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Attention Deficit Hyperactivity Disorder (ADHD) affects somewhere between 10% and 15% of all school children in the U.S. (1.8 million to 2.7 million children). The estimate is uncertain because the behavior of children can be erratic under the best of circumstances and therefore the disorder is not simple to diagnose. Indeed, many cases are thought to go undiagnosed.[1,2]

According to recent estimates, as many as 1.5 to 2 million children in the U.S. diagnosed with ADHD are currently taking Ritalin (methylphenidate hydrochloride), a prescription drug with cocaine-like characteristics, to calm them down and/or help them focus their attention.[1,pg.1;2,pg.3] In 1997, more than 10 tons of Ritalin were ingested by U.S. children to control ADHD. It was recently found that Ritalin causes liver cancer in mice (though not in rats), so the long-term consequences of Ritalin use by millions of children need to be considered.[2,pgs.13-14]

Much evidence suggests that the ADHD problem is growing. Last month, at a medical conference devoted to the disorder, the organizers of the conference estimated that occurrence of ADHD among children in the U.S. is doubling every 3 to 4 years.[3] The use of Ritalin quadrupled between 1990 and 1997.[1,pg.1]

Children with ADHD often continue the symptoms into adulthood, with unhappy consequences for job performance. According to one 1997 estimate, somewhere between 6.5 million and 9 million adults in the U.S. have ADHD -- making it as large a problem as clinical depression or drug abuse. In 1997, about 730,000 adults in the U.S. were taking Ritalin by prescription for ADHD.[4]

The causes of ADHD are not known, but they are thought to be a combination of hereditary predisposition and environmental factors. Research in recent years has focused on prenatal exposures to agents such as lead, cigarette byproducts, and alcohol. Since the 1970s, researchers have been studying the effects of certain foods and food additives such as dyes and colorings; over the past 25 years, 16 out of 23 studies have found that food additives exacerbate the symptoms of ADHD in some children.[2] Poor diet (malnutrition) undoubtedly contributes to ADHD.[2,pgs.23,37] Most recently, research has implicated pesticides and exposure to low levels of industrial chemicals that may interfere with hormones, especially thyroid.[2,pgs.53,59] Obviously, combinations of all these factors could be important.

ADHD was first identified as a specific disorder in 1902. The definition of the disorder has changed over time. In 1902, George Still described 43 children with aggression, defiance, emotionality, limited sustained attention, and deficient rule-governed behavior. From the 1930s to the 1950s, the term "minimal brain damage" was used to describe the syndrome, even though there was no evidence of brain damage in most of the children so labeled. During the late 1950s, hyperactivity began to dominate the description of the disorder and the official name was changed to "hyperkinetic reaction of childhood" or hyperkinesis. The use of stimulant drugs, like Ritalin and amphetamines, to treat ADHD began in the 1960s. (Some drugs that act as stimulants or "speed" in most adults can have a calming effect in children and even in some adults.) In the 1970s, researchers considered inattention as central to the syndrome, and it became officially known as attention deficit disorder or ADD. In the 1980s and 1990s, the combination of attention deficits and hyperactivity have both been highlighted, thus the current name, Attention Deficit Hyperactivity Disorder (ADHD).5

The DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS IV, published by the American Psychiatric Association, describes 3 patterns of behavior that may indicate ADHD: consistent inattention, hyperactivity, and impulsive behavior, or combinations of these three behaviors.

Signs of inattention include:

- (1) the person fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities;
- (2) the person has difficulty sustaining attention in tasks or play activities;
- (3) the person often does not seem to listen when spoken to;
- (4) the person often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace;
- (5) the person often has trouble organizing tasks and activities;
- (6) the person avoids or dislikes or is reluctant to engage in tasks that require sustained mental effort;
- (7) the person often loses things necessary for tasks or activities, such as pencils or tools;
- (8) the person is easily distracted by extraneous stimuli -- the honk of a car's horn, or a bird flying by.

A person with 6 or more of these inattention symptoms for more than six months might be a candidate for an ADHD diagnosis.

Signs of hyperactivity and impulsiveness include:

- (1) feeling restless, often fidgeting with hands or feet, or squirming in a seat;
- (2) running or climbing excessively at inappropriate times;
- (3) leaving a seat early in the classroom or in other situations;
- (4) the person has difficulty engaging in leisure activities quietly;
- (5) the person is often "on the go" or acting as if driven by a motor;
- (6) the person often talks excessively;
- (7) the person blurts out answers before hearing the whole question;
- (8) the person has difficulty waiting in line or for a turn;
- (9) the person often interrupts or intrudes on others.

A person with 6 or more of these hyperactivity symptoms for more than six months might be a candidate for an ADHD diagnosis.

Because everyone exhibits some of these behaviors from time to time, the DIAGNOSTIC AND STATISTICAL MANUAL specifies additional guidelines for determining when they indicate ADHD:

- (1) Some of the behaviors must have begun early in life, before age 7;
- (2) In children the behaviors must be more pronounced than in others the same age;
- (3) Above all, the behaviors must create a real handicap in at least two areas of a person's life, such as school, home, work, or social settings. So, for example, a child would not be diagnosed with ADHD if he or she seems overly active at school but functions well elsewhere.

Studies of identical twins reveal that environmental factors contribute significantly to ADHD. It is not known whether environmental factors can cause ADHD in an otherwise normal person, or whether environmental factors only exacerbate ADHD among those who are genetically predisposed. In either case, people with ADHD often do poorly in school (many drop out early), have low self-esteem, and have difficulty making connections with other

people. People with ADHD are often described as messy, disorganized, inattentive, irritable, and aggressive. Because their lives can be frustrating and unrewarding, some ADHD sufferers may become hostile and even violent. In May of this year, T.J. Solomon, 15, shot six of his schoolmates at Heritage High School in Conyers, Georgia, a suburb of Atlanta.[6] At the time, the Solomon boy was taking prescription Ritalin for ADHD.

Malnutrition can trigger ADHD, and large numbers of U.S. children are malnourished. The U.S. Department of Agriculture (USDA) publishes "recommended daily allowances" (or RDAs) for various nutrients. USDA considers that RDAs exceed the average nutritional requirements of average people; a person is assumed to be malnourished if he or she receives less than 60% of an RDA for a particular nutrient. Notably, the number of U.S. children consuming less than 50% of RDAs has been reported as follows: vitamin A (9%); vitamin E (15%); vitamin C (6%); calcium (7%); and zinc (6%).[7] There are roughly 18 million children in the U.S., so these percentages represent large numbers of malnourished individuals. These percentages may even be somewhat optimistic; many scientists consider RDAs inadequate measures of nutritional status because nutritional requirements vary considerably from one individual to the next, so averages may be misleading. Furthermore, the chemical form of a nutrient is important but is often not considered in typical assessments of nutrient status.[8]

There is considerable evidence that food dyes can worsen the symptoms of ADHD in some children, but government authorities deny the evidence. The U.S. Food and Drug Administration (FDA) has published a pamphlet called FOOD COLOR FACTS which states that "there is no evidence that food color additives cause hyperactivity or learning disabilities in children." The pamphlet, though published by the FDA, was actually written by the International Food Information Council, a trade association representing many makers of food additives including General Mills, Kraft, Procter and Gamble, Pepsi-Cola, Coca Cola, Monsanto (maker of aspartame), and Ajinomoto (maker of monosodium glutamate).[2,pg.25] To make the statement that there is no evidence that food dyes cause hyperactivity or learning disabilities in children, the FDA had to ignore 16 double-blinded studies that have shown that food dyes do worsen the symptoms of ADHD in some children.[2] (A double-blinded study is one in which neither the participants, nor those observing and recording the children's behavior, know which children have been exposed to food dyes and which have not, the purpose being to avoid bias.)

In 1976, a study of U.S. children between the ages of 6 and 11 found they ingested an average of 76 milligrams of food dyes per day (mg/day). Ten percent of those studied ingested twice that amount, or 146 mg each day. Since that time, the quantity of food dyes manufactured per person in the U.S. has increased 50%.[2,pg.11]

At a time when Americans are searching for causes of aggression and violence among children, it would make sense to consider malnutrition, food additives, tobacco additives, toxic metals, pesticides and other endocrine-disrupting industrial toxicants --all of which many U.S. children are exposed to from the moment of conception onward.

--Peter Montague (National Writers Union, UAW Local 1981/AFL-CIO)

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[1] Joseph A. Bellanti, William G. Crook, and Richard E. Layton, editors, ADHD ATTENTION DEFICIT HYPERACTIVITY DISORDER, CAUSES AND POSSIBLE SOLUTIONS, CONFERENCE SYLLABUS OF PRESENTATION PAPERS NOVEMBER 4-7, 1999, KEY BRIDGE MARRIOTT HOTEL, ARLINGTON, VIRGINIA (Alexandria, Virginia: International

Research Consultants, November, 1999). Available for \$25 from: International Research Consultants, Suite 2J, 4600 King Street, Alexandria, Virginia 22302. Telephone (703) 998-6091; fax: (301) 320-4688; E-mail: irconsult@aol.com. The conference was sponsored by the Georgetown University Medical Center (Washington, D.C.) and the International Health Foundation (Jackson, Tennessee).

[2] Michael F. Jacobson and David Schardt, DIET, ADHD & BEHAVIOR; A QUARTER-CENTURY REVIEW (Washington, D.C.: Center for Science in the Public Interest, November, 1999). Available for \$8.00 from the Center, No. 300, 1875 Connecticut Avenue, N.W., Washington, D.C. 20009; telephone (202) 332-9110; fax: (202) 265-4954; E-mail: cspi@cspinet.org. Also available free at www.cspinet.org.

[3] Joseph A. Bellanti and William G. Crook, "Introductory Remarks" in the syllabus cited above in note 1, pg. 1.

[4] David J. Morrow, "Attention Disorder Is Found In Growing Number of Adults," NEW YORK TIMES September 2, 1997, pgs. A1, D4.

[5] Marianne Mercugliano Glanzman, "What is ADHD," in the syllabus cited above in note 1, pgs. 3-16.

[6] Associated Press, "Boy's Mother Apologizes Over Shooting in Georgia," New York Times May 25, 1999, pg. A19.

[7] Donald R. Davis, "Nutritional Deficiencies in American Children," in the syllabus cited above in note 1, pgs. 17-21.

[8] For example, see Roger J. Williams, NUTRITION IN A NUTSHELL (Garden City, New York: Doubleday, 1962).

Descriptor terms: adhd; attention deficit disorder; hyperactivity; children; ritalin; cancer; carcinogens;