



Attention Deficit Hyperactivity Disorder (ADHD) - Questions and Answers

Q. What is Attention Deficit Hyperactivity Disorder (ADHD)?

A. ADHD refers to a family of related chronic neurobiological disorders that interfere with an individual's capacity to regulate activity level (hyperactivity), inhibit behavior (impulsivity), and attend to tasks (inattention) in developmentally appropriate ways. The core symptoms of ADHD include an inability to sustain attention and concentration, developmentally inappropriate levels of activity, distractibility, and impulsivity. Children with ADHD have functional impairment across multiple settings including home, school, and peer relationships. ADHD has also been shown to have long-term adverse effects on academic performance, vocational success, and social-emotional development. Children with ADHD experience an inability to sit still and pay attention in class and the negative consequences of such behavior. They experience peer rejection and engage in a broad array of disruptive behaviors. Their academic and social difficulties have far-reaching and long-term consequences. These children have higher injury rates. As they grow older, children with untreated ADHD, in combination with conduct disorders, experience drug abuse, antisocial behavior, and injuries of all sorts. For many individuals, the impact of ADHD continues into adulthood.

Q. What are the symptoms of ADHD?

- **Inattention.** People who are inattentive have a hard time keeping their mind on one thing and may get bored with a task after only a few minutes. Focusing consciously, deliberate attention to organizing and completing routine tasks may be difficult.
- **Hyperactivity.** People who are hyperactive always seem to be in motion. They can't sit still; they may dash around or talk incessantly. Sitting still through a lesson can be an impossible task. They may roam around the room, squirm in their seats, wiggle their feet, touch everything, or noisily tap a pencil. They may also feel intensely restless.
- **Impulsivity.** People who are overly impulsive, seem unable to curb their immediate reactions or think before they act. As a result, they may blurt out answers to questions or inappropriate comments, or run into the street without looking. Their impulsivity may make it hard for them to wait for things they want or to take their turn in games. They may grab a toy from another child or hit when they are upset.

Q. How is ADHD diagnosed?

A. The diagnosis of ADHD can be made reliably using well-tested diagnostic interview methods. Diagnosis is based on history and observable behaviors in the child's usual settings. Ideally, a health care practitioner making a diagnosis should include input from parents and teachers. The key elements include a thorough history covering the presenting symptoms, differential diagnosis, possible comorbid conditions, as well as medical, developmental, school, psychosocial, and family histories. It is helpful to determine what precipitated the request for evaluation and what approaches had been used in the past. As of yet, there is no independent test for ADHD. This is not unique to ADHD, but applies as well to most psychiatric disorders, including other disabling disorders such as schizophrenia and autism.

Q. How many children are diagnosed with ADHD?

A. ADHD is the most commonly diagnosed disorder of childhood, estimated to affect 3 to 5 percent of school-age children, and occurring three times more often in boys than in girls. On average, about one child in every classroom in the United States needs help for this disorder.

Q. Aren't there various types of ADHD?

A. According to *DSM-IV*, the fourth and most recent edition of the *DSM*, while most individuals have symptoms of both inattention and hyperactivity-impulsivity, there are some individuals in whom one or another pattern is predominant (for at least the past 6 months).

Q. How are schools involved in diagnosing, assessing, and treating ADHD?

A. Physicians and parents should be aware that schools are federally mandated to perform an appropriate evaluation if a child is suspected of having a disability that impairs academic functioning. This policy was recently strengthened by regulations implementing the 1997 reauthorization of the Individuals with Disabilities Act (IDEA), which guarantees appropriate services and a public education to children with disabilities from ages 3 to 21. For the first time, IDEA specifically lists ADHD as a qualifying condition for special education services. If the assessment performed by the school is inadequate or inappropriate, parents may request that an independent evaluation be conducted at the school's expense. Furthermore, some children with ADHD qualify for special education services within the public schools, under the category of "Other Health Impaired." In these cases, the special education teacher, school psychologist, school administrators, classroom teachers, along with parents, must assess the child's strengths and weaknesses and design an Individualized Education Program. These special education services for children with ADHD are available through IDEA.

Q. Is ADHD inherited?

A. Research shows that ADHD tends to run in families, so there are likely to be genetic influences. Children who have ADHD usually have at least one close relative who also has ADHD. And at least one-third of all fathers who had ADHD in their youth have children with ADHD. Even more convincing of a possible genetic link is that when one twin of an identical twin pair has the disorder, the other is likely to have it too.

Q. Is ADHD on the increase? If so, why?

A. No one knows for sure whether the prevalence of ADHD per se has risen, but it is very clear that the number of children identified with the disorder who obtain treatment has risen over the past decade. Some of this increased identification and increased treatment seeking is due in part to greater media interest, heightened consumer awareness, and the availability of effective treatments. A similar pattern is now being observed in other countries. Whether the frequency of the disorder itself has risen remains unknown, and needs to be studied.

Q. Can ADHD be seen in brain scans of children with the disorder?

A. Neuroimaging research has shown that the brains of children with ADHD differ fairly consistently from those of children without the disorder in that several brain regions and structures (pre-frontal cortex, striatum, basal ganglia, and cerebellum) tend to be smaller. Overall

brain size is generally 5% smaller in affected children than children without ADHD. While this average difference is observed consistently, it is too small to be useful in making the diagnosis of ADHD in a particular individual. In addition, there appears to be a link between a person's ability to pay continued attention and measures that reflect brain activity. In people with ADHD, the brain areas that control attention appear to be less active, suggesting that a lower level of activity in some parts of the brain may be related to difficulties sustaining attention.

Q. Can a preschool child be diagnosed with ADHD?

A. The diagnosis of ADHD in the preschool child is possible, but can be difficult and should be made cautiously by experts well trained in childhood neurobehavioral disorders. Developmental problems, especially language delays, and adjustment problems can sometimes imitate ADHD. Treatment should focus on placement in a structured preschool with parent training and support. Stimulants can reduce oppositional behavior and improve mother-child interactions, but they are usually reserved for severe cases or when a child is unresponsive to environmental or behavioral interventions.

Q. What is the impact of ADHD on children and their families?

A. Life can be hard for children with ADHD. They're the ones who are so often in trouble at school, can't finish a game, and have trouble making friends. They may spend agonizing hours each night struggling to keep their mind on their homework, then forget to bring it to school. It is not easy coping with these frustrations day after day for children or their families. Family conflict can increase. In addition, problems with peers and friendships are often present in children with ADHD. In adolescence, these children are at increased risk for motor vehicle accidents, tobacco use, early pregnancy, and lower educational attainment. When a child receives a diagnosis of ADHD, parents need to think carefully about treatment choices. And when they pursue treatment for their children, families face high out-of-pocket expenses because treatment for ADHD and other mental illnesses is often not covered by insurance policies. School programs to help children with problems often connected to ADHD (social skills and behavior training) are not available in many schools. In addition, not all children with ADHD qualify for special education services. All of this leads to children who do not receive proper and adequate treatment. To overcome these barriers, parents may want to look for school-based programs that have a team approach involving parents, teachers, school psychologists, other mental health specialists, and physicians.

Q. Aren't there nutritional treatments for ADHD?

A. Many parents have exhausted nutritional approaches, such as eliminating sugar from the diet, before they seek medical attention. However, there are no well-established nutritional interventions that have been consistently demonstrated to be efficacious for assisting the great majority of children with ADHD. A small body of research has suggested that some children may benefit from these interventions, but delaying the implementation of well-established, effective interventions while engaged in the search for unknown, generally unproven allergens, is likely to be harmful for many children.

Q. What are behavioral treatments?

A. There are various forms of behavioral interventions used for children with ADHD, including psychotherapy, cognitive-behavioral therapy, social skills training, support groups, and parent and educator skills training. An example of very intensive behavior therapy was used in the NIMH Multimodal Treatment Study of Children with ADHD (MTA), which involved the child's teacher, the family, and participation in an all-day, 8-week summer camp. The consulting therapist worked with teachers to develop behavior management strategies that address behavioral problems interfering with classroom behavior and academic performance. A trained classroom aide worked with the child for 12 weeks in his or her classroom, to provide support and reinforcement for

appropriate, on-task behavior. Parents met with the therapist alone and in small groups to learn approaches for handling problems at home and school. The summer day camp was aimed at improving social behavior, academic work, and sports skills.

Q. What medications are currently being used to treat ADHD?

A. Psychostimulant medications, including methylphenidate (Ritalin®) and amphetamines (Dexedrine®, Dextrostat®, and Adderall®), are by far the most widely researched and commonly prescribed treatments for ADHD. Numerous short-term studies have established the safety and efficacy of stimulants and psychosocial treatments for alleviating the symptoms of ADHD. NIMH research has indicated that the two most effective treatment modalities for elementary school children with ADHD are a closely monitored medication treatment and a treatment that combines medication with intensive behavioral interventions. In the NIMH Multimodal Treatment Study for Children with ADHD (MTA), which included nearly 600 elementary school children across multiple sites, nine out of ten children improved substantially on one of these treatments. Additionally, antidepressant medications may also be used as a second line of treatments for children who show poor response to stimulants, who have unacceptable side effects, or who have comorbid conditions (such as tics, anxiety, or mood disorders). Tricyclic antidepressants have shown clinical efficacy in 60-70% of children with ADHD. While the medications were extremely beneficial to most children, MTA findings indicated that medications alone may not necessarily be the best strategy for many children. For example, children who had accompanying problems (e.g., anxiety, stressful home circumstances, social skills deficits, etc.), over and above the ADHD symptoms, appeared to obtain maximal benefit from the combined treatment.

Q. Are there standard doses for these medications?

A. Careful medication management is important in treating a child with ADHD. For methylphenidate (Ritalin®), the usual dosage range is 5 to 20 mg given two to three times a day. The dose for amphetamines (Dexedrine® and Dextrostat® and Adderall®) is one-half the methylphenidate dose. Dosage requirements do not always correlate with weight, age or severity of symptoms in an individual patient. Dosages may need to be increased during childhood with increased lean body weight and decreases may be necessary after puberty. Different doctors use these medications in slightly different ways.

Q. How long are children on these medications?

A. The expected duration of treatment has lengthened during this past decade as evidence has accumulated that benefits extend into adolescence and adulthood. However, many factors work against continued treatment during adolescence including the partial resolution of the most obvious symptoms, the short-lasting effects of medications that require multiple doses per day, and the need for regular physician written prescriptions. Additionally, parents often discontinue medication even when benefit has been demonstrated or because they see the child improve and don't think the medication is necessary any longer.

Q. How often are stimulant prescriptions used?

A. Data from 1995 show that physicians treating children and adolescents wrote six million prescriptions for stimulant medications—methylphenidate (Ritalin®) and dextroamphetamine (Dexedrine®). Of all the drugs used to treat psychiatric disorders in children, stimulant medications are the most thoroughly studied.

Q. Isn't stimulant use on the increase?

A. Stimulant use in the United States has increased substantially over the last 25 years. A recent study saw a 2.5-fold increase in methylphenidate between 1990 and 1995. This increase appears to be largely related to an increased duration of treatment, and more girls, adolescents,

adults, and inattentive individuals (in addition to those individuals with both hyperactivity and inattentiveness/attention deficit) receiving treatment.

Q. Are there differences in stimulant use across racial and ethnic groups?

A. There are significant differences in access to mental health services between children of different racial groups; and, consequently, there are differences in medication use. In particular, African American children are much less likely than Caucasian children to receive psychotropic medications, including stimulants, for treatment of mental disorders.

Q. Why are stimulants used when the problem is overactivity?

A. The answer to this question is not well established, but one theory suggests that ADHD is related to difficulties in inhibiting responses to internal and external stimuli. Evidence to date suggests that those areas of the brain thought to be involved in planning, foresight, weighing of alternative responses, and inhibiting actions when alternative solutions might be considered, are underaroused in persons with ADHD. Stimulant medication may work on these same areas of the brain, increasing neural activity to more normal levels. More research is needed, however, to firmly establish the mechanisms of action of the stimulants.

Q. What are the risks of the use of stimulant medication and other treatments?

A. Stimulant drugs, when used with medical supervision, are usually considered quite safe. Although they can be addictive when abused by teenagers and adults, when taken as prescribed for ADHD these medications have not been shown to be addictive nor to lead to substance abuse problems. They seldom make children "high" or jittery, nor do they sedate the child. Although little information exists concerning the long-term effects of psychostimulants, there is no evidence that careful therapeutic use is harmful. When adverse drug reactions do occur, they are usually related to dosage and are always reversible. Effects associated with moderate doses are decreased appetite and insomnia. These effects occur early in treatment and may decrease with time. There may be negative effects on growth rate, but ultimate height appears not to be affected.

Q. Will children taking these medications for ADHD become drug addicts?

A. Actually, it appears to be just the opposite. Although an increased risk of drug abuse and cigarette smoking is associated with childhood ADHD, this risk appears mostly due to the ADHD condition itself, rather than its treatment. In a study jointly funded by the NIMH and the National Institute on Drug Abuse, boys with ADHD who were treated with stimulants were significantly less likely to abuse drugs and alcohol when they got older. Caution is warranted, nonetheless, as the overall evidence suggests that persons with ADHD (particularly untreated ADHD) are indeed at greater risk for later alcohol or substance abuse. Because some studies have come to conflicting conclusions, more research is needed to understand these phenomena. Regardless, in view of the substantial, well-established findings of the harmful effects of inadequate or no treatment for a child with ADHD, parents should not be dissuaded from seeking effective treatments because of misconstrued or exaggerated claims about substance abuse risks.

Q. Wasn't there a large conference held at NIH on ADHD recently?

A. In 1998, the NIH held a two-day Consensus Conference on ADHD, bringing together national and international experts, as well as representatives from the public. The Consensus statement is now available at http://odp.od.nih.gov/consensus/cons/110/110_statement.htm.

Q. What is the relationship between ADHD and other disorders, such as learning disabilities, anxiety disorders, bipolar disorder, or depression?

A. Comorbidity occurs in most children clinically treated for ADHD. ADHD can co-occur with learning disabilities (15-25%), language disorders (30-35%), conduct disorder (15-20%), oppositional defiant disorder (up to 40%), mood disorders (15-20%), and anxiety disorders (20-25%). Up to 60 percent of children with tic disorders also have ADHD. Impairments in memory,

cognitive processing, sequencing, motor skills, social skills, modulation of emotional response, and response to discipline are common. Sleep disorders are also more prevalent.

Q. What is the history of ADHD? How is it related to ADD?

A. ADHD has assumed many aliases over time from hyperkinesis (the Latin derivative for "superactive") to hyperactivity in the early 1970s. In the 1980s, *DSM-III* dubbed the syndrome Attention Deficit Disorder, or ADD, which could be diagnosed with or without hyperactivity. This definition was created to underline the importance of the inattentiveness or attention deficit that is often but not always accompanied by hyperactivity. The revised edition of *DSM-III*, the *DSM-III-R*, published in 1987, returned the emphasis back to the inclusion of hyperactivity within the diagnosis, with the official name of ADHD. With the publication of *DSM-IV*, the name ADHD still stands, but there are varying types within this classification, to include symptoms of both inattention and hyperactivity-impulsivity, signifying that there are some individuals in whom one or another pattern is predominant (for at least the past 6 months). In the *International Classification of Diseases* (used predominantly in other Western countries), the term "Hyperkinetic Disorder" is used, but the criteria are the same as for ADHD/combined type.

Q. What are the future research directions for ADHD?

A. Continued research on ADHD is needed from many perspectives. The societal impact of ADHD needs to be determined. Studies in this regard include (1) strategies for implementing effective medication management or combination therapies in different schools and pediatric healthcare systems; (2) the nature and severity of the impact on adults with ADHD beyond the age of 20, as well as their families; and (3) determination of the use of mental health services related to diagnosis and care of persons with ADHD. Additional studies are needed to improve communication across educational and health care settings to ensure more systematized treatment strategies. Basic research is also needed to better define the behavioral and cognitive components that underpin ADHD, not just in children with ADHD, but also in unaffected individuals. This research should include (1) studies on cognitive development, cognitive and attentional processing, impulse control, and attention/inattention; (2) studies of prevention/early intervention strategies that target known risk factors that may lead to later ADHD; and (3) brain imaging studies before the initiation of medication and following the individual through young adulthood and middle age. Finally, further research should be conducted on the comorbid (coexisting) conditions present in both childhood and adult ADHD, and treatment implications.

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