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Inside News: 3 Worried About Plastic Bottles? 4 Virtual Colon Scans... DrugPubs... Children & Clinical Studies

Holding Their Attention Get the Scoop on ADHD

Attention deficit hyperactivity disorder, or ADHD, was once considered a problem that children outgrew. If they didn't, their parents were often blamed for bad parenting. But researchers have found that ADHD is a very real disorder rooted in brain development. Effective treatments are now available, and researchers continue to make progress in understanding what causes ADHD—as well as how to prevent and treat it.

Many people blurt out things they didn't mean to say from time to time, or jump from one task to another, or become disorganized and forgetful. But people with ADHD have more serious problems that get in the way of their school, work and family life. They have trouble staying focused and paying attention, difficulty controlling behavior, and very high levels of activity.

"The key to a diagnosis of ADHD is that the symptoms are impairing for the child," says Dr. Philip Shaw in the Child Psychiatry Branch at NIH's National Institute of Mental Health (NIMH). "Kids with ADHD often really struggle at school, and the symptoms can impair the child's family life and relationships with peers."

"The great majority of cases start by age 7," says Dr. Judith Rapoport, chief of the NIMH Child Psychiatry Branch. Adults can also be diagnosed with ADHD, but Rapoport

says it's difficult to tell whether the problems really started in adulthood. They may have had undiagnosed symptoms as children.

The causes of ADHD aren't fully understood, but genes play a role.



"ADHD is one of the most heritable of all childhood mental health problems," Shaw says. "About 70-80% is caused by heritable genetic factors."

But it's been difficult to pinpoint which genes are involved. "Like most psychiatric disorders," Rapoport says, "it looks like there's a number of genes with a very small effect." At least 20 genes have been linked to

ADHD, she says. Most of the genetic variations are found in the general population, but they're a little more common in people with ADHD.

Environmental factors also play a role. "Like nearly all childhood mental health problems," Shaw says, "ADHD is a complex mix of genetic factors and environmental factors and their interaction."

Mothers who smoke or drink excessive amounts of alcohol during pregnancy are more likely to have children with ADHD. Lead exposure has been very strongly associated with ADHD symptoms. And some evidence suggests that certain food additives may have a small effect.

Brain imaging studies have shed some light on how ADHD unfolds. Development in some regions of the brain is delayed by an average of 3 years—and up to 6—in kids with ADHD. This delay is most marked in an area involved in focusing attention, working for reward and planning, among other things. In most kids, this part of the brain—the frontal cortex—is fully developed by the age of 7 or 8. For kids with ADHD, it's between 10 and 13.

continued on page 2

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Web Links

For links to more information about ADHD, see this story online:

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also what the school can do.”

Schools can play a major role in helping a child with ADHD. Rapoport says, “Having the child sit in the first row can be very helpful for mild cases.” Teachers can lend a hand by pointing out when a child isn’t paying attention. Sometimes a little bit of gentle guidance can help children correct themselves.

For some kids, ADHD symptoms fade as they grow up, but 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. Although many adults with ADHD receive treatment for other mental disorders or substance abuse, fewer receive treatment for their ADHD symptoms.

Researchers are now using brain imaging to compare the brains of adults who recover from ADHD with those who never grew out of it. “We’re trying to understand why ADHD has such a variable outcome,” Shaw says. “If you take 100 children with ADHD and look at how they’re doing when they’re adults, some are completely better, some are essentially unchanged and a large chunk are somewhere in the middle. We’re looking at the brain basis for that variable outcome.”

Scientists also continue to seek the root causes of ADHD. They’re looking into many other aspects of ADHD as well, like how treatments in childhood affect long-term outcomes. Other researchers are trying to relate genetic differences to how the brain develops in ADHD. The ultimate goal, of course, is to find better ways to diagnose and treat the disorder.

But effective treatments are already available for ADHD. See your doctor if you suspect your child may have a problem. ■



Wise Choices ADHD Symptoms

If these behaviors are creating a problem in your child’s life, it’s important to get a thorough examination and diagnosis from a doctor. Common symptoms of ADHD include:

- Feeling restless, often fidgeting with hands or feet, or squirming while seated
- Running, climbing or leaving a seat in situations where sitting or quiet behavior is expected
- Blurting out answers before hearing the whole question
- Having difficulty waiting in line or taking turns
- Becoming easily distracted by irrelevant sights and sounds
- Failing to pay attention to details and making careless mistakes
- Rarely following instructions carefully and completely
- Losing or forgetting things like toys, or pencils, books and tools needed for a task
- Often skipping from one uncompleted activity to another

continued from page 1

“That delay is carried forward into adolescence,” Shaw says. “We know that changes in brain structure and function can often persist into teenage years and beyond in people who have ADHD.”

Research has yielded insight into the brain chemistry of ADHD as well. One of the main brain chemicals that seems to be disrupted is dopamine. The chief class of medications used to treat ADHD, called psychostimulants, apparently act by boosting the levels of dopamine in the brain. Other brain chemicals have also been tied to ADHD, and new medications to target them are becoming available. What these chemicals have in common is that brain cells use them to communicate with each other.

Medication can control symptoms in moderate to severe cases of ADHD,

Rapoport says. Behavioral treatment, or psychotherapy, is also sometimes used. A large NIMH-funded study found that combining behavioral treatment with medication is more effective than either treatment alone. Families and teachers reported being more satisfied when treatments included behavioral therapy.

“The kids that benefit most from behavioral treatment tend to be those who have ADHD complicated by other mental health problems,” Shaw says.

Mental health professionals, Rapoport explains, can make a big difference by helping parents to become less critical and frustrated. “Children do better when they have parents that aren’t judgmental,” she says. “Counseling and education sessions are important for the family so they understand what can be helpful and

NIH News in Health (ISSN 1556-3898)

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Worried About Plastic Bottles?

Experts Weigh Possible Health Risks of BPA

A chemical called bisphenol A (BPA) is found in many types of hard plastics. You're probably exposed to it every day. It's used to make water cooler bottles, baby bottles, plastic coatings inside food cans, dental sealants, plastic utensils, CDs and medical devices. BPA is just about everywhere you turn. But can it harm your health? That's a question experts have been debating for nearly 2 decades.

Dozens of studies—mostly in animals—have raised questions about the safety of BPA. BPA can affect the behavior of rats and mice, as well as harm development of their brains and reproductive organs. But rodents differ from humans in how their bodies break down and process BPA. Scientists aren't sure how much animal studies can really tell us about human risks.

BPA gets into our bodies when we eat or drink foods that have been stored in containers made with BPA.

Most plastic containers aren't made with BPA, but it's often found in a strong, see-through plastic called polycarbonate. (Polycarbonate containers with BPA usually have a #7 recycling symbol on the bottom, although not all plastics marked with #7 contain BPA.) Scientists know that tiny amounts of BPA can leach out of these containers into foods and drinks. Some studies suggest that exposing the plastics to high temperatures can cause more BPA to seep into foods.

There's a good chance that you have at least some BPA in your body. A recent study by the U.S. Centers for Disease Control and Prevention (CDC) found that more than 90% of Americans age 6 and older have detectable levels of BPA in their urine. The question remains, though, whether these levels of BPA can harm our health.

Several teams of experts worldwide have examined the evidence on BPA safety. Two of the most recent U.S. government reports come from the Food and Drug Administration (FDA) and the National Toxicology Program, an interagency program headquartered at NIH. Based on available data, the FDA report concluded that our current exposures to BPA from foods are likely too low to affect our health. But it noted that more research is needed to know for sure. The FDA will continue its review of BPA safety as more research and information become available.

The report from the National Toxicology Program, released in September 2008, expressed "some concern" about BPA's potential effects on infants, children and fetuses. Evidence from animal studies suggests that BPA exposure before adulthood can affect the brain, behavior and prostate gland. Some evidence in



animals also suggests that BPA exposure might affect development of the mammary glands or lead to early puberty in females.

Dr. John Bucher, associate director of the National Toxicology Program, noted that the connections between animal studies and human health effects are uncertain. "But we have concluded that we cannot dismiss the possibility that BPA may affect human development," he added.

At this time, the FDA does not recommend that people stop using products made with BPA. Still, the agency notes that several alternatives are available for people who have concerns about BPA. You can take steps to reduce your exposure. See the "Wise Choices" box for details. ■



Wise Choices Reduce Your Exposure to BPA

Some animal studies suggest that infants and children may be the most vulnerable to the effects of BPA. To reduce exposure:

- Don't microwave polycarbonate plastic food containers. The plastic may break down if repeatedly exposed to high temperatures.
- Reduce your use of canned foods.
- When possible, opt for glass, porcelain or stainless steel containers, especially for hot food or liquids.
- Use baby bottles and water bottles that are labeled "BPA free."



Web Links

For links to more information about BPA and food packaging, see this story online:
<http://newsinhealth.nih.gov/2008/November/feature2.htm>



Health Capsules

For links to more information about these topics, visit this page online:
<http://newsinhealth.nih.gov/2008/November/capsules.htm>

“Virtual” Colon Scans Show Promise

A colonoscopy can identify colon cancer at an early stage, when it's easiest to treat. But some people hesitate to undergo this invasive procedure, which uses a long, flexible tube with a camera to view the lining of the colon. Now scientists report that a newer technique called virtual colonoscopy can detect most of the large colon **polyps** that can be found by standard colonoscopy.

Virtual colonoscopy takes a series of x-ray scans of the lower belly. A computer then puts the pictures together to create 3-D images and videos of the inside of the colon.

To compare the accuracy of the new and old techniques, NIH-funded researchers examined more than 2,500 patients, age 50 or older. Each had a virtual colonoscopy followed by a standard one.

Virtual colonoscopy successfully identified about 90% of the patients

who had larger polyps, measuring about a ¼ inch or more, that were identified by standard colonoscopy. However, the virtual scan was less effective at detecting smaller polyps.

Both techniques have advantages and drawbacks. Virtual colonoscopy isn't as accurate as the standard one, but it may be more appealing for those put off by the long tube and sedation used in regular colonoscopy.

A key benefit of standard colonoscopy is that physicians can remove suspicious polyps immediately during the procedure. The long tube— or scope—includes tools for tissue

removal. In contrast, patients undergoing a virtual scan must schedule a followup regular colonoscopy to have suspicious polyps removed.

“The most important advice we can give to patients is to get screened,” said study coauthor Dr. Paul Limburg of the Mayo Clinic in Rochester, Minnesota. “How they get screened should be an individual decision based upon discussions between patients and their providers.” ■



Definitions

Polyps

Fleshy growths that stick out from the inside lining of the colon. Over time, they may develop into cancer.

Information on Drug Abuse and Addiction

Why do some people become addicted to drugs while others don't? How do drugs work in the brain? Where can you turn to learn more about drug abuse and addiction?

You can find the answers at *DrugPubs*, a new information center that distributes a wide range of free or low-cost materials on a variety of drug abuse topics, from *Marijuana: Facts for Teens to Preventing Drug Use Among Children and Adolescents*.

Many of the materials—including

fact sheets, brochures, pamphlets and videotapes—are available in both English and Spanish. *DrugPubs* is a service of NIH's National Institute on Drug Abuse (NIDA).

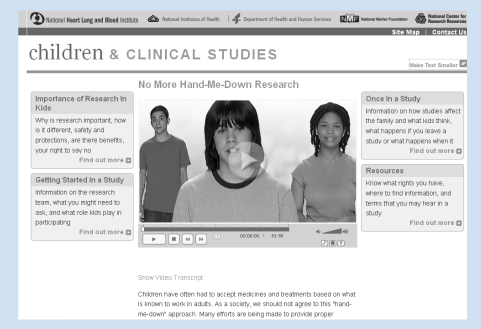
To see a list of available materials, visit www.nida.nih.gov/Pubcat. Most are available for online viewing or downloading. To order them, call 1-877-NIDA-NIH (1-877-643-2644) or 1-240-645-0228 (TDD), or e-mail drugpubs@nida.nih.gov. Online ordering will be available soon. ■



Featured Web Site Children & Clinical Studies

www.ChildrenAndClinicalStudies.nih.gov
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Treatments for children are often based on what works in adults. But children aren't little adults. Kids who participate in clinical studies can help save lives and improve the health of countless children. This new web site, with videos from kids, parents and experts, offers an insider's guide to help parents make well-informed decisions about whether to enroll their child in a clinical study.



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