

# Ictal PET in presurgical workup of refractory extratemporal epilepsy

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## Abstract

Ictal PET in presurgical workup of refractory epilepsy is seldom performed and limited due to technical difficulties. In carefully selected patient subset with frequent extratemporal seizures, ictal PET depicts 'seizure onset zone' with high spatial resolution even within a widespread pathology. We here depict a four year old with posterior quadrant dysplasia evaluated with ictal PET.

## Key Words

Epilepsy, Ictal PET, presurgical workup, refractory

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## Introduction

Ictal PET studies are limited by several technical difficulties but tend to have high spatial resolution and utility in a selected patient subset. We here report a case with refractory epilepsy evaluated by ictal PET.

## Case

A 4-year-girl was evaluated for medically refractory daily seizures of 2 years duration. Seizures started with ocular deviation to left with nystagmoid eye movements, followed by brief posturing of both limbs, kicking movements of the legs and restlessness lasting less than a minute. She was on five antiepileptic medications at evaluation. Examination was normal except for doubtful right hemifield visual deficit.

Magnetic resonance imaging (MRI) showed right posterior

quadrant dysplasia [Figure 1]. Video-EEG showed right posterior head region slowing and interictal epileptiform discharges with typical complex partial seizures arising from the right posterior head regions [Figure 2, see video]. Planned ictal positron emission tomography (PET) showed increased ictal metabolism in the right lateral parietal-occipital region [Figure 3]. She underwent right posterior quadrant disconnection to remain seizure free at 2 year follow-up.

## Discussion

FDG-PET is a standard non-invasive tool in presurgical refractory epilepsy evaluation with high spatial resolution

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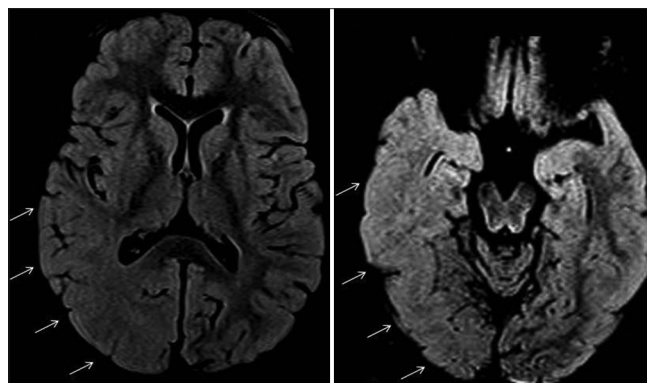
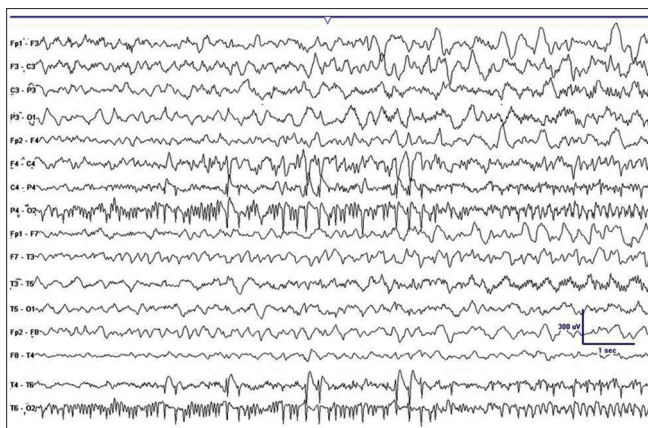
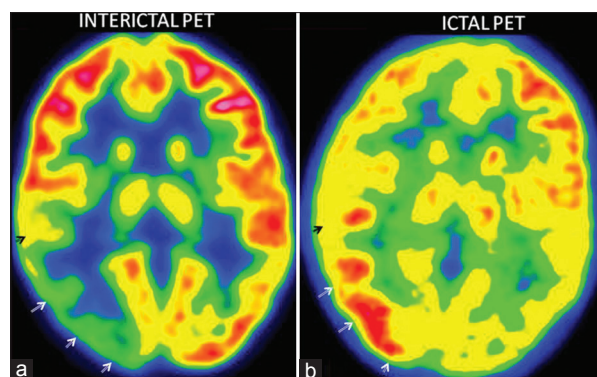


Figure 1: MRI brain (1.5T-FLAIR sequence) showing right parietal-temporal-occipital dysplasia with poor gray white differentiation (arrows)



**Figure 2:** EEG during one of the complex partial seizure during video-EEG (bipolar anterior to posterior montage) showing right-occipital 15 hz rhythm evolving to 5-7 hz theta activity over the right posterior head region at seizure onset

than ictal SPECT.<sup>[1]</sup> Commonly, interictal PET is performed due to short 110-minute FDG ligand half-life. PET abnormalities are dynamic and variable. Interictal PET may show widespread hypometabolism than the 'ictal onset zone'. This can be accurately clarified with ictal PET in selective patients with high seizure frequency more so in extratemporal epilepsies.<sup>[2]</sup> In patients with widespread or large area of MRI abnormality, ictal PET or ictal SPECT help localize 'seizure onset zone' within this abnormality that help planning invasive recordings, surgical resection, and prognosticate seizure outcomes after surgery. PET imaging is considered integral of the pediatric refractory epilepsy presurgical workup.<sup>[3]</sup>



**Figure 3:** PET imaging showing right temporo-parietal interictal hypometabolism (a) that during seizure demonstrates hypermetabolism (b). Note the mildly increased metabolism in bilateral thalamus and basal ganglia with widespread hypometabolism diffusely in the ictal PET

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