

## ATTENTION DEFICIT DISORDERS

### **FRONTAL BRAIN EEG ACTIVATION IN ADHD**

Electroencephalographic (EEG) activity of 117 unmedicated children (66 aged 4 years, 51 aged 8 years) with attention deficit/hyperactivity disorder (ADHD) was analyzed at the Department of Child and Adolescent Psychiatry and Psychotherapy, Central Institute of Mental Health, Mannheim, Germany. Boys with ADHD had reduced right frontal brain activity, compared to controls. These differences were specific to the frontal regions, and were not observed in central and occipital EEG patterns. Girls with ADHD had increased right-lateralized frontal activation patterns compared to normal control girls; the asymmetry was opposite to that found in boys with ADHD. Both 4 and 8-year-old children showed these changes. Children with ADHD and comorbid oppositional defiant disorder showed similar EEG changes to those with ADHD alone. This EEG baseline activity reflecting functional changes in the frontal areas correlates with previously reported MRI changes in ADHD. (Baving L, Laught M, Schmidt MH. Atypical frontal brain activation in ADHD: Preschool and elementary school boys and girls. J Am Acad Child Adolesc Psychiatry Nov 1999;38:1363-1371). (Reprints: Dr Baving, Central Institute of Mental Health, Department of Child and Adolescent Psychiatry and Psychotherapy, PO Box 12 21 20, 68072 Mannheim, Germany).

COMMENT. Boys with ADHD have a right frontal lobe deficit, as determined by EEG laterality scores (alpha-1 8-10 Hz), whereas girls with ADHD show the opposite activation pattern, with enhanced left frontal alpha power, corresponding to a left frontal deficit. These changes in frontal brain activation in ADHD may indicate a disorder in the development of regulation of behavior and attention, stemming from a deficit in behavioral inhibition.

Quantitative MRI studies at the National Institutes of Health, Bethesda, MD, and other centers have demonstrated decreased volume of the prefrontal cortex, caudate nucleus, and globus pallidus on the right side of the brain of ADHD boys, pointing to a dysfunction of right-sided prefrontal-striatal systems (see Progress in Pediatric Neurology III, PNB Publ, 1997;pp212-213).

These studies emphasize the neurologic basis for ADHD, as distinct from a purely psychiatric disorder, a concept emphasized by Gordon M in a recent review article (Attention deficit hyperactivity disorder: diagnosis and management in the USA. JR Soc Med Sept 1999;92:453-455). The author correctly emphasizes that the diagnosis and treatment of ADHD should be reserved for patients with evidence of functional impairment. He cautions against the use of the overall IQ as a measure of the expected level of performance and academic achievement in school. Rather, the ADHD diagnosis should be reserved for significant disabilities relative to the general population, a viewpoint that may be questioned by many authorities.

### **ADHD-RELATED RISK FACTORS FOR EARLY DRUG USE**

The risk of early drug use associated with ADHD was evaluated in a community-based sample of 717 (412 low birth weight, 305 normal birth weight) children examined at 6 years of age and at follow-up at age 11 years, at the Department of Psychiatry, Henry Ford Health Sciences Center, Detroit, MI. Of 137 (19%) who had used drugs at least once, 10.6% had used tobacco, 10.1% alcohol, 3.8% inhalants, and only 7 children had used marijuana. Independent of low or normal birth weight, ADHD at age 6 years increased the odds of drug use to 1.7