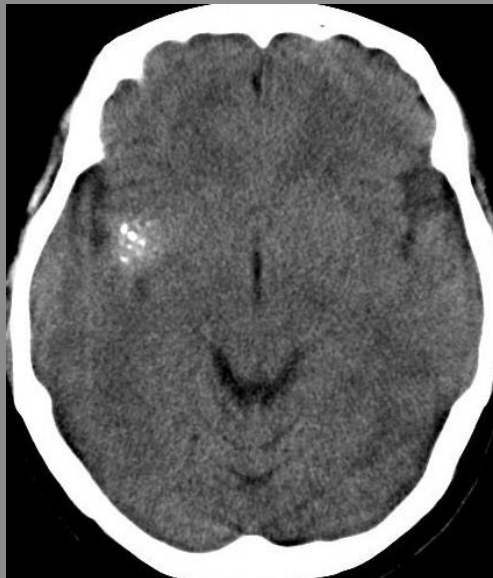
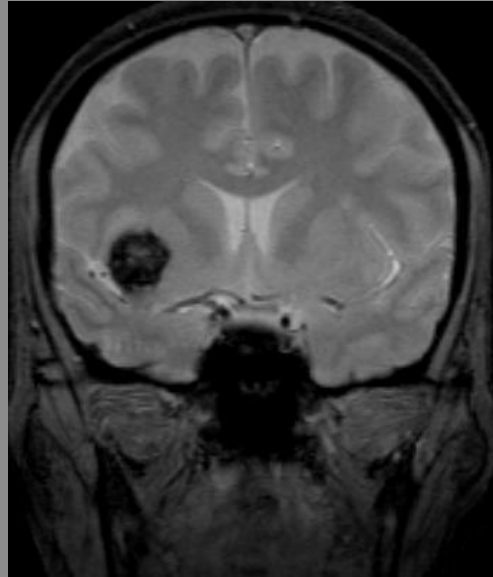
- \* Pial angioma on CE study
- \* Cortical calcification
- \* Enlarged choroid plexus and transmedullary venous collaterals
- \* Atrophy of the ipsilateral cerebral hemisphere



A 7 year-old girl seizure for 2 years.

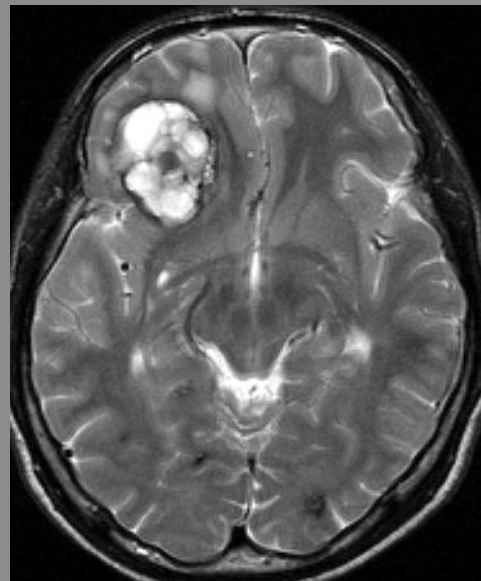
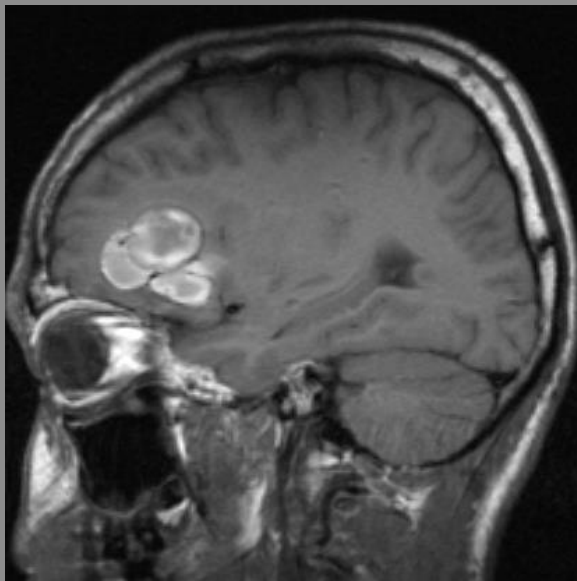
## \* Cavernoma

- \* Composed of vascular spaces containing blood in various stages.
- \* The typical MRI finding is a popcorn appearance composed of heterogeneous mixed signal intensities of blood, surrounded by a hypointense rim of hemosiderin.



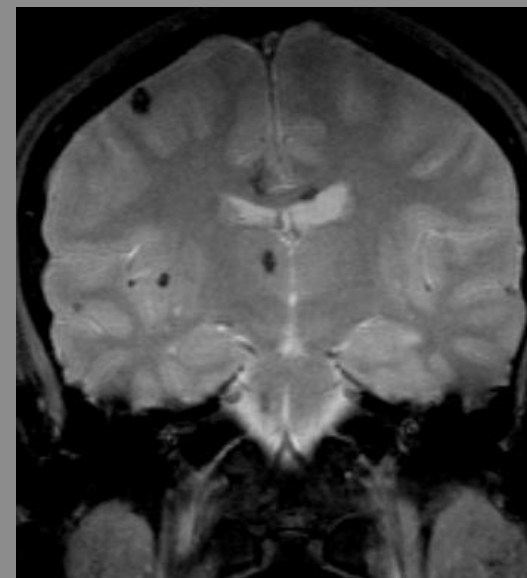
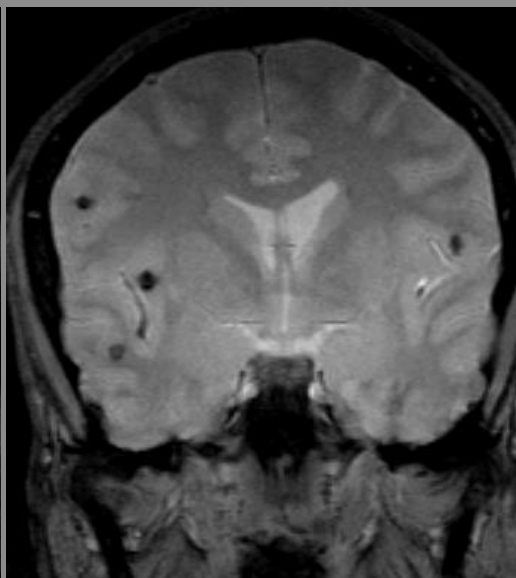
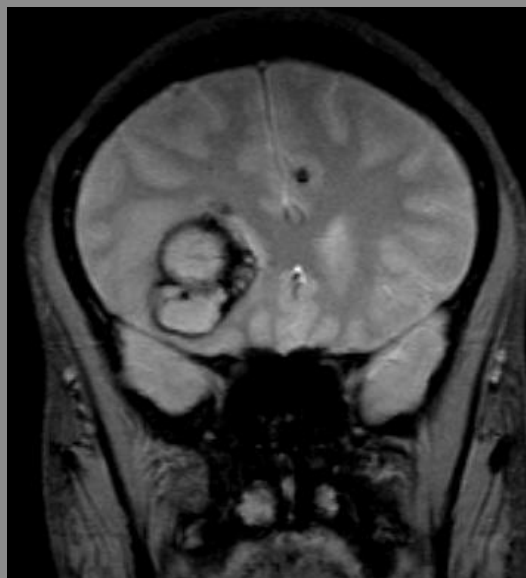
A 43 year-old female had seizure.





# \* Cavernoma

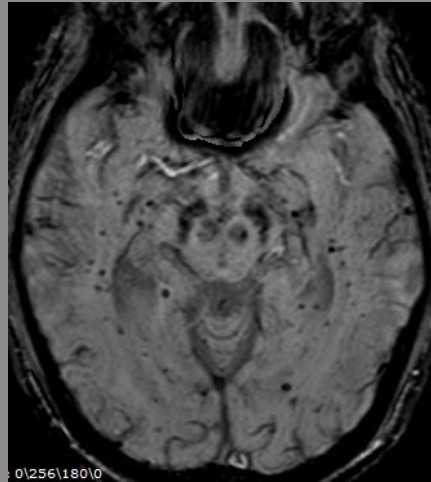
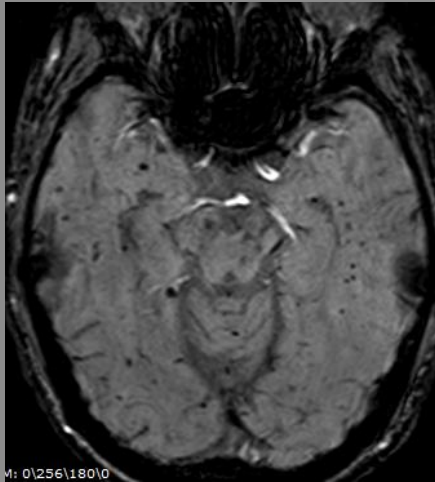
- \* 15-54 % of lesions are multiple
- \* GRE T2W&SWI are useful in detecting small cavernoma



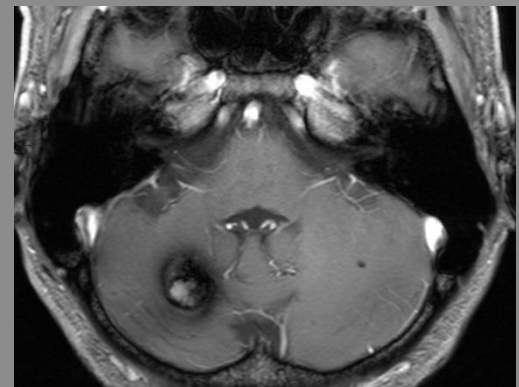
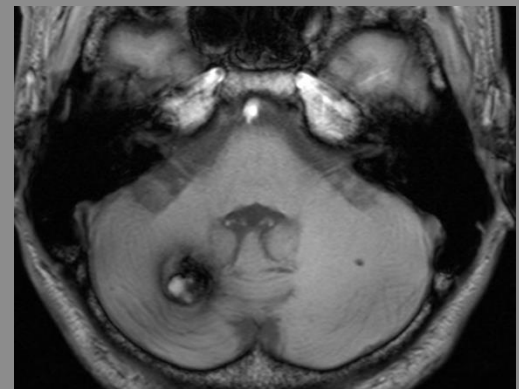
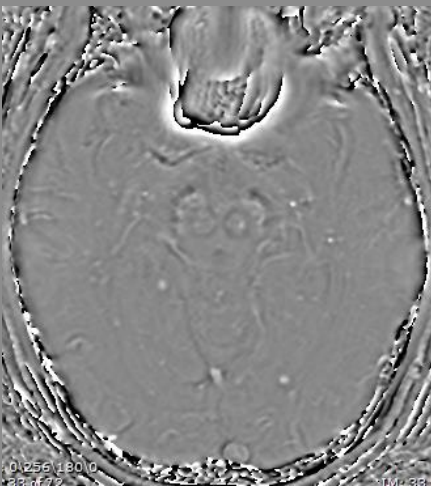
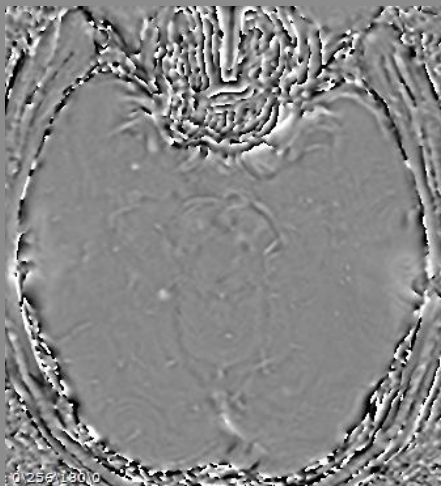


# \*Cavernoma

SWI  
SOURCE IMAGE

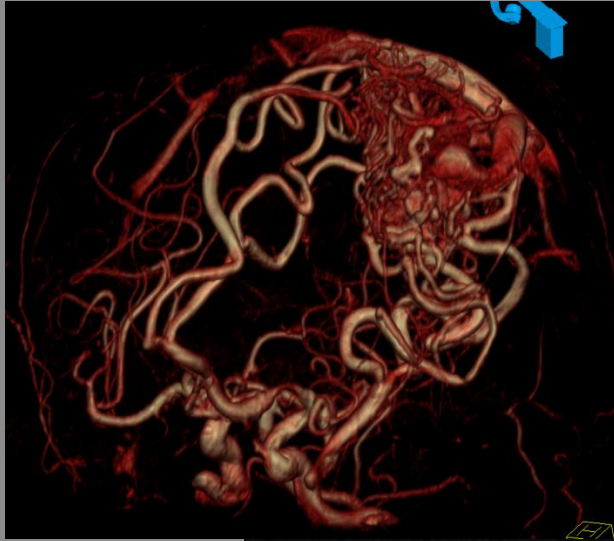


SWI  
PHASE IMAGE

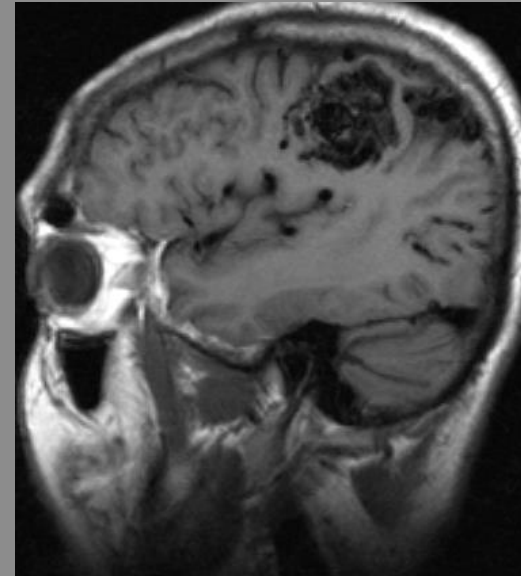
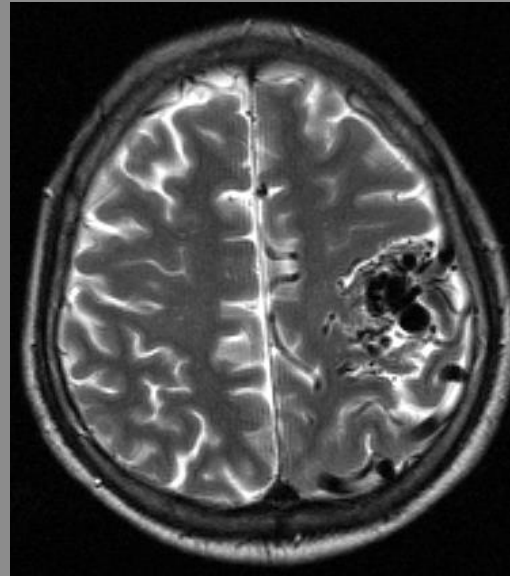
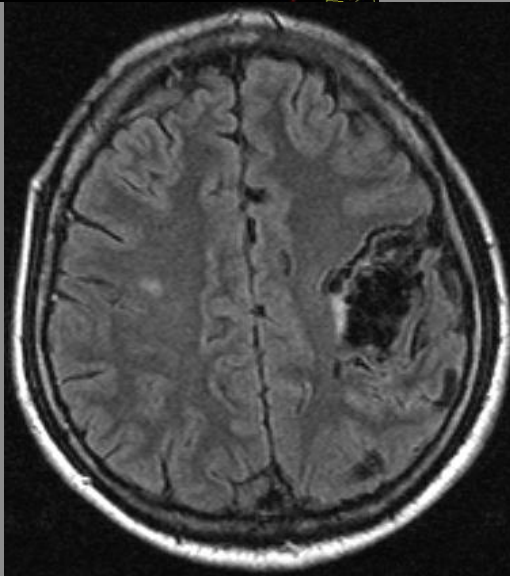


# \* Arteriovenous Malformations

- \* AVMs consist of a tangle of blood vessels lacking of intervening capillary network and leading to A-V shunting
- Mechanisms for seizure generation may include (1) focal cerebral ischemia, and (2) gliosis and hemorrhage

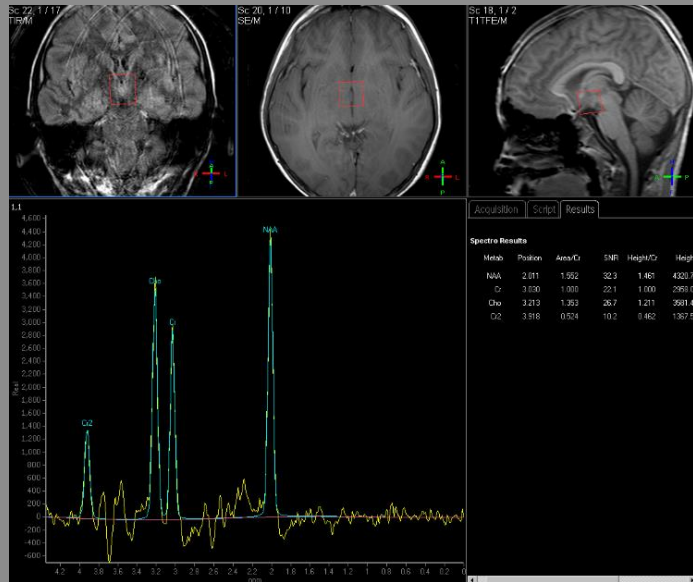


A 51 year-old male presented with focal seizure for 5 years.

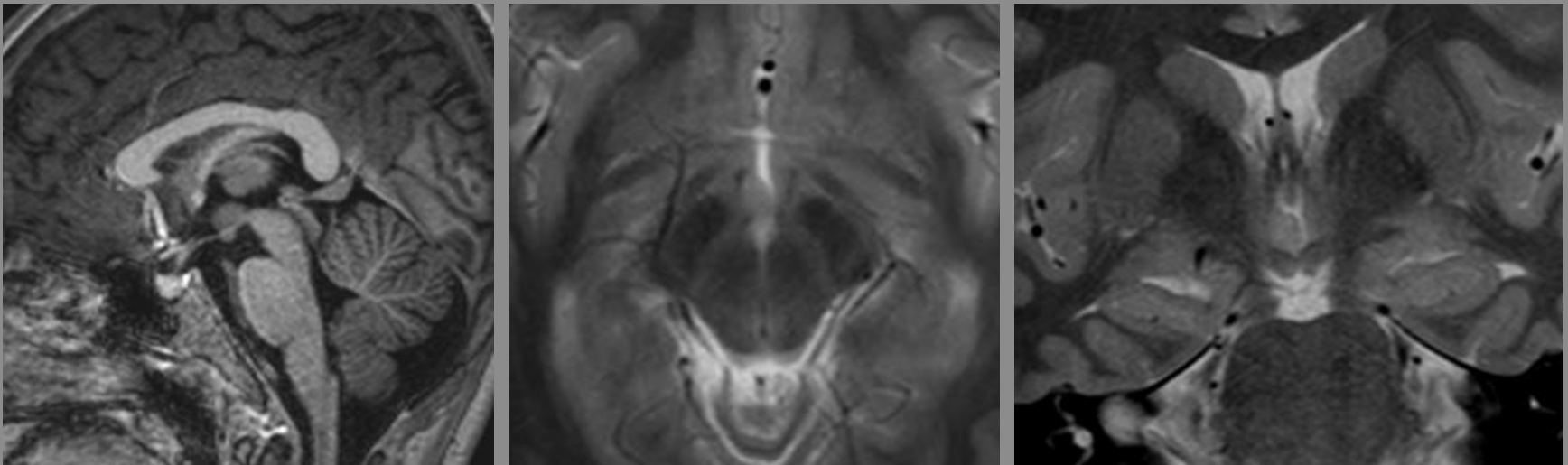


\* *Gliososis and  
miscellaneous  
abnormalities*

# \* Hypothalamic hamartoma \*



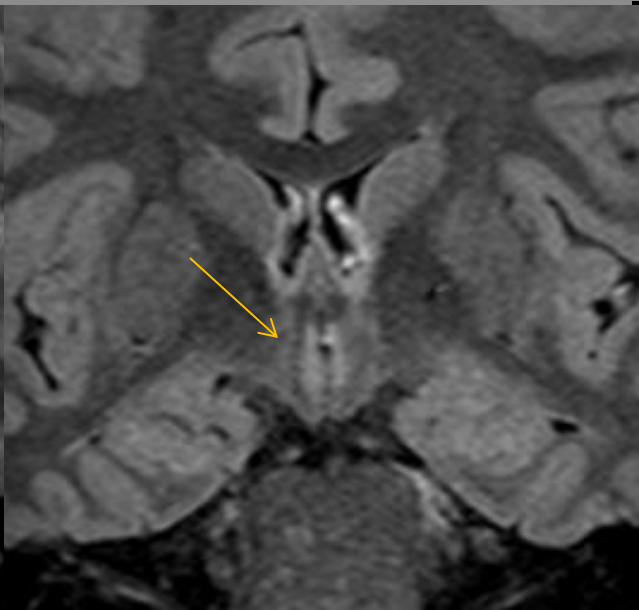
- \* Developmental malformation
  - \* Central precocious puberty and gelastic seizure
  - \* MRI&MRS findings suggest reduced neuronal density and relative gliosis
- Jeremy L. Freeman et al AJNR;25:450-462
- \* Seizure – intrahypothalamic or posterior hypothalamus



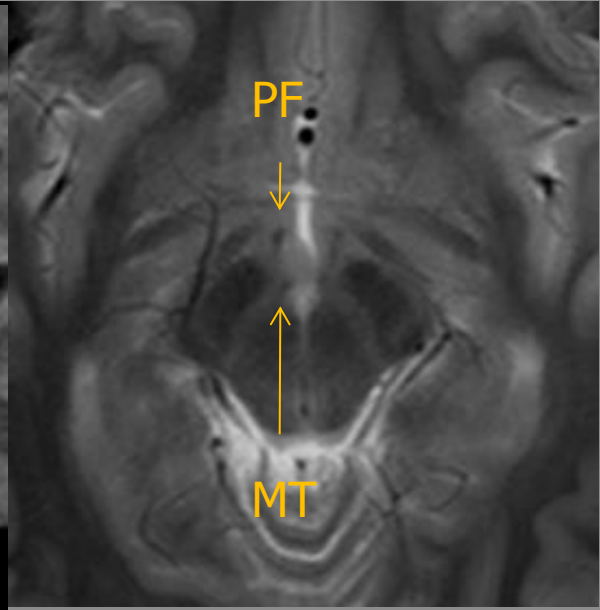
A 11 year-old boy had history of laughing, facial movement and turning to left side of 1-2 times per day.



Postcommissural  
Fornix (PF)



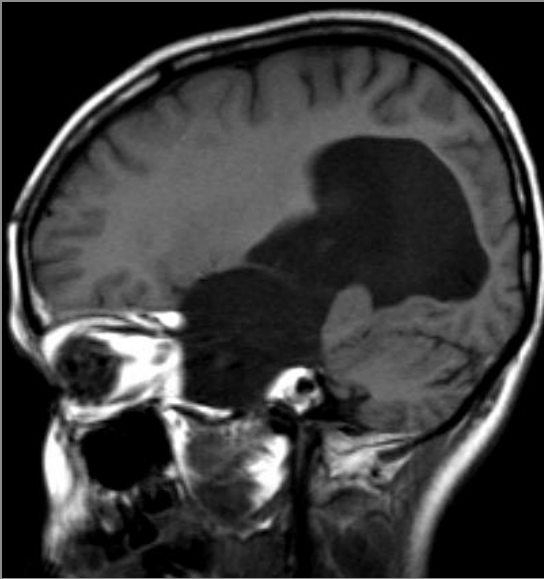
Mamillothalamic  
Tract (MT)



# \* Hypothalamic Hamatoma



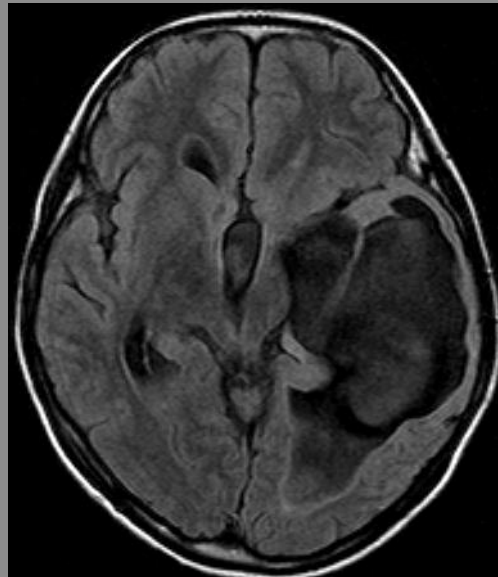
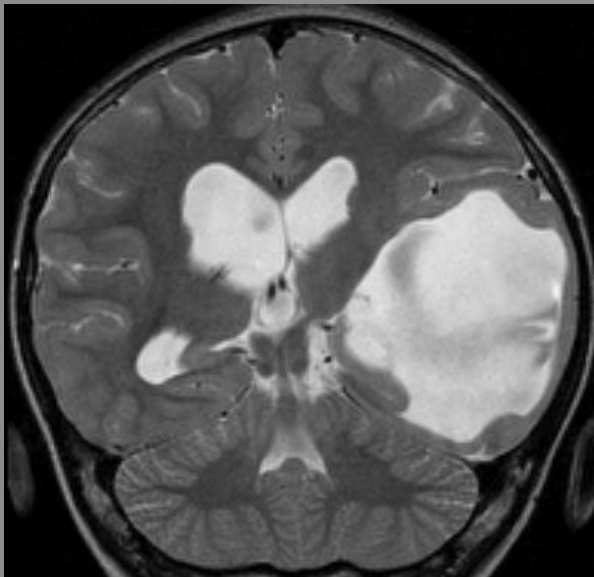
# \* Porencephaly



\* Amygdalar-hippocampal atrophy often coexists with congenital porencephaly (95%)\*.

\* Hippocampal structures should be carefully assessed in patients with porencephalic-related seizures\*.

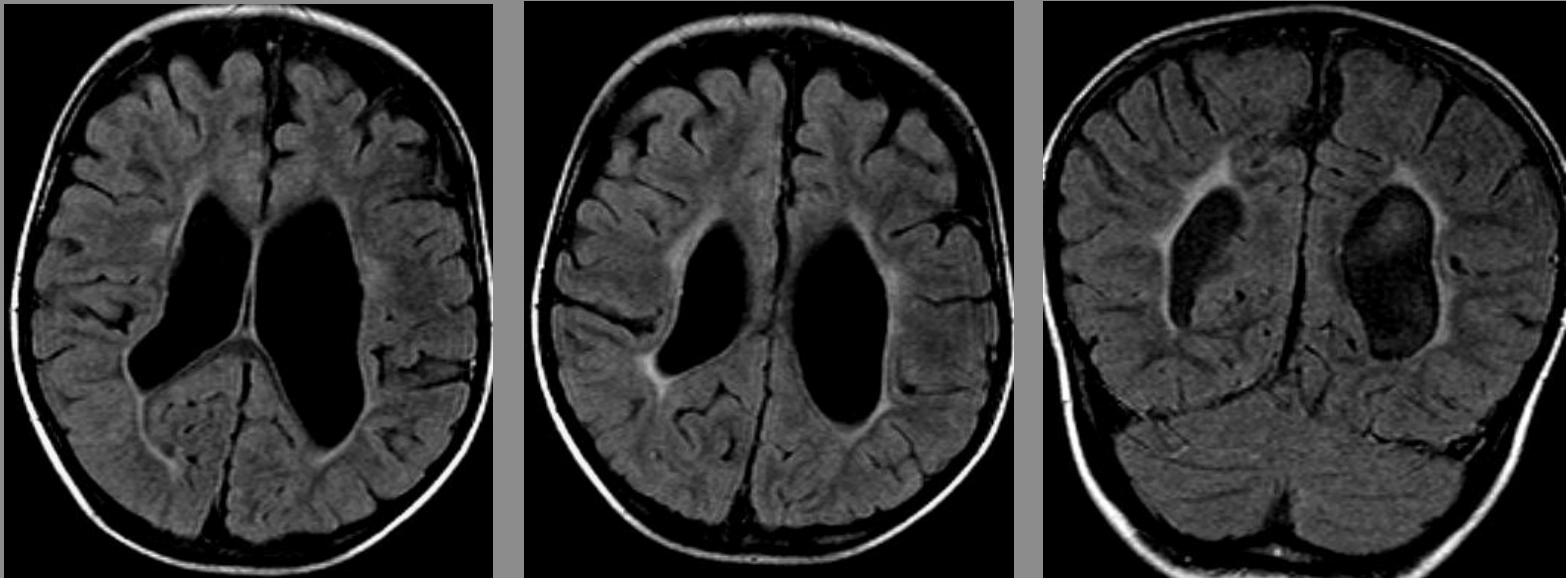
\* Susan S. Ho et al *AJNR* 1998;19:135-141



\* A smooth-walled cavity, CSF-like signal intensity. The surrounding brain is normal.

A 8 year-old girl  
complex partial  
seizure

# \* Periventricular Leukoencephalomalacia (PVL)



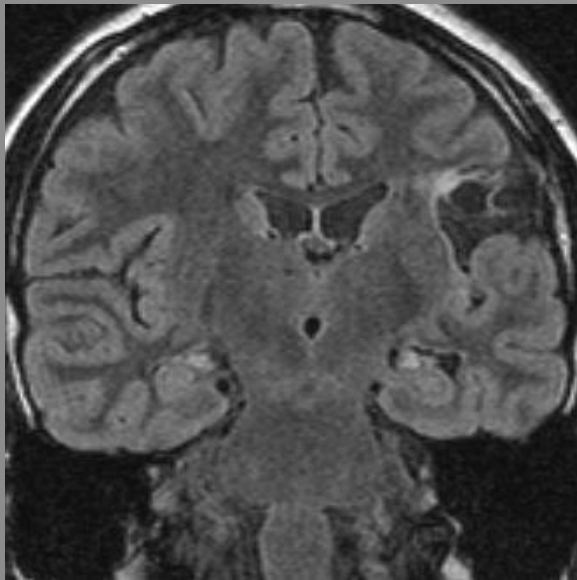
A 3 year-old boy, preterm with BPD, had intractable seizure.

- \* Gliosis is the end result of various focal and diffuse CNS injuries e.g. trauma, infection, infarction etc.

- \* MRI findings

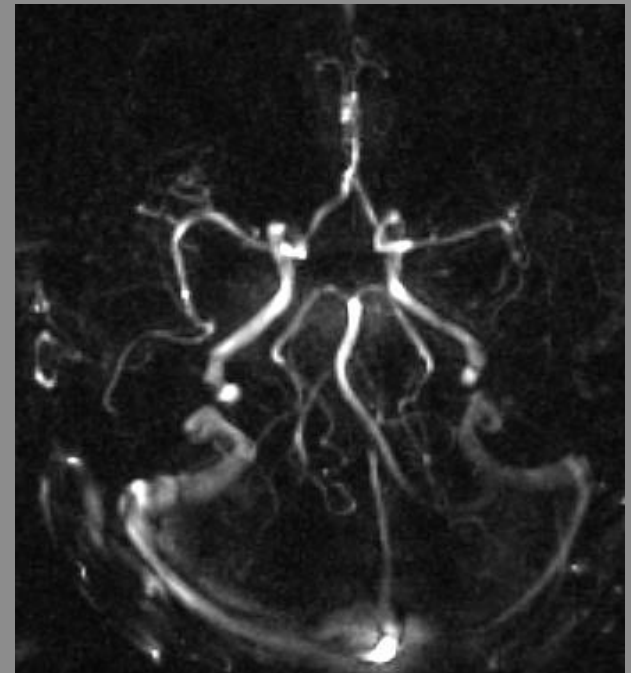
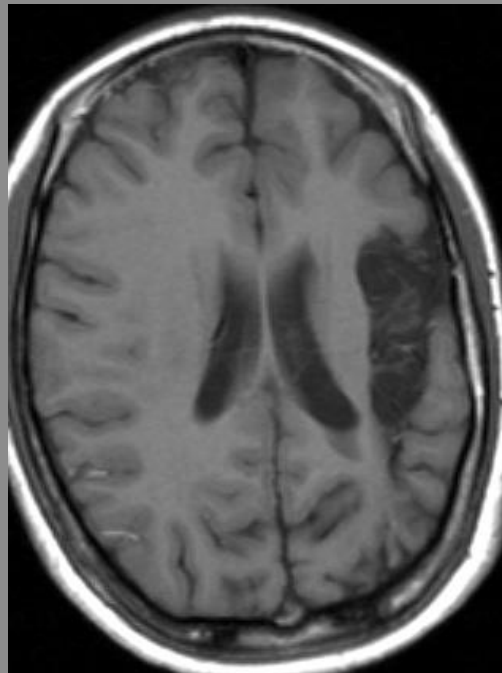
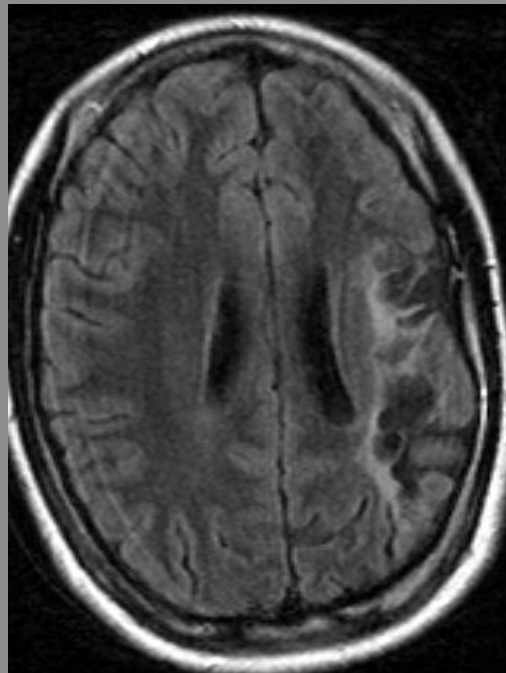
- \* Hypersignal T2 change associated with volume loss, sulcal widening and ventricular enlargement.

\* Gliosis



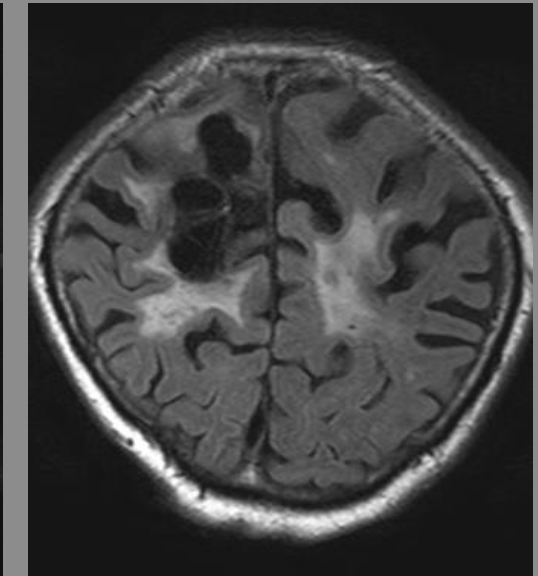
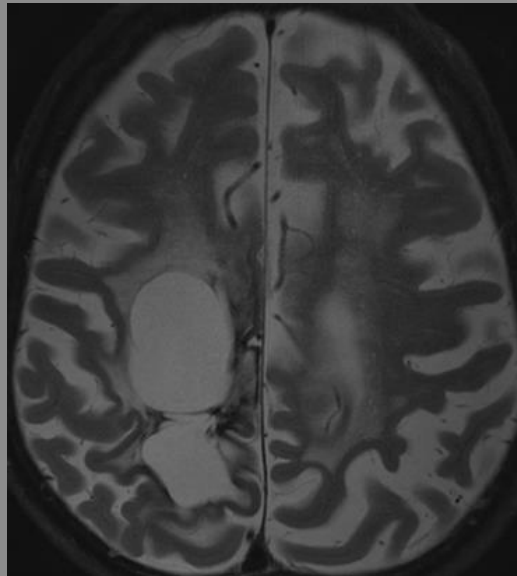
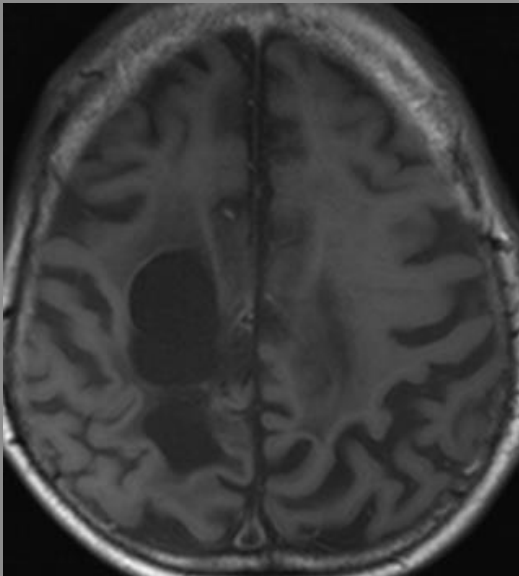
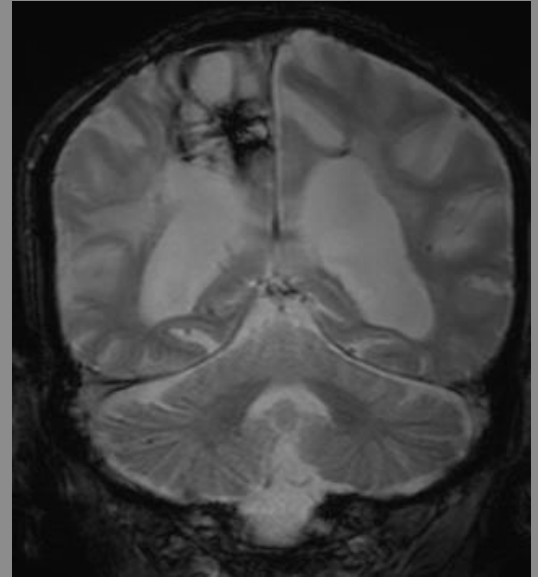
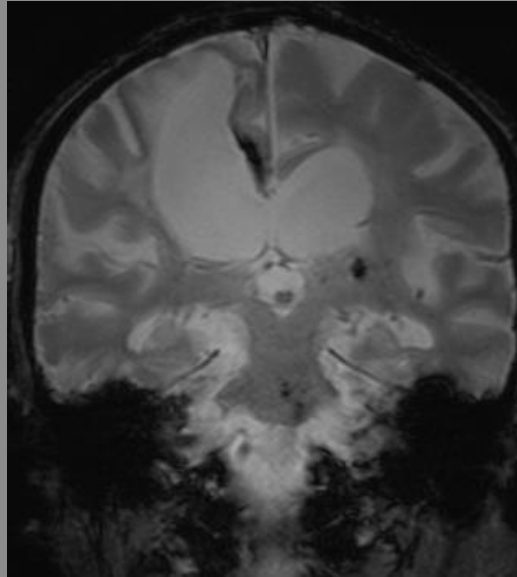
# \* An old MCA's infarction

A 13 year-old girl had seizure since 9 years of age.



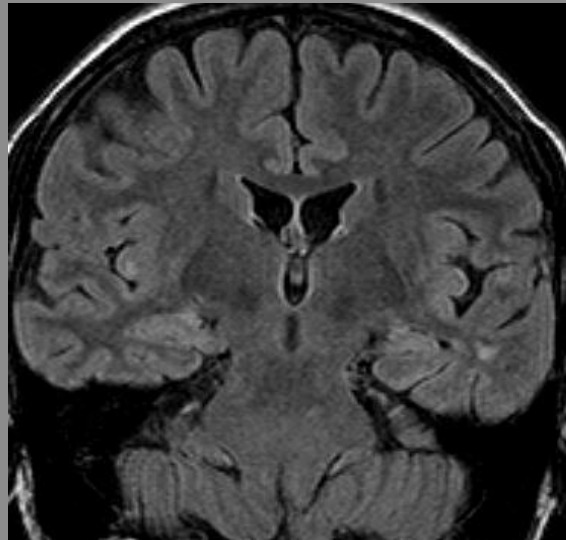
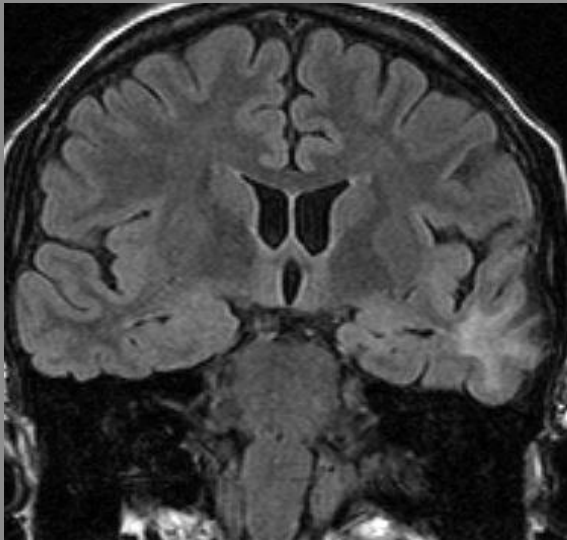
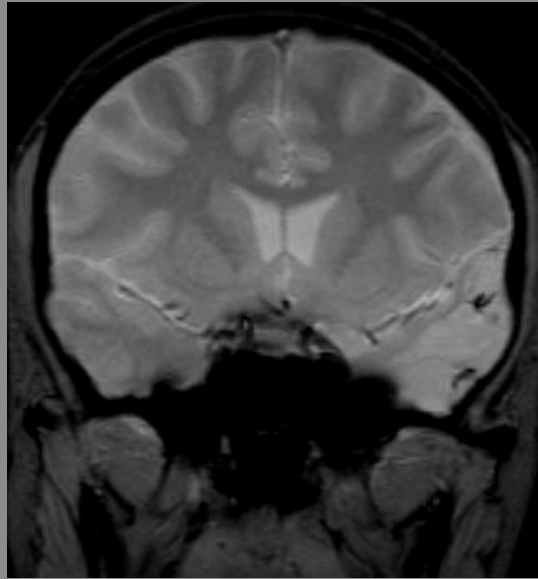
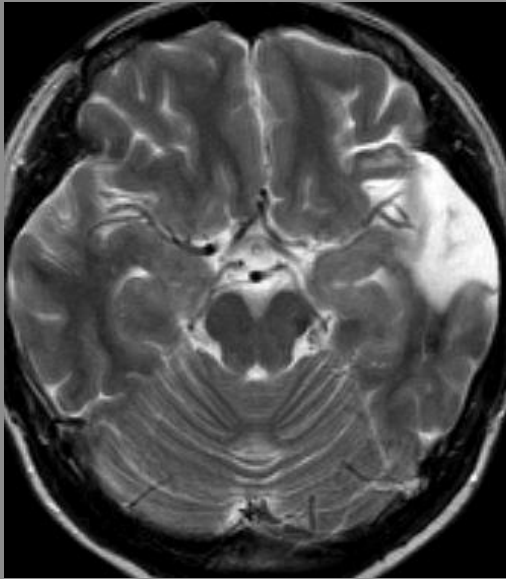
# \* Old Hemorrhage

An 88 year-old male, old case CVA, had seizure.





# \* Post traumatic seizure



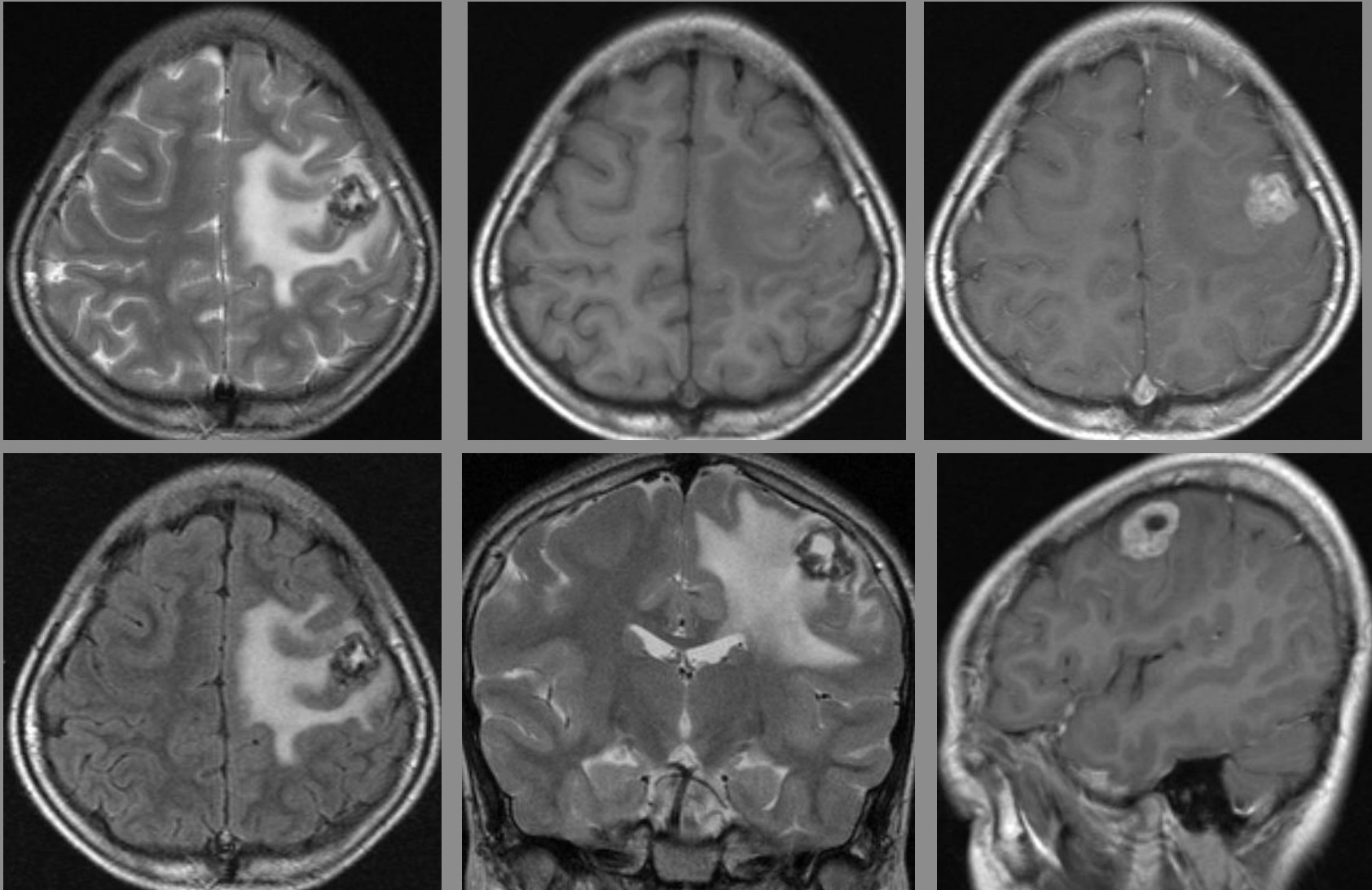
A 30 year-old female, history of head injury 5 years ago, had automatism of left arm and movement followed by loss of consciousness of 6 months duration.

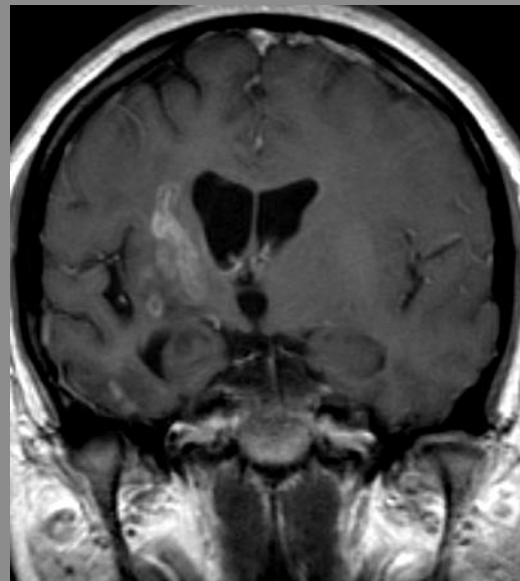
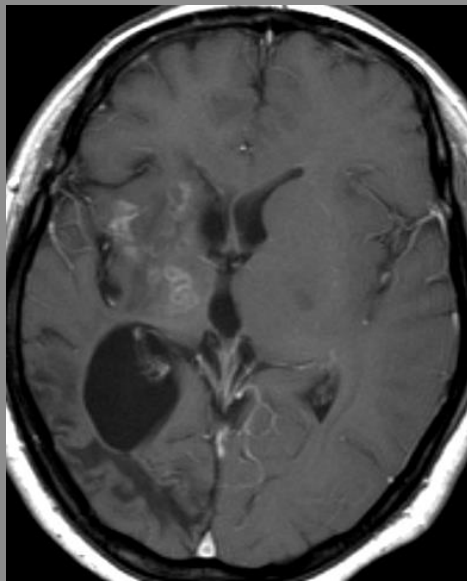
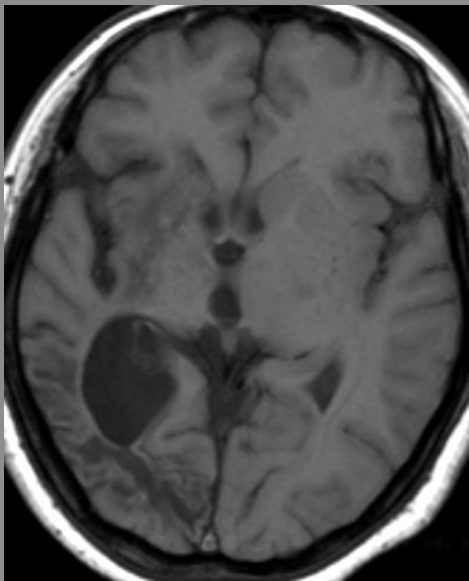
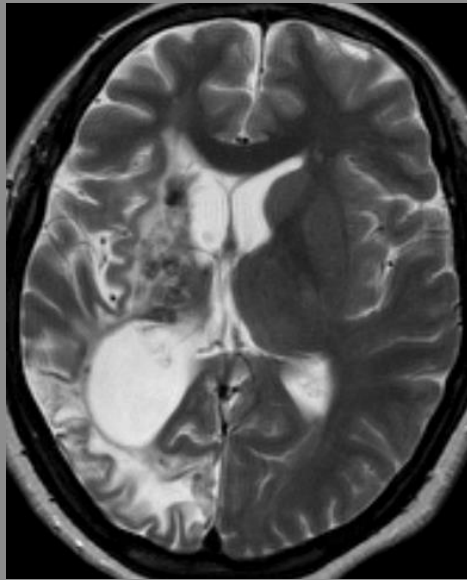
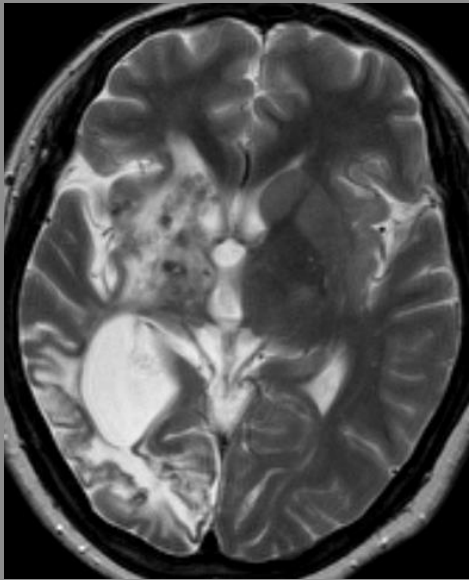
- \* Early posttraumatic seizures
  - \* Increased injury severity, including loss of consciousness or posttraumatic amnesia lasting > 24 h
  - \* Acute intracerebral hematoma, especially subdural hematoma
  - \* Brain contusion
  - \* Age older than 65 yr at time of injury
- \*Lauren C. Frey *Epilepsia* 2003;44(Suppl 10):11-17.

**\* Risk factors for late posttraumatic seizures\***

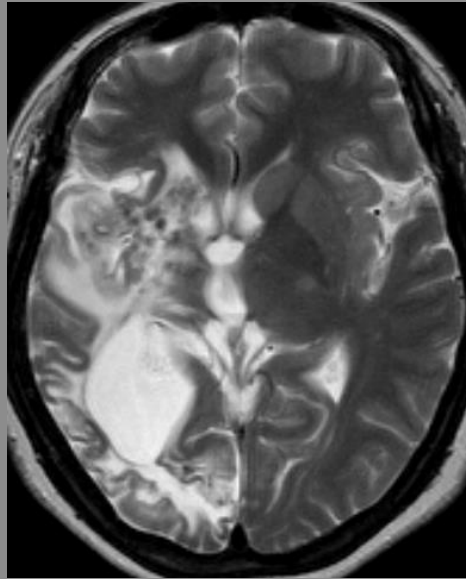
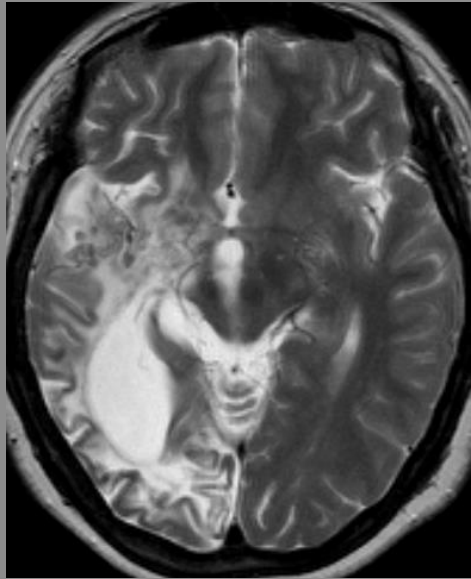
# \* Granulomatous inflammation

A 12 year-old girl had seizure starting from right hand for 1 year.



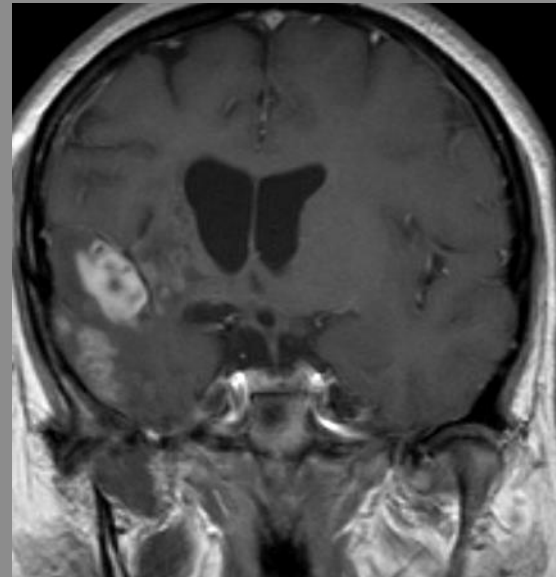
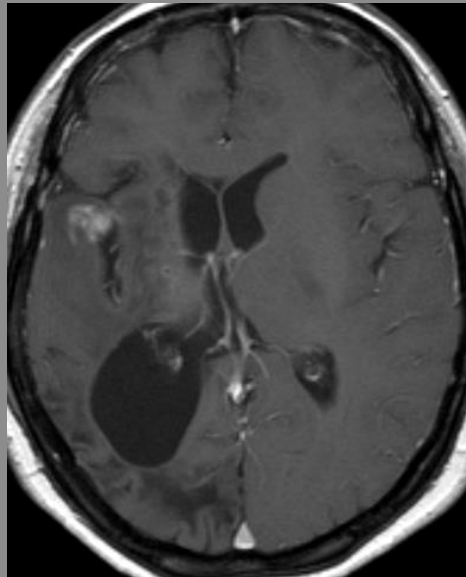
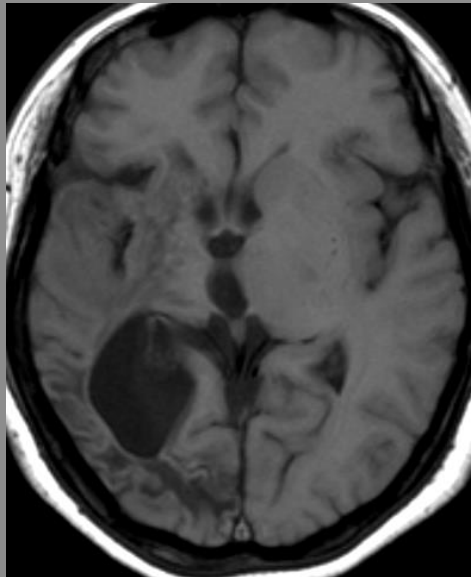


A 27 year-old female  
had seizure.



\*Sparganosis

3 years  
later





\* *Spirometra mansoni*

\* Man: Accidental intermediate host

\* Raw or inadequately cooked flesh e.g. frogs,  
snake, chickens

\* Sparganosis

\*Enhancing lesions \*

\*Tunnel sign – moving track of a migrating worm

\*Conglomerating ring-like or bead-shaped enhancement

\*Calcification\*

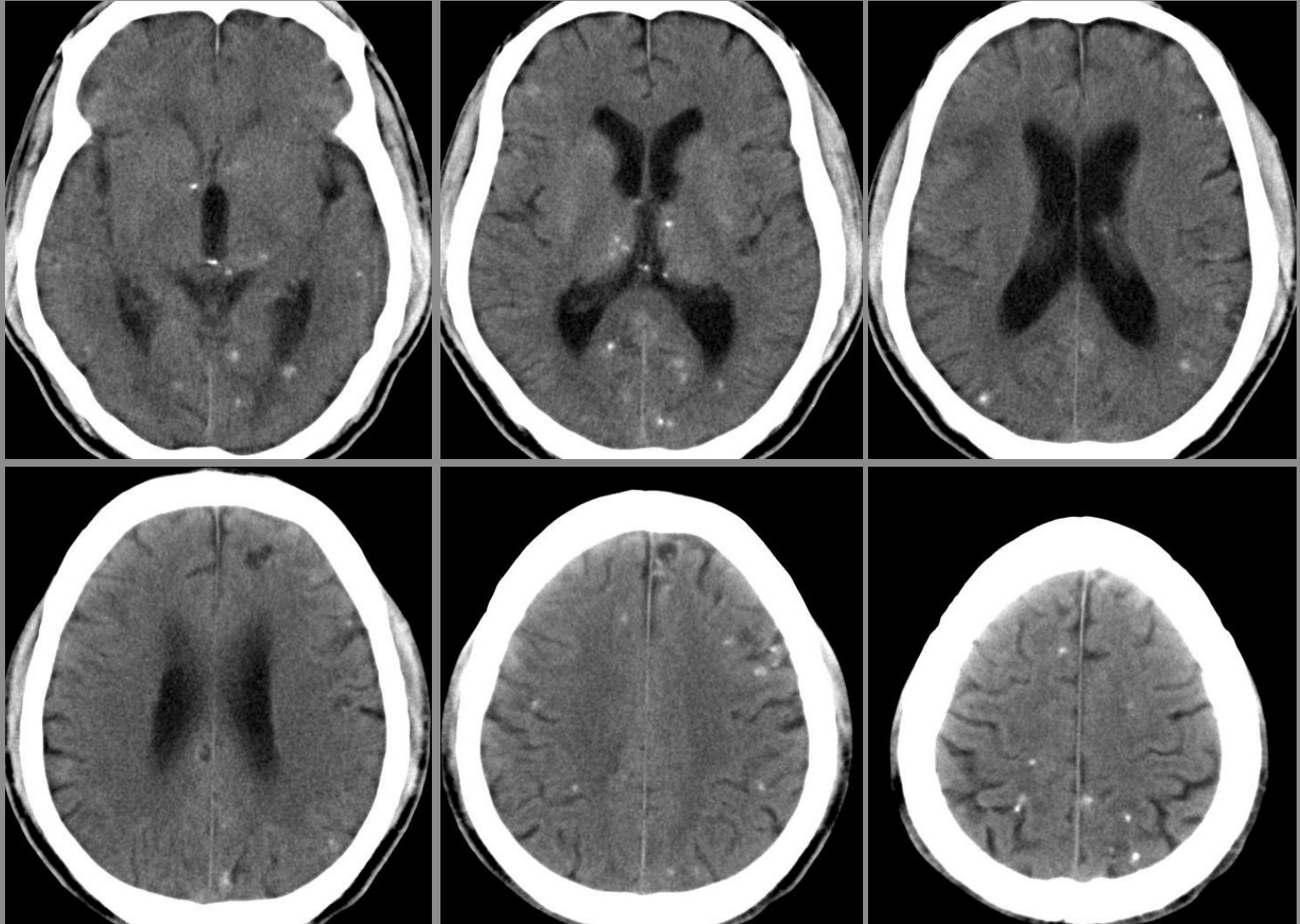
\*Presence of new and old lesions

\* T. Song et al *AJNR* 2007;28:1700-05

\*Sparganosis: Imaging findings

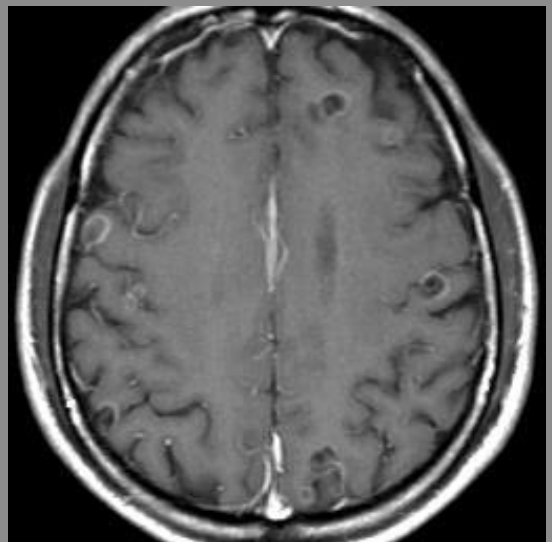
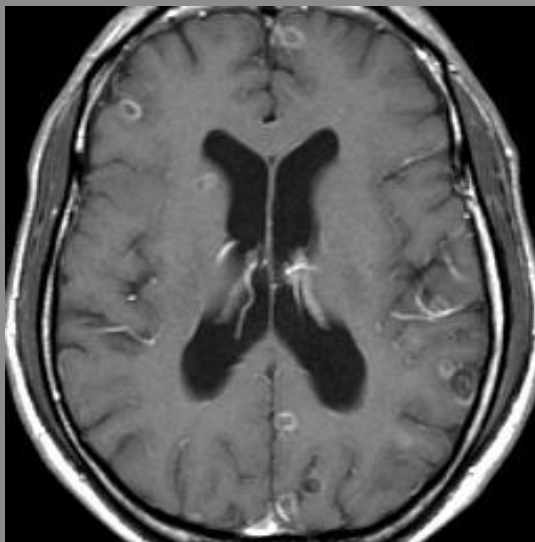
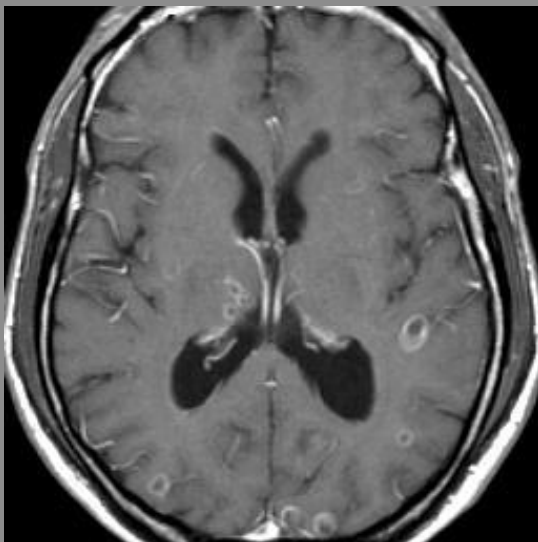
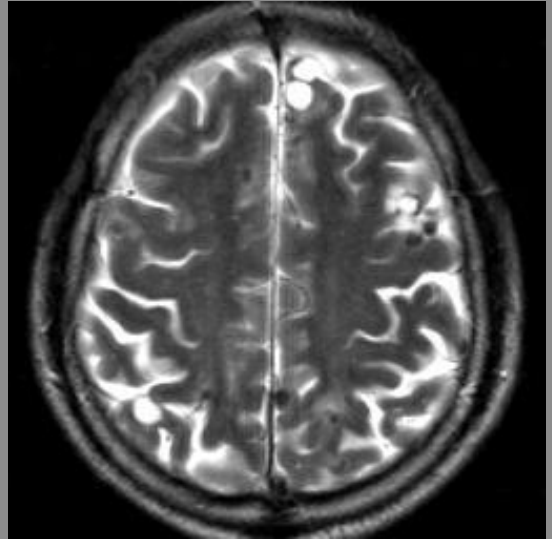
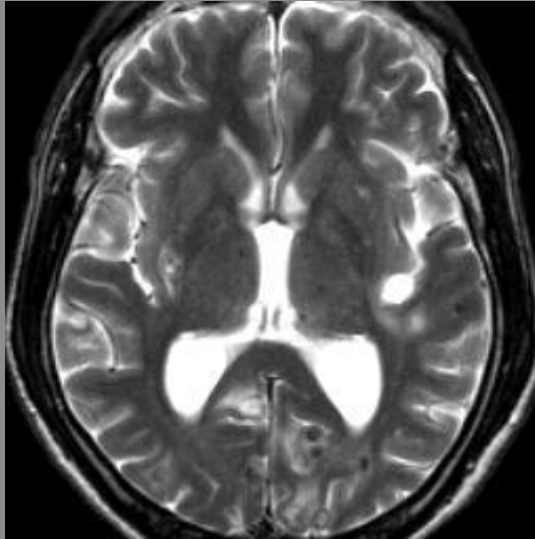
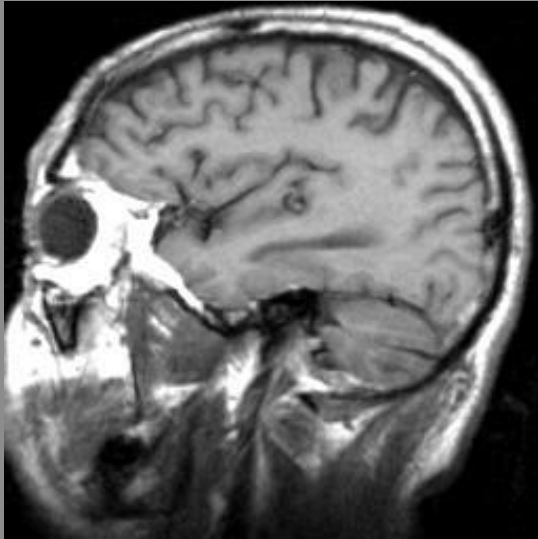
# Cysticercosis

A 55 year-old male, history of eating fresh vegetables, had focal seizure left side of mouth for 3 times 2 days ago.



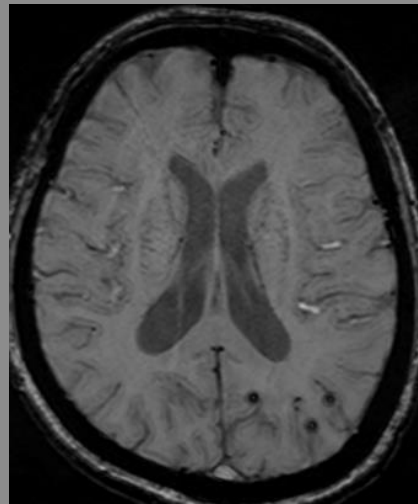
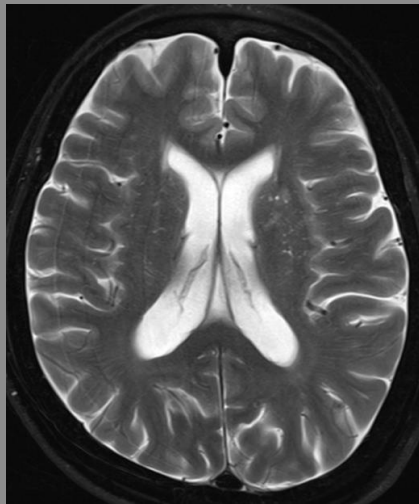
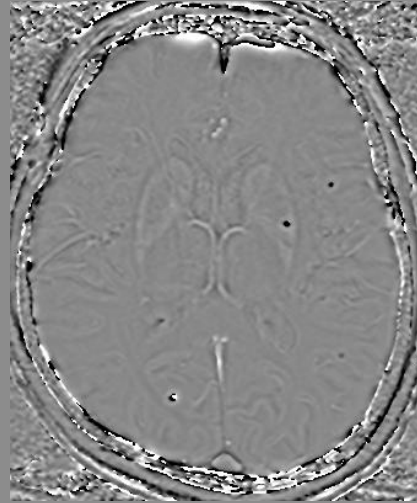
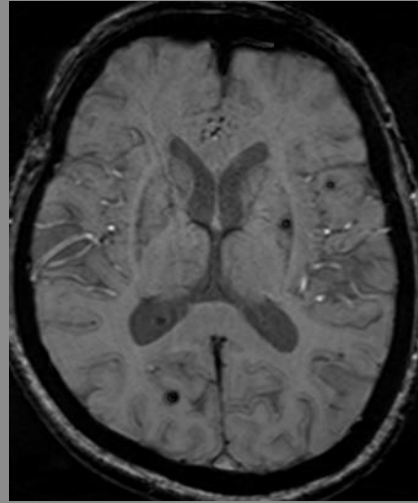
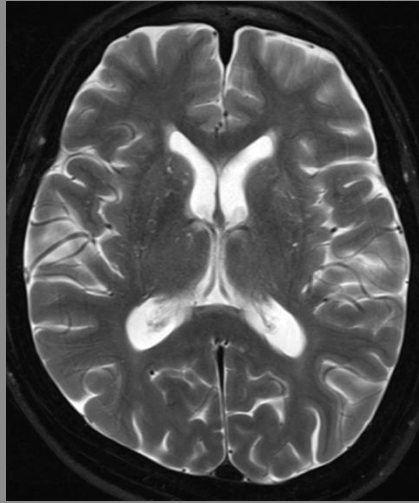
# Cysticercosis

A 55 year-old male, history of eating fresh vegetables, had focal seizure left side of mouth for 3 times 2 days ago.





# \* Calcified Cysticercosis



SWI-SOURCE IMAGE

SWI-PHASE IMAGE



*\*Thank You*