

Attention Deficit Hyperactivity Disorder (ADHD)



Attention deficit/hyperactivity disorder (ADHD) is one of the most common mental disorders in children and adolescents. It also affects an estimated 4.4 percent of adults in the United States in a given year. Symptoms include difficulty staying focused and paying attention, difficulty controlling behavior, and very high levels of activity. Studies show that the number of children being diagnosed with ADHD is increasing.

Yesterday

- ADHD was once considered a transient disorder of childhood that children would outgrow upon entering their teen years.
- ADHD was seen as a behavioral disturbance caused by environmental factors, such as inconsistent parenting.
- Brain development in people with ADHD could not be studied directly, but only estimated by observing behavior or using other indirect methods.
- ADHD was treated with immediate release stimulant medications such as methylphenidate (for example, Ritalin), which worked well but whose effect lasted only a few hours. Children needed multiple doses during the day, disrupting their school schedules and daily activities.

Today

- Using brain imaging, scientists observed that brain development in some children with ADHD, while still showing a normal pattern, is delayed in some regions by an average of three years compared to children without the disorder.
- The delay was most marked in the brain area that supports the ability to suppress inappropriate actions and thoughts, focus attention, remember things moment to moment, work for reward, and plan (the frontal cortex). By contrast, the area that controls movement (the motor cortex) tends to mature faster than normal, an exception to the pattern of delay. This

mismatch in brain development may account for the restlessness and fidgety symptoms common among those with ADHD.

- Findings from the Preschoolers with ADHD Treatment Study (PATS) indicate that using low dose methylphenidate (for example, Ritalin) to treat children age 3–5 years diagnosed with severe ADHD can be effective.
- A preschooler's response to medications for ADHD has been found to be associated with the number of coexisting mental disorders the child has. Children with fewer coexisting disorders were most likely to respond to methylphenidate treatment, whereas those with three or more coexisting disorders did not respond to the treatment.
- For some children, early behavioral interventions designed to reduce symptoms of ADHD in preschoolers may be effective alternatives or additions to medication treatment.
- One study comparing a parent education (PE) program with a multi-component intervention (MCI) found that problem behavior decreased among the children in both programs and their social skills improved after one year.
- The PE program focused on teaching parenting skills in a group setting. The MCI included parent education classes as well as individualized interventions in the home and at preschool or day care.
- The ongoing Multimodal Treatment Study of Children with ADHD (MTA study) (<http://www.nimh.nih.gov/trials/practical/mta/the-multimodal-treatment-of-attention-deficit-hyperactivity-disorder-study-mta-questions-and-answers.shtml>) is helping to inform long-term treatment decisions. For example, MTA researchers found that medication works best when treatment is regularly monitored by the prescribing doctor and the dose is adjusted based on the child's needs. As children with ADHD mature, maintaining a good treatment response probably requires a sustained

effort that takes into account long-term academic and behavioral problems commonly associated with ADHD and adapts to the demands of adolescence.

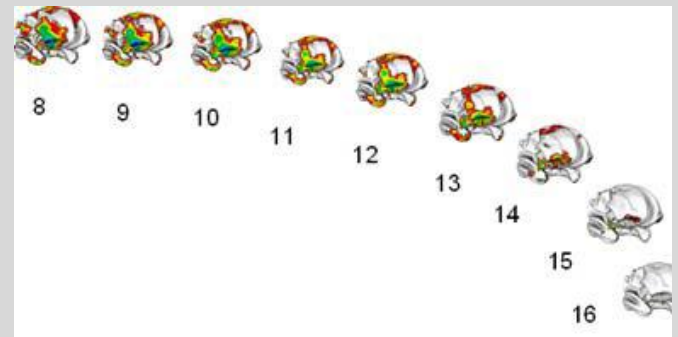
- New research linking genetics, brain development, and functioning are providing scientists with a new understanding of how ADHD develops.
 - One such study showed that brain areas controlling attention were thinnest in children with ADHD who carried a particular version of the gene for one type of neurochemical receptor in the brain. However, these areas normalized in thickness during the teen years in these children, coinciding with clinical improvement. Although this particular gene version increased risk for ADHD, it also predicted better clinical outcomes and higher IQ than two other versions of the same gene in youth with ADHD.

Tomorrow

- Research continues on the search for innovative methods to treat ADHD and may someday offer more options for children who cannot take ADHD medications or do not respond to them. These methods include using neurofeedback and novel psychosocial treatments.
- Amid concerns about the safety of stimulant medications for treating children with ADHD, an NIH-funded study found that screening for heart conditions using electrocardiograms (ECG) was minimally cost-effective. According to the researchers, adding ECG to the current standard of care may identify more children at risk for sudden cardiac death and provide opportunities for doctors to discourage them from playing competitive sports, which could bring on a cardiac event. Further research is needed to better address the rare but serious issue of sudden death in children who use stimulant medications.
- While ADHD symptoms may decline for some children as they grow up, others may face continuing problems. A recent study found that adults with ADHD have higher than average rates of divorce, unemployment, substance abuse, and disability. Also, while many adults with ADHD receive treatment for other mental disorders or substance abuse, a smaller

proportion receive treatment for their ADHD symptoms.

- More studies are needed to assess the effects of ADHD over the lifespan and to find better ways to diagnose and treat ADHD in adults, with a special focus on promoting competence and improving functioning.



Composite 3-D MRI scan data for youth, ages 8-16. Colored areas are those in which cortex thickness varied between ADHD study participants and healthy controls, with brighter colors indicating greater differences.

Children with ADHD with a certain version of the dopamine receptor gene had thinner-than-normal areas in their brain's outer mantle, the cerebral cortex, which normalized during the teen years. This thickening in areas that control attention paralleled clinical improvement.

Source: NIMH Child Psychiatry Branch

For more information, please contact the NIMH Information Center at nimhinfo@nih.gov or 301-443-4513.

National Institute of Mental Health (NIMH):

<http://www.nimh.nih.gov>