

COMBINED EPILEPSY/ADHD AND WORKING MEMORY

Researchers at University Children's Hospital Basel, and other centers in Switzerland, Norway, and Germany studied behavioral differences in working memory performance, response to methylphenidate, and functional brain organization in 17 boys with combined epilepsy/ADHD, 15 boys with developmental ADHD, and 15 healthy controls (aged 8-14 years). Boys with epilepsy-associated ADHD and those with ADHD without epilepsy both performed poorly on psychological tests with high cognitive load when compared to healthy controls. Methylphenidate improved cognitive performance almost to normal levels in both ADHD groups. Functional MRI showed similar reductions of activation in both ADHD groups, using working memory tasks. Boys with epilepsy/ADHD and ADHD without epilepsy recruited less cortical regions involved with working memory. ADHD with or without epilepsy show a common aberrant network of working memory. Following intake of methylphenidate, working memory was improved without alteration in the functional MRI. Seizures or administration of antiepileptic drugs in the epilepsy/ADHD group were not considered a cause of the working memory deficits. (Bechtel N, Kobel M, Penner I-K, et al. Attention-deficit/hyperactivity disorder in childhood epilepsy: a neuropsychological and functional imaging study. **Epilepsia** February 2012;53(2):325-333). (Respond: Dr Nina Bechtel, University Children's Hospital Basel, Spitalstrasse 33, 4056 Basel, Switzerland. E-mail: nina.bechteln@unibas.ch).

COMMENT. The authors conclude and confirm reports that ADHD with and without epilepsy represent epiphenomena of a common underlying functional and neurobehavioral pathophysiology, and that methylphenidate shows equivalent efficacy in both patient groups. Approximately 20% children with epilepsy have ADHD (Gross-Tsur V, et al. **J Pediatr** 1997;130:670-674), and ~25% of children with ADHD have epileptiform, sleep-deprived EEGs (Millichap JJ, Stack CV, et al. **J Child Neurol** 2011;26(1):6-11).

A longitudinal follow-up study correlating clinical, neuropsychological, and EEG features with AED therapy reveals a temporal relation between subclinical epileptiform discharges, cognitive dysfunction, and effectiveness of AEDs on ADHD and EEG discharges (Laporte N, et al. Cognitive epilepsy: ADHD related to focal EEG discharges. **Pediatr Neurol** 2002;27:307-311). The authors' recommendation of AEDs in children with ADHD and abnormal EEG remains controversial and not generally accepted in practice. However, more recent studies confirm the reversal of transient cognitive impairment (TCI) with epileptiform EEG in children with ADHD without clinical seizures. (Schubert R. **Pediatr Neurol** 2005;32:1-10) (Mintz M, et al. **J Child Neurol** 2009;24(7):807-815). The doctrine or admonition, "Treat the patient's seizures and not the EEG," may require modification.

RELATION OF COGNITIVE PROFICIENCY TO EPILEPSY FOCUS

Investigators at Children's Memorial Hospital/Northwestern University School of Medicine Epilepsy Center, Chicago, and Kangbuk Samsung Hospital, Seoul, Korea examined the relationship of cognitive proficiency (CP) to general intellectual ability

(GA) and seizure focus by retrospective chart review of 90 children (aged 6-18 years) with epilepsy, video-EEG recording, MRI, and neuropsychological testing (WISC-IV). Cognitive Proficiency Index (CPI) scores based on the WISC-IV Working Memory (WM) and Processing Speed (PS) indices were significantly lower than the General Ability Index (GAI) scores, comprising the WISC-IV Verbal Comprehension (VC) and Perceptual Reasoning (PR) indices. GAI>CPI differences were significantly greater in the right than left lateralized seizure group and also greater for the frontal than temporal group. CP was selectively compromised in those with seizures lateralized to the right hemisphere or localized to the frontal lobe. Right lateralization and frontal localization independently impact CP. GAI>CPI differences were significantly greater in the right-lateralized group than the generalized group and in the frontal-localized group than the generalized group. Deficits in CP are a defining neurocognitive characteristic of pediatric epilepsy in individuals with both focal and generalized onset, but especially when seizures originate from a primary epileptogenic focus within the right hemisphere or the frontal lobe. (Gottlieb L, Zelko FA, Kim DS, Nordli DR Jnr. Cognitive proficiency in pediatric epilepsy. *Epilepsy Behav* 2012;23:146-151). (Respond: Dr Frank A Zelko, Children's Memorial Hospital, #10, 2300 Children's Plaza, Chicago, IL 60614. E-mail: fzelko@childrensmemorial.org).

COMMENT. Children with epilepsy lateralized to the right hemisphere or localized to the right frontal lobe are at increased risk of cognitive deficits involving working memory and processing speed. Working memory maintains short-term information, and processing speed determines the amount of information that can be used and accommodated in working memory. Cognitive proficiency contributes to cognitive aptitude in learning and problem solving. A general availability of psychological services should add to the proficiency of epilepsy management in the clinic.

SHARED GENETIC BASIS OF EPILEPSY AND BEHAVIOR DISORDERS

Researchers from Columbia University, New York; UCLA; Northern Illinois University, DeKalb, IL; and Northwestern Children's Memorial Hospital, Chicago have examined whether the first-degree family history of unprovoked seizures in 308 probands with childhood onset epilepsy is associated with behavioral disorders. The association was assessed separately in uncomplicated and complicated epilepsy and for febrile seizures. Median age at onset was 4.2 years, and age at time of 9-year interview was 13.5 years. Epilepsy was uncomplicated in 213 (69.2%) and complicated in 95 (30.8%). Family history of unprovoked seizure was present in 24 probands with uncomplicated epilepsy (11.3%) and 9 probands with complicated epilepsy (9.5%). Family history of febrile seizures was present in 21 probands with uncomplicated (9.9%) and in 8 with complicated epilepsy (8.4%).

In probands with uncomplicated epilepsy, first-degree family history of unprovoked seizure was significantly associated with internalizing disorders, withdrawn/depressed, affective and anxiety disorders, aggressive and delinquent behavior, conduct disorder and oppositional defiant disorder. In probands with complicated epilepsy, family history of unprovoked seizure and behavioral problems