## LEARNING AND BEHAVIOR DISORDERS

### FRAGILE X SYNDROME RECOGNITION

The clinical characteristics of 20 children younger than 7½ years of age with the fragile X syndrome were reviewed at the Cincinnati Center for Developmental Disorders, Children's Hospital Medical Center, University of Cincinnati College of Medicine, Cincinnati. The study was undertaken to establish guidelines that would aid the practicing physician in determining which children should have a chromosomal analysis. All children in the study were developmentally delayed: 95% had speech delays; and 50% or more had short attention span with hyperactivity, temper tantrums, mouthing of objects, autistic behaviors and poor gross motor coordination. The family history was positive for mental retardation in 65%, and 90% had a family history of at least one of the following: mental retardation, learning disabilities, or hyperactivity. The most common physical findings included long and/or wide and/or protruding ears in 15 (75%), prominent jaw or long face in 14 (70%), high arched palate in 10 (50%), flattened nasal bridge in 10 (50%), macrocephaly in 8 (40%), hypertelorism 8 (40%), and epicanthic folds 8 (40%), and Simian creases of palms in 7 (35%). Only 17% had relative increase in testicular volume. The authors believe that a chromosomal test for fragile X is likely to be of diagnostic benefit in young children with developmental delay (particularly in speech), a maternal family history for mental retardation or developmental disabilities, and long and/or wide and/or protruding ears. (Simko A et al. Fragile X syndrome: Recognition in young children. Pediatrics April 1989; 83;547-552).

COMMENT. Martin and Bell first showed the association of mental retardation with the X chromosome and the marker X, now known as the fragile X, was first described in 1969 by Lubs. Sutherland discovered the method to enhance expression of the fragile site on the human chromosomes, dependent on folic acid deficient tissue culture medium (1977). In the adult, the classical triad of physical findings in the fragile X syndrome consists of a long face with prominent jaw, large prominent ears and macroorchidism. A number of different minor nonspecific dysmorphic characteristics have been noted in the occasional affected female but no large group of young girls with fragile X syndrome have been described.

### PSYCHOPATHOLOGY IN FRAGILE X SYNDROME

The physical and behavioral features of the fragile X syndrome are reviewed in a paper from the Child Development Unit and Behavioral Sciences Department, Children's Hospital, Denver. In the prepubertal child, macroorchidism means a testicular volume greater than 2 ml, documented in 39% of prepubertal fragile X males (Hagerman 1987). It is measured with an orchidometer, a string of ellipsoid shapes of known volume which can be matched for size next to the testicle. In the adult male, macroorchidism means a testicular volume of approximately 30 ml or larger. A broad spectrum of cognitive involvement occurs in both males and females affected by the fragile X syndrome. The majority of adult fragile X males are moderately retarded and function well in group homes and sheltered workshops; Whereas the majority of prepubertal males are mildly retarded and 10% have IQs in the

borderline or low normal range, associated with significant learning disabilities. Language deficits are seen in all affected fragile X males, even those with a normal IQ. Speech is described as jocular or staccato, in bursts which may include perseverations or repetition of words or phrases. Longitudinal IQ evaluations of fragile X males have shown that younger boys score higher cognitively than adults. Heterozygous females may be completely unaffected by the syndrome or may have milder problems than those commonly seen in the males. Approximately 30% of heterozygotes have cognitive deficits ranging from a borderline IQ to more significant retardation. Heterozygotes with normal IQ (approximately 70%) have cognitive defects including a poor performance on Arithmetic, digit span and block design subtest scales on the WISC. Physical features in the mildly affected heterozygotes include prominent ears, double jointed thumbs, hyperextensible finger joints, and elongated face or prominent jaw in older females. Typical fragile X facial features are reported in 55% of retarded heterozygotes and in 14% of normal IQ heterozygotes. Enlargement of ovaries has been noted by ultrasound studies. (Hagerman R J and Sobesky W E. Psychopathology in fragile X syndrome. Amer. J. Orthopsychiat. Jan 1989; 59:142-152).

COMMENT. This review article provides useful information about the clinical manifestations and psychopathology of heterozygous fragile X females. Careful examination will often reveal subtle physical features associated with the fragile X syndrome in females. Cognitive, social and emotional disorders are described. More detailed neuropsychological testing of heterozygotes has demonstrated learning disabilities in math, right left disorientation, constructional dyspraxia, and finger agnosia (Gerstmann's syndrome). (Grigsby J et al. Neuropsychologia 1987; 25:881).

MENTAL STATUS EXAMINATION

The child neurologists' approach to the mental status examination of children with learning problems was examined by questionnaires randomly submitted to 163 attendees at the 16th Annual Child Neurology Society Meeting in 1987 and the results are reported from the Division of Neurology, Department of Pediatrics, Newington Children's Hospital and Biostatistics Research Center, Farmington, Connecticut. The child neurologists were asked to score on a five point scale (0=never, 5=always) the frequency with which they test for 30 mental status items when examining school age children who present with learning problems. The 30 items were divided into six categories of mental status function in ascending order of complexity: 1) fundamental processes including level of responsiveness, attention and/or vigilance; 2) Language including handedness, spontaneous speech, comprehension, reading, writing, spelling; 3) Memory including orientation, immediate recall, remote memory; 4) Constructional ability with reproduction drawings, drawings to command and block designs; 5) Higher cortical function for fund of information, proverb interpretation, similarities, calculations; 6) Related cortical function including ideomotor apraxia, ideational apraxia, right/left disorientation, finger agnosia, childhood Gerstmann, visual agnosia, and geographic orientation. The responders' frequency of testing in the six major categories of mental status function was independent of their age, sex, board certified/eligible status, type of practice and years elapsed