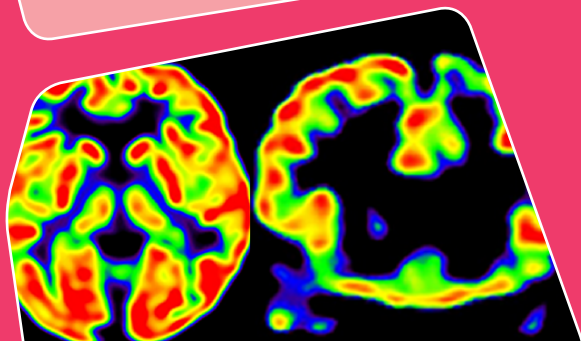
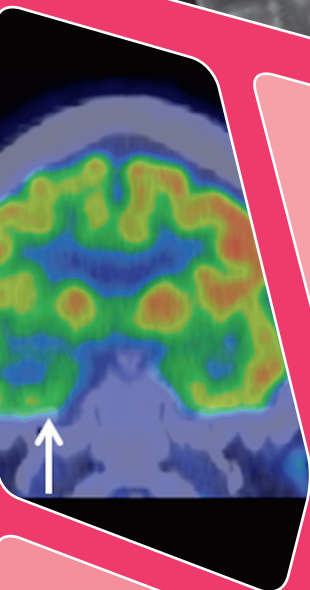
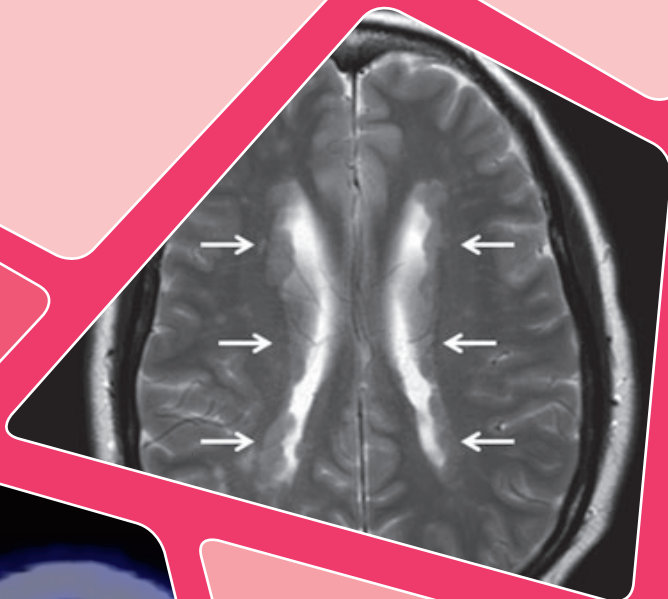


# Atlas of MRI in Epilepsy



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# Atlas of MRI in Epilepsy

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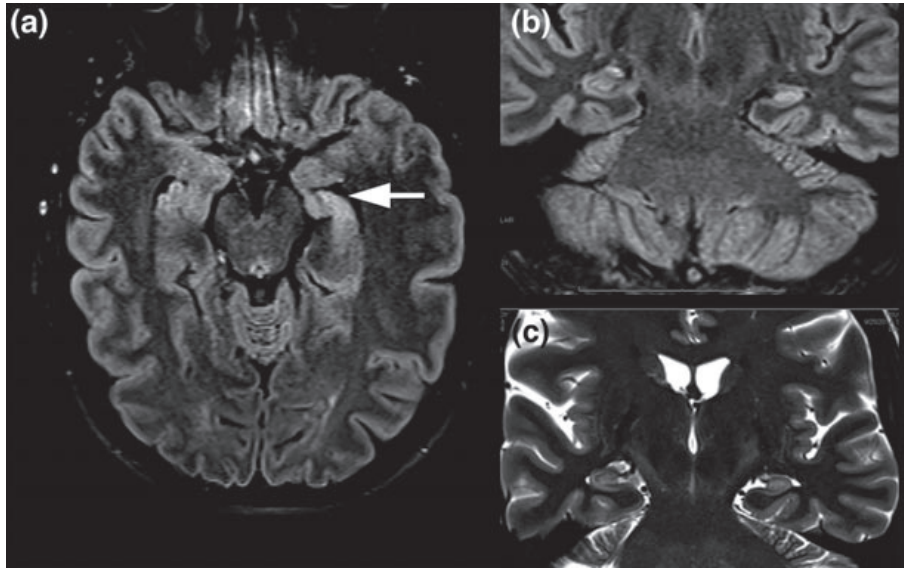
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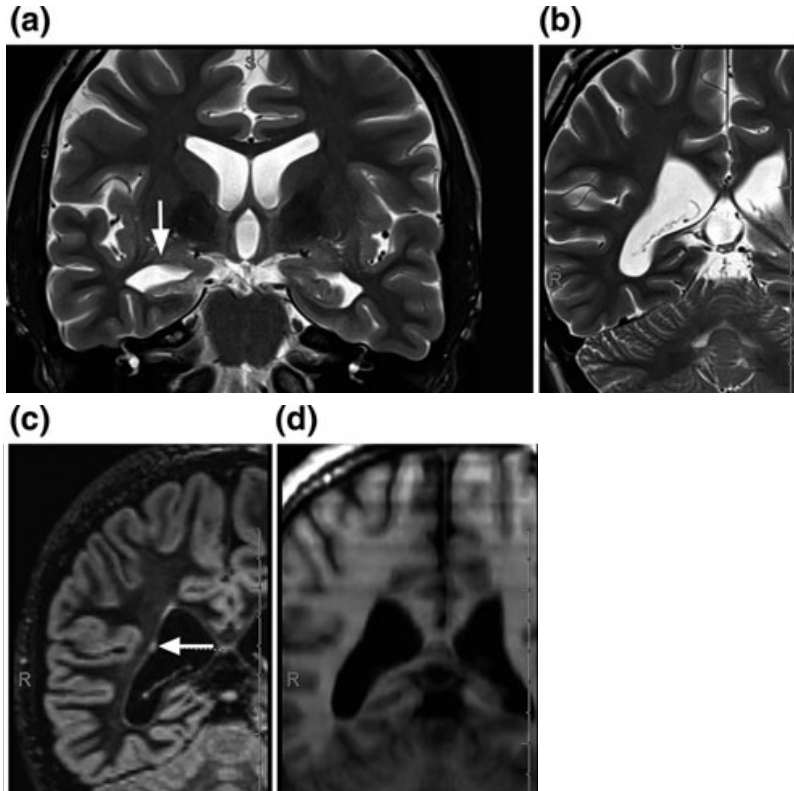


## Axial FLAIR, companion coronal FLAIR and T2-weighted MRI



Axial FLAIR (a) demonstrates enlargement of the left lateral ventricle temporal horn and the left hippocampus is relatively smaller and hyperintense compared to the contralateral side. Note that the lateral aspect of the left hippocampal body is abnormally smooth, and hippocampal head digitations are reduced (*arrow*). Companion coronal FLAIR (b) and T2-weighted MRI (c) demonstrate volume loss, hyperintensity, and subtle laminar blurring. These are classic MRI findings for left hippocampal sclerosis. If the amygdala also is involved, this can be classified as left mesial temporal sclerosis.

## Companion T2 and T1-weighted MRI



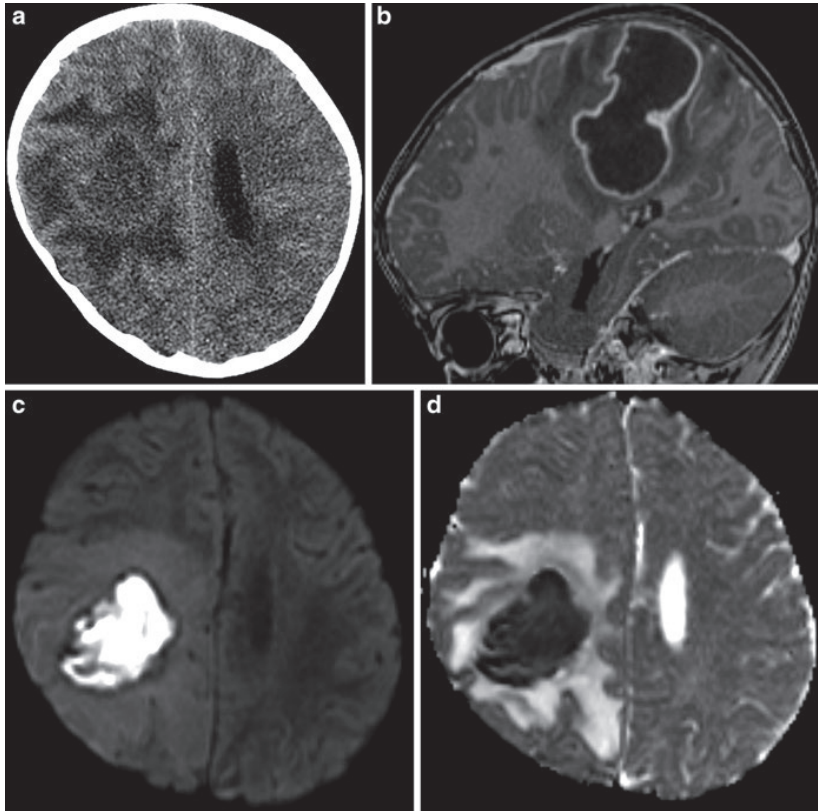
Oblique coronal T2 demonstrates obvious volume loss and laminar blurring of the right hippocampal head (*arrow*, panel **a**) consistent with right hippocampal sclerosis and right fornix atrophy (**b**). There is a small gray matter heterotopia in the lateral wall of the right lateral ventricle, best seen on the coronal double-inversion recovery image (*arrow*, panel **c**) compared to companion T2 and T1-weighted MRI (**b** and **d**).

Authors: Anuradha Singh, Priyanka Sabharwal, Timothy Shephard  
Title: Neuroimaging in epilepsy  
Book: Epilepsy Board Review  
DOI: 10.1007/978-1-4939-6774-2\_21  
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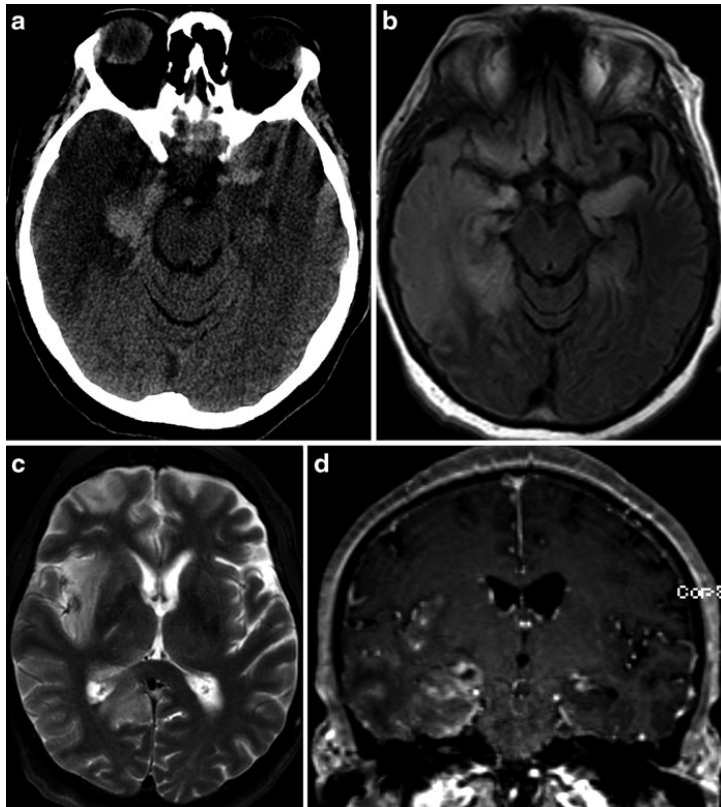
## A 4-year-old boy with focal seizures with a cerebral pyogenic abscess on neuroimaging



Axial noncontrast head CT image (**a**) shows large right hemispheric mass lesion with surrounding hypodensity suggestive of vasogenic edema. Sagittal contrast-enhanced T1-weighted MR image (**b**) shows large rim-enhancing mass lesion. Diffusion-weighted image (**c**) shows high signal intensity of the lesion contents, with corresponding hypointense signal on ADC map (**d**), indicating restricted diffusion from purulent content.

Authors: Diana M. Gomez-Hassan, Aine Marie Kelly, Daniela N. Minecan, Bruno P. Soares  
Title: Seizures in adults and children: evidence-based emergency imaging  
Book: Evidence-Based Emergency Imaging  
DOI: 10.1007/978-3-319-67066-9\_10  
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## A 59-year-old woman with mental status changes, headache, fever, and a seizure

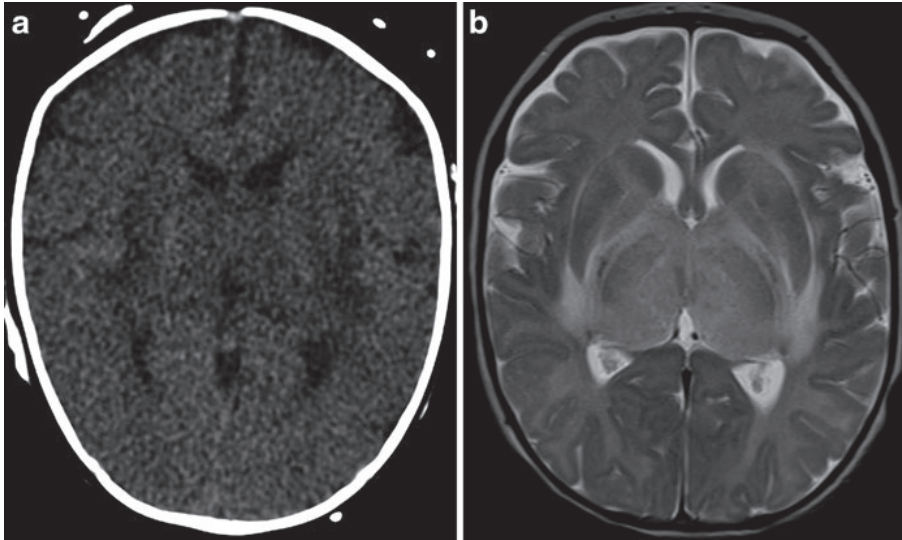


Imaging suggested herpes (HSV1) encephalitis. Axial noncontrast head CT (**a**) shows marked hypodensity of the right temporal lobe and bilateral areas of high density consistent with acute hemorrhage in the bilateral mesial temporal lobes. Axial T2-FLAIR MR image (**b**) shows bilateral asymmetric high signal intensity within the temporal lobes. Axial T2-weighted MR image (**c**) shows additional involvement of the right insula and posterior cingulate gyrus as areas of high signal intensity. Coronal contrast-enhanced T1-weighted image (**d**) shows leptomeningeal and cortical enhancement in the right temporal lobe and insula.

Authors: Diana M. Gomez-Hassan, Aine Marie Kelly, Daniela N. Minecan, Bruno P. Soares  
Title: Seizures in adults and children: evidence-based emergency imaging  
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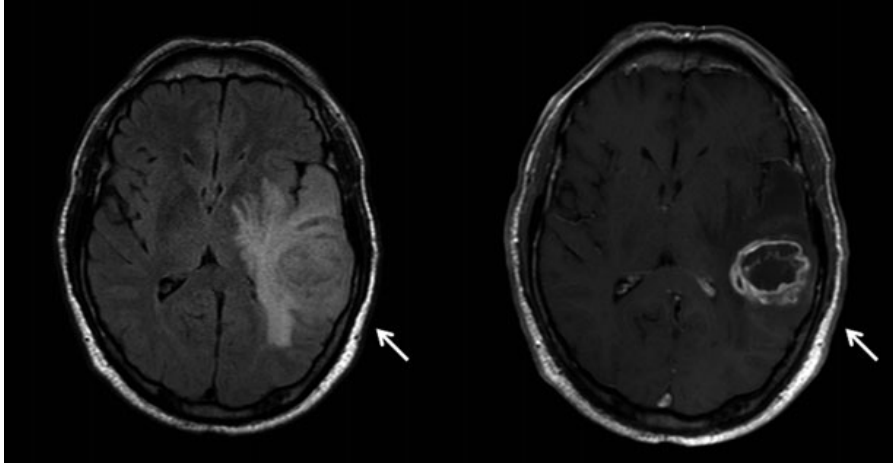


## A 5-week-old girl with lethargy, poor feeding, and seizures



Imaging revealed acute necrotizing encephalitis. Axial noncontrast head CT image **(a)** shows abnormal patchy hypodensity involving the bilateral deep gray nuclei. Axial T2-weighted MR image **(b)** shows abnormal swelling and hyperintense signal of the thalami, basal ganglia, and adjacent white matter tracts.

## Left temporal glioblastoma multiforme

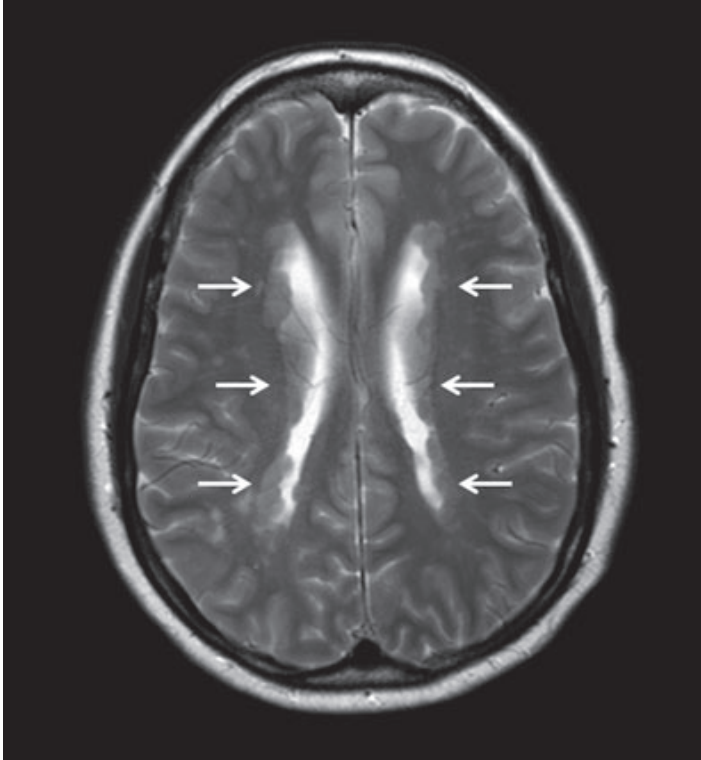


Left temporal glioblastoma multiforme, on T2 FLAIR and T1-contrast MRI. Nearly all dysembryoplastic neuroepithelial tumors will cause seizures, followed by gangliogliomas and low-grade astrocytomas; higher grade or fast-growing tumors (such as glioblastoma multiforme [GBM] or primary CNS lymphoma) do not cause seizures as often. A characteristic GBM is shown in this figure.

Authors: Amar Bhatt  
Title: Epilepsy secondary to specific mechanisms  
Book: Epilepsy Board Review  
DOI: 10.1007/978-1-4939-6774-2\_14  
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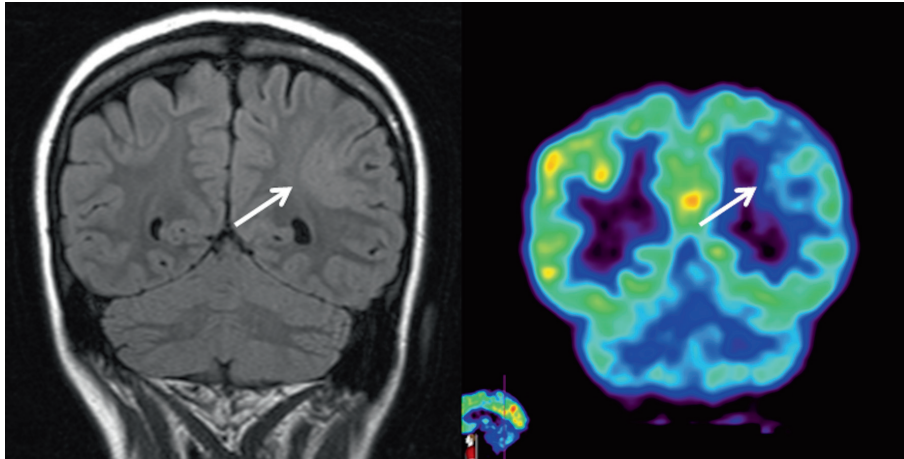
## Bilateral periventricular nodular heterotopia



Bilateral periventricular nodular heterotopia (PVNH), as seen on T2-weighted MRI. PVNH consists of gray matter nodules along the lateral ventricles due to failed neuronal migration, often causing intractable focal seizures.

Authors: Amar Bhatt  
Title: Epilepsy secondary to specific mechanisms  
Book: Epilepsy Board Review  
DOI: 10.1007/978-1-4939-6774-2\_14  
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## Left parietal focal cortical dysplasia, with thickened cortex

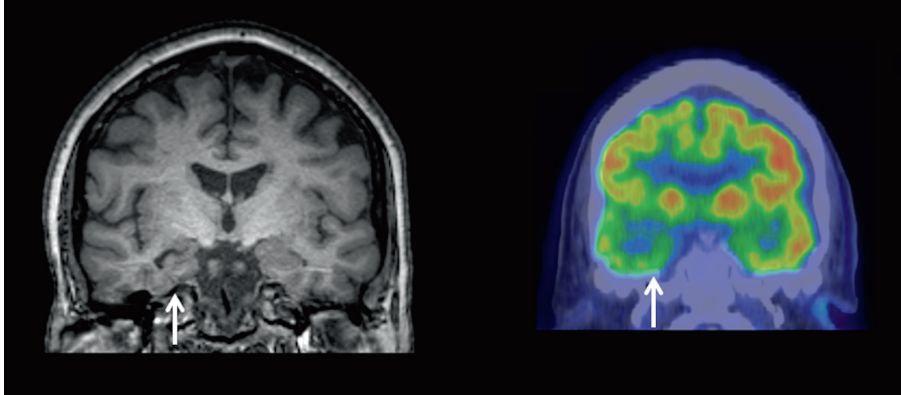


Left parietal focal cortical dysplasia (FCD), with thickened cortex on T2 FLAIR and concordant region of hypometabolism on FDG-PET. FCDs can also cause intractable focal seizures. Typical MRI findings include blurred gray–white junction, thickened cortex, or the transmantle sign (a band of T2 hyperintensity extending radially between the cortex and ventricle).

Authors: Amar Bhatt  
Title: Epilepsy secondary to specific mechanisms  
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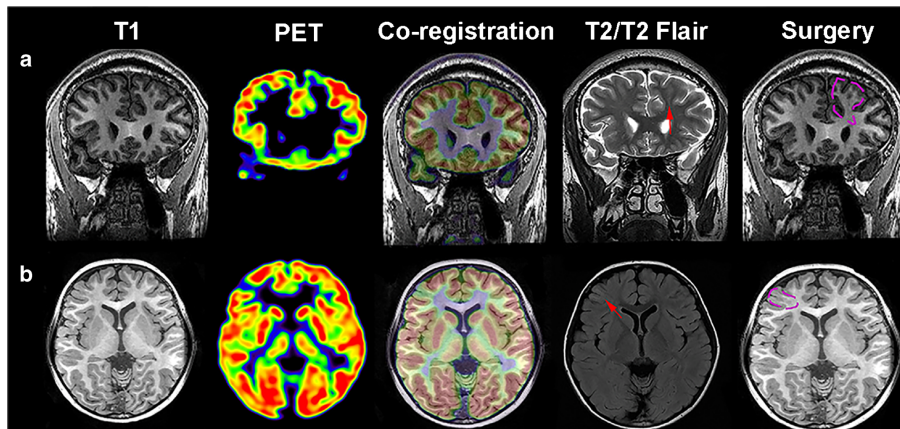


## Right mesial temporal sclerosis, with hippocampal atrophy



Right mesial temporal sclerosis, with hippocampal atrophy on T1-weighted MRI and anterior temporal hypometabolism on FDG-PET. The most common MRI finding in MTS is hippocampal hyperintensity on T2-weighted sequences (e.g., FLAIR). However, this is not very reliable. Hippocampal atrophy is the most specific finding, usually noted on T1-weighted, thin cut imaging.

## Refractory focal epilepsy



- (a) A 22-year-old male with refractory focal epilepsy for 2 years. Co-registration detected a missing transmantle in the left superior frontal gyrus. The patient was classified as Change-1. The patient underwent resective surgery and pathology confirmed FCD type II.
- (b) A 4-year-old girl with refractory focal epilepsy for 2 years. Co-registration confirmed a lesion located in the right middle frontal gyrus which was considered as a nonspecific abnormality in the first MRI reading (Change-2). She was recommended for resective surgery, and pathological findings confirmed FCD type II.

Authors: Yao Ding, Yuankai Zhu, Biao Jiang, *et al.*

Title:  $^{18}\text{F}$ -FDG PET and high-resolution MRI co-registration for pre-surgical evaluation of patients with conventional MRI-negative refractory extra-temporal lobe epilepsy

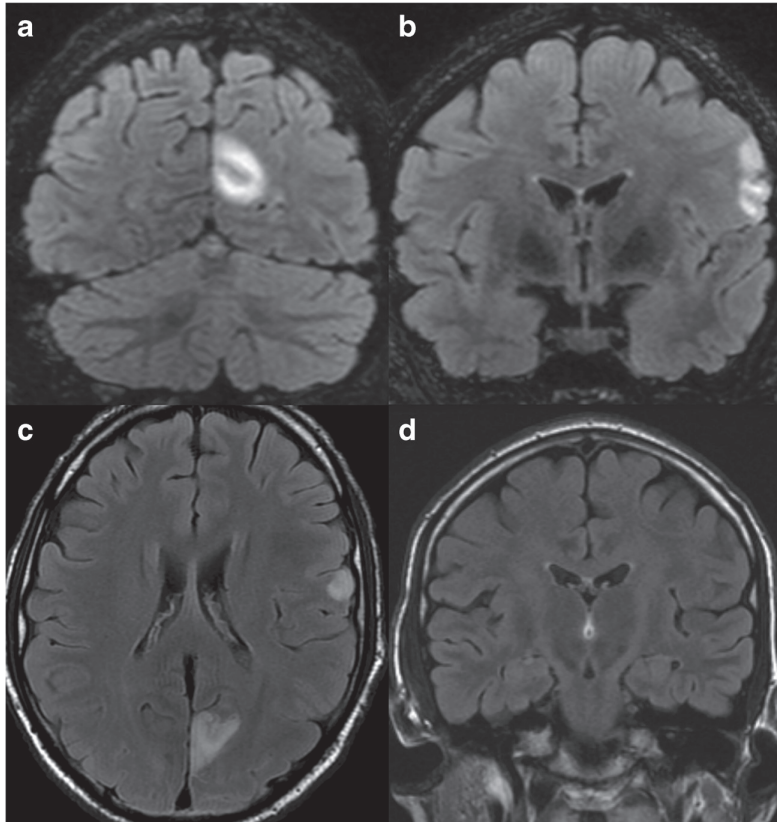
Journal: *Eur J Nucl Med Mol Imaging*

DOI: 10.1007/s00259-018-4017-0

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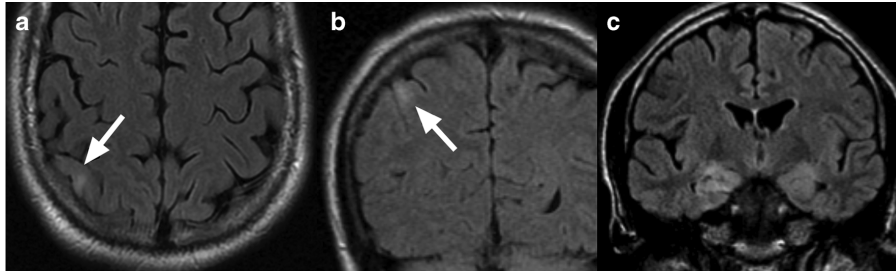
## Hyperintensities in the left frontal, parietal and occipital lobes



Coronal (**a**, **b**, **d**) and axial T2/FLAIR (**c**) images obtained in a 20-year-old male (patient 19) with serum GAD65 level of 54 nmol/L demonstrate multiple cortical/subcortical T2 hyperintensities in the left frontal, parietal, and occipital lobes. There is mild diffuse cerebral parenchymal atrophy with relative preservation of cerebellar parenchymal volume (**a**) and normal appearance of the hippocampal formations (**d**).

Authors: Jason R. Fredriksen, Carrie M. Carr, Kelly K. Koeller, *et al.*  
Title: MRI findings in glutamic acid decarboxylase associated autoimmune epilepsy  
Journal: *Neuroradiology*  
DOI: 10.1007/s00234-018-1976-6  
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## Focal hyperintensity in the right parietal lobe



MRI in a 33-year-old male (patient 8) with serum GAD65 level of 175 nmol/L. Axial (a) and coronal (b, c) T2/FLAIR images demonstrate a focal area of cortical/subcortical parenchymal hyperintensity in the right parietal lobe (*white arrows*). Abnormal hyperintensity is also present in the hippocampal formations bilaterally (c).

Authors: Jason R. Fredriksen, Carrie M. Carr, Kelly K. Koeller, *et al.*  
Title: MRI findings in glutamic acid decarboxylase associated autoimmune epilepsy  
Journal: *Neuroradiology*  
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