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Introduction

Positron emission tomography (PET) with ^{18}F -fluorodeoxyglucose (FDG) displays patterns of regional cerebral metabolic rate for glucose (rCMRglc). Two FDG-PET scans were performed on a case of epilepsy with electrical status epilepticus during slow sleep (ESES) at inter-ictal and ictal stages.

Case Report

A 6-year-old girl was hospitalized for treatment of seizures. Her pregnancy and birth were normal. Psychomotor development was apparently normal until her first seizure occurred at 2 1/4 years. She was treated by phenobarbital. At 5 1/2 years, focal motor seizures of left arm preceded by twitchings of both eye-lids developed and did not respond to most of anticonvulsant drugs. She became mute, poor at figures and developed various behavioral problems such as loss of contact with surroundings, restlessness, and a short attention span. The routine EEG study revealed focal spikes in the right mid-temporal area as well as continuous, diffuse spike-and-wave discharges. All-night EEG demonstrated that the spike-and-wave index was 50-70 %. Rectal administration of diazepam was effective for the seizures, and the continuous discharges were completely disappeared. However 2 months later, the partial seizures recurred and the ESES reappeared. The PET scans were performed twice when the seizures were controlled and when the ESES existed. CT scan was normal, and her intelligence quotient (Tanaka-Binet) before and after ESES were 81 and 79, respectively (Fig. 1).

The PET images were obtained using FDG by an ECAT II (Ortec) with a full-width-half-maximum spatial resolution of 17 mm. Mean rCMRglc of unaffected regions in six age-matched patients of partial epilepsy was used for control values.

Results

Figure 2 shows the images of PET with FDG and X-ray CT in this case. In the right temporal region, hypometabolism was observed on inter-ictal PET scan, whereas hypermetabolism on ictal PET scan. X-ray CT demonstrated no asymmetry. Mean rCMRglc during inter-ictal and ictal stages were 6.2 and 9.8 mg/100 g/min, respectively. At inter-ictal stage, rCMRglc of six different areas in the grey matter were almost 70 % of control values (Fig. 3).

Discussion

In generalized seizures, rCMRglc patterns were normal and identical for ictal and inter-ictal scans, although 2.5-3.5-fold diffuse ictal increase in global rCMRglc was evident.¹⁾ PET scans of partial epilepsy demonstrated focal hypometabolism in almost same area of epileptic focus on EEG during inter-ictal stage, and ictal rCMRglc increased in just previously hypometabolic area.²⁾ Iinuma et al. described that inter-ictal PET scans of Lennox-Gastaut Syndrome showed focal hypometabolism in temporal region and reduced average rCMRglc.³⁾

Pattern of PET scan of this case resembled with partial epilepsies, and since ictal scan showed diffuse 1.6-fold increase in mean rCMRglc, the glucose metabolism of this case also had some features of generalized epilepsy. It can be considered that these findings of PET agree with her EEG character which represents focal discharges in the right temporal region and diffuse spike-waves.

Tassinari et al. pointed out that ESES were classified into two groups, one with a normal psychomotor development prior to the occurrence of ESES and the other with a slight psychomotor retardation. In the latter case, the level of mental activity was almost same before and during ESES, but psychiatric disturbances were considerably improved in inter-ictal stages.⁴⁾ Slightly lowered mean inter-ictal rCMRglc may correspond to her subnormal IQ.

References

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CASE HISTORY

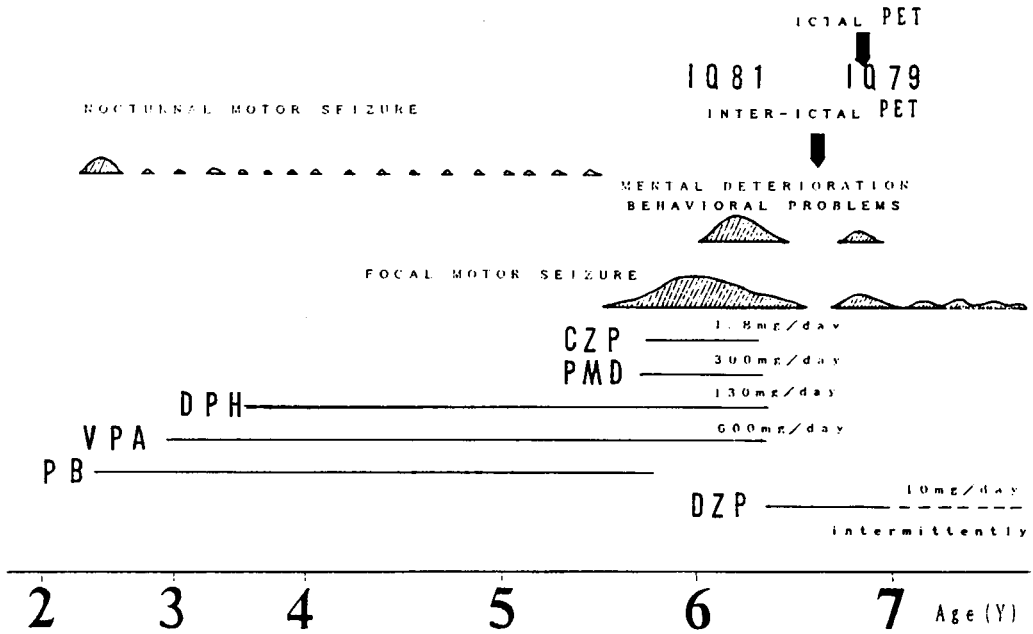


Fig. 1. Clinical course of our case.

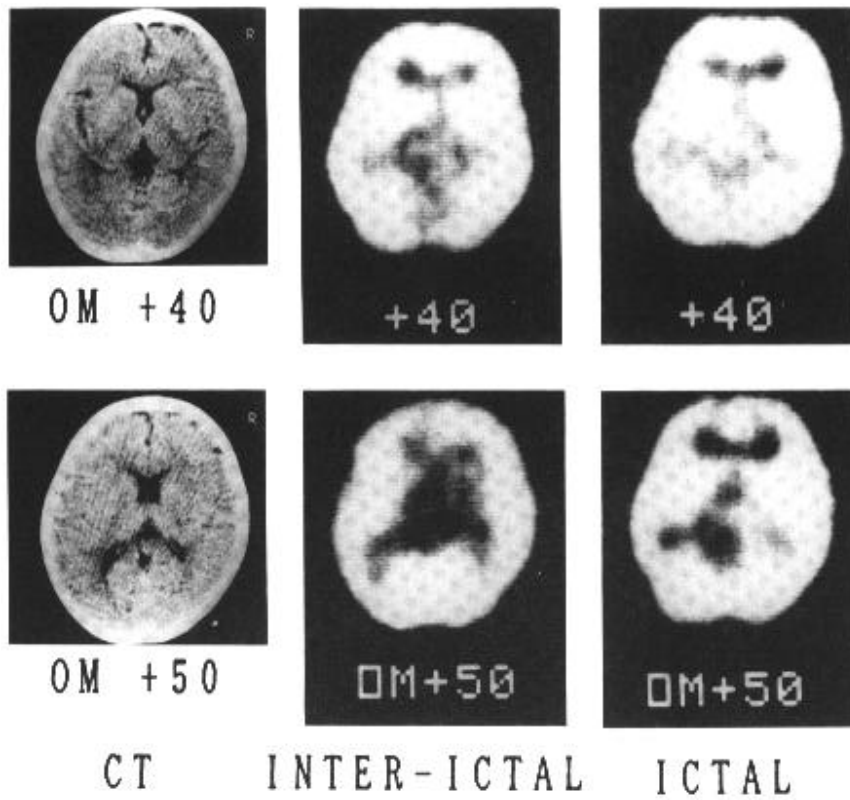


Fig. 2. The images of PET with FDG and X-ray CT at inter-ictal and ictal stages of ESES on the level of Om +40 and +50.

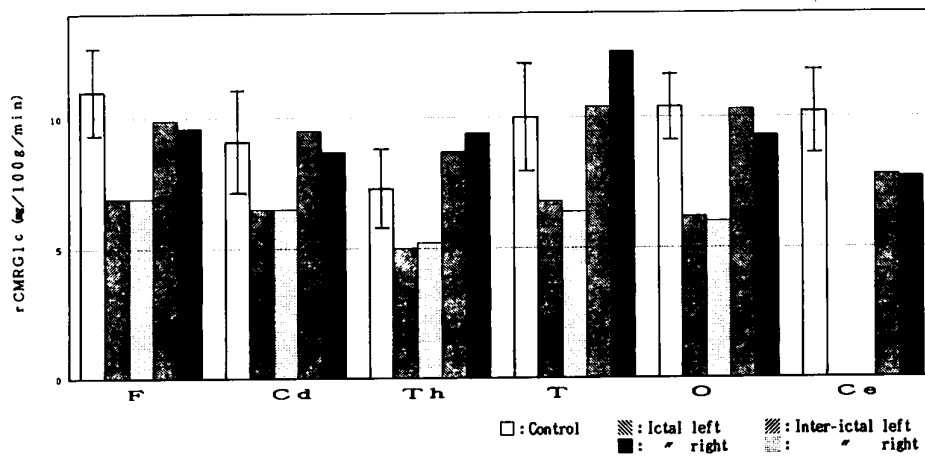


Fig. 3. Regional cerebral metabolic rate for glucose in our patient and six age-matched controls. The rCMRglc was expressed by mg/100 g brain tissue per min. F, frontal; T, temporal; O, occipital cortex; Cd, caudate nuclei; Th, thalamic area; Ce, cerebellum. Error bars represent 1 SD.