

# PEDIATRIC NEUROLOGY BRIEFS

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## ATTENTION DEFICIT AND COGNITIVE DISORDERS

### **EPILEPTIFORM EEGs AND ATTENTION DEFICIT DISORDER**

The electroencephalograms (EEGs) of 176 children with attention deficit-hyperactivity disorder (ADHD) were analyzed at the University of Illinois, Chicago. Patients with a history of clinical seizures were excluded. Definite noncontroversial epileptiform activity was present in 30.1%. Epileptiform spike discharges were focal in 24% (mainly occipital or temporal), and generalized spike and wave in 6%. Normal records were found in a total of 47%; these were read as completely normal in 28%, and an additional 19% had positive spikes as the only finding, sometimes classified as a normal variant. All records were interpreted by the senior author (JRH). Some type of spike activity, including the group with positive spikes, was found in 69% (spike group), while 31% had no spikes in the EEGs (control group). Focal slow waves were reported in 11%, mainly in frontal and temporal areas, and usually in the records with spike activity. There were no differences between the spike and control groups with respect to family history of epilepsy, perinatal problems, head injury, and response to stimulant drugs. (Hughes JR, DeLeo AJ, Melyn MA. The electroencephalogram in attention deficit-hyperactivity disorder: emphasis on epileptiform discharges. *Epilepsy & Behavior* August 2000;1:271-277). (Respond: Dr John R Hughes, Department of Neurology, University of Illinois Medical Center M/C 796, 912 South Wood Street, Chicago, IL 60612).

**COMMENT.** The importance of the EEG in the evaluation of children with ADHD is frequently neglected, as for example, in a recent NIH consensus report (see *Ped Neur Briefs* Feb 2000;14:15). The article by Dr. John Hughes and associates draws attention to the relevance of the EEG to ADHD. The frequency of "non-controversial" epileptiform activity (30.1%) among their patients was particularly striking, when compared to some previous studies.

In 100 consecutive hyperactive children diagnosed with minimal brain dysfunction syndrome (now called ADHD) and first reported in 1977, I found the frequency of non-controversial epileptiform dysrhythmias to be 7%, while 19% had moderately abnormal dysrhythmias, not diagnostic of epilepsy, a total of 26%

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abnormal records (Millichap JG. *Attention Deficit Hyperactivity and Learning Disorders. Questions & Answers*. Chicago, PNB Publ, 1998). Oettinger F also reported a 7% incidence of "very specific" EEG abnormalities, compatible with a susceptibility to generalized or partial epilepsies, findings that altered his traditional approach to treatment of ADHD with stimulants (In: *Learning Disabilities and Related Disorders*. Ed. Millichap JG, Chicago, Year Book Med Publ, 1977). The difference in incidence of "epileptiform" records in my study compared to that of Dr Hughes and associates may be more apparent than real, and merely a matter of interpretation. In this regard, I defer to the experience and opinion of Dr Hughes. In any event, these figures are indicative of a need to consider specific indications to obtain an EEG in patients presenting with symptoms of ADHD.

**Indications for an EEG in ADHD** may include the following:

- 1) a personal or close family history of seizures;
- 2) inattentive episodes characterized by excessive "daydreaming" and/or periodic confused states;
- 3) comorbid episodic, unprovoked temper or rage attacks;
- 4) frequently recurrent headaches;
- 5) a history of head trauma, encephalitis or meningitis preceding the onset of ADHD;
- 6) abnormalities on neurologic examination indicative of brain damage or defect.

An ambulatory or video-EEG may be necessary to evaluate the significance of some reported paroxysmal symptoms, a question that I refer to my colleagues, Drs Nordli and Kelly, at our Epilepsy Center.

**When to treat with AEDs.** Treatment with antiepileptic drugs (AEDs) in ADHD patients with an epileptiform EEG, but without definite seizures, is a difficult and controversial decision. Indications to treat may include one or more of the following: 1) recurrent, clinically recognized seizures; 2) frequent episodic symptoms, suggestive of seizures, not amenable to behavioral intervention; 3) treatment with stimulant and antidepressant drugs in doses known to lower the threshold to seizures. The potential toxicity, adverse effects on learning, and need for frequent monitoring of AEDs must be weighed against the possible benefits in children with ADHD.

## **TRANSITORY COGNITIVE DEFICIT WITH EPILEPSY PAROXYSM**

The EEGs and cognitive responses during a go-no go Continuous Performance Test (CPT) were studied in two groups of 58 epileptic and 20 healthy control children, ages 8 to 12 years, at the Hospital Civil de Guadalajara, Mexico. Paroxysmal discharges occurred in 88% of the epileptic compared to 5% of the control group. Transitory cognitive impairments (TCI) with higher numbers of behavioral errors and longer reaction times were detected in 36% of the epilepsy patients, in the absence of clinical seizures. TCI was correlated with the frequency and duration of paroxysmal discharges, occurring with discharges at more than 5 per second and lasting longer than 500 ms. (Gonzalez-Garrido AA, Oropeza de Alba JL, Gomez-Velazquez FR et al. Transitory cognitive impairment in epileptic children during a CPT task. *Clin Electroencephalogr* October 2000;31:175-180). (Reprints: Dr AA Gonzalez-Garrido, Hospital Civil de Guadalajara, Hospital 270, Col El Retiro, Torre de Especialidades, 8vo Piso, Guadalajara, Jalisco, CP 44280, Mexico).

**COMMENT.** The epileptic paroxysm, even without clinical seizure, can be associated with transitory cognitive impairment. Treatment of epilepsy may need to focus on control of EEG epileptiform discharges in addition to control of seizures.