

# Attention Deficit Syndrome

## What is attention deficit syndrome?

Attention deficit syndrome (ADS) is the most common psychiatric childhood disorder. It is characterised by early onset in life (studies now indicate that ADS can be diagnosed in children by the age of four) and a combination of overactive, poorly modulated behaviour and lack of concentration on tasks. It is widely thought that abnormalities in the body's system play a crucial role in the development of ADS, but knowledge about specific causes is lacking at present.

The disorder can affect a child's education, development and self-esteem. Patients present with inattention, hyperactivity, impulsivity, underachievement in school or behaviour problems, such as impulsive flouting of social rules. The disease is defined and diagnosed in behavioural terms. Its assessment requires evidence regarding the core symptoms of the disorder directly obtained from parents, caregivers and from classroom teachers.

## Who does attention deficit syndrome affect?

The disease is six to nine times more frequent in boys between six and twelve years of age than in girls and affects both school-aged children and adults. In adults, the disorder seems to be equally distributed between women and men. Adults' complications include substance abuse, high-risk and anti-social behaviour and accidents, but there is a certain diagnostic problem, because criteria for an adult form of the disorder do not exist. ADS is estimated to be present in approximately 1.5 per cent of the European population, with prevalence increasing. It is not known whether this reflects a real increase in ADS or a better ability to recognise it.

Evidence is increasing that genetic factors play an important role in ADS. Relatives of both boys and girls with ADS have much higher rates of the condition. In a twin study, 90 per cent of children with ADS shared it with their twin.

## Present treatments

The goals of therapy are in first instance to improve functioning at home, in school, and with peers through the modification of the inattention, impulsiveness, and hyperactivity and secondly to maximize cognitive functioning and social/behaviour skills with minimal side effects. Most experts and organisational policies promote a multi-modal approach to therapy for children with ADS. This includes behaviour modification, medication, psychotherapeutic and school-based approaches. Teaching children to be achievers in school is an important part of their treatment.

**Attention Deficit Syndrome (ADS) is the most common psychiatric disorder in children.**

**It can seriously affect a child's education and development. Research by the pharmaceutical industry is beginning to develop new and better medicines to improve the lives of the children and those who care for them.**



Controlled clinical studies have suggested that psychostimulants are the treatment of choice for ADS where medicines are to be used. Stimulant medicines are given to increase the probability of certain neurotransmitters such as catecholamines interacting with post-synaptic receptors in particular areas of the brain. Clinical research has established these compounds as effective in about 70 per cent of patients. Short-acting stimulants have a generally rapid onset of action and duration of action is about four hours. Long-acting stimulants have a slower onset of action and are used in combination with short-acting medicines.

Furthermore, antidepressants (with norepinephrine effects) are used as independent treatment or as adjunct to stimulant medication. Tricyclic antidepressants are a common addition to treatment to improve the patient's sleep and appetite. If depression is involved, therapy with any antidepressant should be considered. Other medications used in combination with these include *alpha2*-blockers to modulate emotions and behaviours that can be initiated by stimulants. *Beta*-blockers and low doses of certain anticonvulsive medications can also be of help. If the patient presents with extreme and defiant behaviour, therapy with tranquilisers should be considered.

### **What's in the development pipeline?**

Most recent evidence indicates that ADS has a central nervous system basis, as do all normal and abnormal behaviours, thoughts and emotions. Latest research findings suggest that ADS has to do with a disorder of the right side of the brain. When applying imaging techniques in patients with ADS, it was found that the prefrontal cortex (thought to regulate the brain's ability to inhibit responses) was less active when compared to a control group. It is also thought that areas in the centre of the brain which speed up or stop orders stemming from the prefrontal cortex may have functional deficits in ADS patients and may impair a person's ability to control their actions, resulting in the impulsive behaviour typical of patients with ADS.

The neurotransmitter dopamine is under particular scrutiny. Studies have suggested that dopamine levels are abnormal in ADS, with its effects being inhibited in the prefrontal lobes of the brain. Deficiencies of the chemical transmitter norepinephrine in the brain may also be critical in ADS.

Clinical trials with a blocker of the transport system for norepinephrine are underway. Furthermore, early studies with a substance which is used to treat patients with narcolepsy suggest that it may be useful for adults and children with ADS. Also, medicines known as central anticholinesterases are being investigated for the disorder. Other findings suggest that nicotine improves ADS symptoms. Such experiences should not encourage anyone to smoke, but they show new ways of treating adult patients with smoking cessation patches.

### **The longer-term future**

Research and development of medicines to treat ADS is still at its very beginning. It was only in 1998 that it was agreed to consider ADS a legitimate psychological condition, even though its definition has not been fully pinned down. As 60 per cent of children with ADS are still symptomatic as young adults and thus considered chronic, there is a need for new and better medicines, including formulations to improve patient compliance.

The prevalence, aetiology, and developmental course of ADS remain poorly described. These data gaps exist because few population-based epidemiological studies are available. Recent developments underscore the need for such additional studies. Meanwhile, the literature suggests that ADS is best conceptualised as a lifelong disability rather than as a childhood disorder. This suggestion implies that treatment and monitoring may last a lifetime. The evidence suggesting a biological basis for the disorder has become more persuasive; for example, several studies suggest a possible

role for two genes involved in dopamine regulation and several imaging studies suggest possible differences in brain structure and function among adults with ADS.

Interesting new avenues of exploration include the study of (i) specific perinatal/pre-natal influences in interaction with genes that might be susceptible; (ii) the impact of factors at home and in the environment that might modulate the development of children's ability to concentrate; (iii) learning experiences or other factors that may up-regulate young children's attention styles; and (iv) early intervention strategies designed to help children at risk.

New findings have revealed shape differences in the brains of children with ADS. Researchers examined the precise shape of the basal ganglia, a part of the brain critical for controlling behaviour and movement. The study found boys with the disorder showed significant shape differences and decreases in overall volume of the basal ganglia compared to their peers who were developing typically. However, no shape or volume differences were revealed in girls with ADS, adding to the evidence that sex strongly influences the disorder's expression.

The multiple shape differences found in boys with ADS suggests that the disorder may not be associated with abnormalities in one specific neural circuit. Rather, it appears the disorder involves abnormalities in parallel circuits, including circuits important for the control of complex behaviour and more basic motor responses. Such abnormalities in basic motor response control may be crucial to understanding why children with ADS have difficulty suppressing impulsive actions.

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