

Paediatrics, University of Munster, Germany (Weglage J et al. Eur J Pediatr March 1996;155:200-204). These attention deficits probably resulted from impairment of frontal lobe function and could probably be avoided by a stricter dietary control of the PKU. Phenylalanine inhibits the synthesis of dopamine and serotonin as well as the uptake of tyrosine and tryptophan.

### **INFRARED MOTION ANALYSIS OF HYPERACTIVE CHILDREN**

Movement patterns of 18 boys with ADHD and 11 normal controls were recorded using an infrared video and motion analysis system during a continuous performance task (CPT) at the Department of Psychiatry, Harvard Medical School, Boston, and the McLean Hospital, Belmont, MA. Compared to controls, subjects with ADHD moved their extremities and head more than twice as often, they covered a 3.4-fold greater distance and a 4-fold greater area. Whole body movements were also 3 to 4 times more frequent and covered a greater distance. Their responses on the CPT were slower and more variable. The less complex and more linear movement patterns of ADHD children correlated with teacher ratings of overactivity-inattention. (Teicher MH et al. Objective measurement of hyperactivity and attentional problems in ADHD. J Am Acad Child Adolesc Psychiatry March 1996;35:334-342). (Reprints: Dr Teicher, McLean Hospital, 115 Mill Street, Belmont, MA 02178).

COMMENT. In addition to the infrared motion analysis of overactivity in ADHD children, the authors used a wristwatch sized "actigraph" worn on a belt to measure activity levels (results to be published separately). Previous publications describing similar objective measurements of hyperactivity were apparently overlooked.

Schulman JL and Reisman JM, at Children's Memorial Hospital, Chicago, devised an "actometer," an automatically winding calendar wristwatch with the pendulum connected directly to the hands of the watch, to measure movements of the arms and legs (Amer J Ment Defic 1959;64:455).

Millichap JG et al, also at Children's Memorial and Northwestern Univ Med School, employed the actometer to demonstrate significant lessening of overactivity in hyperactive children treated with methylphenidate (Am J Dis Child 1968;116:235). The "actometer" was worn on the wrist of the nondominant arm during neuropsychological test periods, and activity was measured in units of hours and minutes. The effect of methylphenidate was related to the level of motor activity before treatment; the more active patients were benefited the most by stimulant medication. This simple objective measure of motor activity could be of value, not only in experimental situations but also, in confirming the diagnosis of ADHD when parent and teacher impressions are in disagreement.

### **DSM-III-R of DSM-IV DIAGNOSTIC CRITERIA FOR ADHD**

Teacher-reported prevalence rates for attention-deficit hyperactivity disorder (ADHD) using DSM-IV and DSM-III-R criteria were compared in a middle Tennessee county during the 1993-94 academic year and analysed by subtypes at Vanderbilt University, Nashville, TN. Rating scales for 8258 children were completed by 398 teachers. Prevalence rates were 7.3% for ADHD using DSM-III-R diagnostic criteria; 5.4% for ADHD, inattentive type (AD); 2.4% for hyperactive-impulsive type (HI); and 3.6% for combined type (CT) using DSM-IV criteria. Boys outnumbered girls with a 4:1 ratio for ADHD-HI and 2:1 for ADHD-AD. The number of children meeting criteria for the total of all three DSM-IV subtypes (11.4%) was 57% greater than those with ADHD

DSM-III-R criteria. Children with ADHD-CT had the highest rate of comorbid conditions, 55% having ODD, 29% CD, and 29% ANX/DEP. ADHD-AD was associated with much lower rates of ODD and CD than other subtypes. Anxiety or depression rates were highest for ADHD-CT types and lowest with ADHD-HI. Behavioral problems predominate in ADHD-HI types and academic problems predominate in ADHD-AD. The use of DSM-IV in place of DSM-III-R criteria increased the prevalence of the diagnosis of ADHD in this community, and the new subtypes better characterized the heterogeneity of the disorder. (Wolraich ML et al. Comparison of diagnostic criteria for attention-deficit hyperactivity disorder in a county-wide sample. J Am Acad Child Adolesc Psychiatry March 1996;35:319-324). (Reprints:Dr Wolraich, Vanderbilt Child Development Center, 2100 Pierce Avenue, Nashville, TN 37232).

COMMENT. The new diagnostic criteria in DSM-IV which include two new subtypes are likely to increase the prevalence of ADHD when compared to DSM-III-R criteria. The ADHD inattentive subtype (AD) is characteristic of children with predominant academic problems and fewer behavioral complaints, and it occurs more frequently in females than do other subtypes. ADHD hyperactive-impulsive type (HI) is characterized by behavioral problems, with fewer academic problems, and a low rate of anxiety or depression. ADHD combined type (CT) criteria are close to the original DSM-III ADD with hyperactivity.

Validity of DSM-IV ADHD subtype diagnoses in relation to previous DSM III and DSM-III-R diagnoses. ADHD-AD and ADHD-CT diagnoses corresponded with DSM-III ADD/WO and ADD/H diagnoses, respectively, in a study at the University of Georgia, Athens, GA. (Morgan AE et al. J Am Acad Child Adolesc Psychiatry March 1996;35:325-333). For the ADHD-AD, predominantly inattentive type, diagnosis the child must have 6 of 9 inattentive symptoms but less than the specified number of HI symptoms.

These frequent and sometimes premature modifications of the DSM criteria for diagnosis of ADHD are certainly leading to confusion and have prompted a rash of articles and studies attempting to clarify the dilemma.

#### RISK FACTORS FOR ADHD PERSISTENCE INTO ADOLESCENCE

Predictors of persistence and the timing of remission of ADHD at a 4-year follow-up of 128 patients were studied prospectively using DSM-III-R criteria at the Massachusetts General Hospital, Boston. The diagnosis of ADHD had persisted in 109 (85%) and had remitted in 19 (15%). Of those no longer meeting the diagnostic criteria, 9 (47%) were late remitters (after age 12 years), and 10 (53%) were early remitters (by age 12 years). Risk factors for persistence included: 1) *genetic* familiarity of ADHD, 2) *environmental* psychosocial adversity and exposure to parental conflict, and 3) comorbidity with conduct, mood, and anxiety disorders. (Biederman J et al. Predictors of persistence and remission of ADHD into adolescence: results from a four-year prospective follow-up study. J Am Acad Child Adolesc Psychiatry March 1996;35:343-351). (Reprints: Dr Biederman, Pediatric Psychopharmacology Unit, Massachusetts General Hospital, ACC 725, 15 Parkman Street, Boston, MA 02114).

COMMENT. The majority of children diagnosed with ADHD in childhood will continue to be affected after 12 years of age, into adolescence, and sometimes into adulthood. The frequently repeated prediction that a child will outgrow ADHD by 12 years of age is no longer tenable. These authors also found that the intensity of treatment of ADHD did not alter the incidence of