

Stimulant ADHD Medications: Methylphenidate and Amphetamines

Stimulant medications (e.g., methylphenidate and amphetamines) are often prescribed to treat individuals diagnosed with attention-deficit hyperactivity disorder (ADHD). ADHD is characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequently displayed and more severe than is typically observed in individuals at a comparable level of development. This pattern of behavior usually becomes evident in the preschool or early elementary years, and the median age of onset of ADHD symptoms is 7 years. For many individuals, ADHD symptoms improve during adolescence or as age increases, but the disorder can persist into adulthood. In this country, ADHD is diagnosed in an estimated 8 percent of children ages 4–17 and 2.9–4.4 percent of adults.^{1,2,3}

How Do Prescription Stimulants Affect the Brain?

All stimulants work by increasing dopamine levels in the brain. Dopamine is a brain chemical (or neurotransmitter) associated with pleasure, movement, and attention. The therapeutic effect of stimulants is achieved by slow and steady increases of dopamine, which are similar to the natural production by

the brain. The doses prescribed by physicians start low and increase gradually until a therapeutic effect is reached. However, when taken in doses and routes other than those prescribed, stimulants can increase brain dopamine in a rapid and highly amplified manner as do most other drugs of abuse, disrupting normal communication between brain cells, producing euphoria, and increasing the risk of addiction.

What's the Role of Stimulants in the Treatment of ADHD?

Treatment of ADHD with stimulants, often in conjunction with psychotherapy, helps to improve the symptoms of ADHD, as well as the self-esteem, cognition, and social and family interactions of the patient. The most commonly prescribed medications include amphetamines (e.g., Adderall, a mix of amphetamine salts); methylphenidate (e.g., Concerta, a formulation that releases medication in the body over a period of time); and Ritalin, which is generally less potent than amphetamine. These medications have a paradoxically calming and “focusing” effect on individuals with ADHD. Researchers speculate that because methylphenidate amplifies the release of dopamine, it can improve

attention and focus in individuals who have dopamine signals that are weak.⁴

One of the most controversial issues in child psychiatry is whether the use of stimulant medications to treat ADHD increases the risk of substance abuse in adulthood. The research so far suggests that individuals with ADHD do not become addicted to their stimulant medications when taken in the form and dosage prescribed by doctors. And, there have been several studies that report stimulant therapy in childhood does not increase the risk for subsequent drug and alcohol abuse disorders.^{5,6,7} However, more research in this area is clearly needed, particularly in adolescents treated with stimulant medications.

Why and How are Prescription Stimulants Abused?

Stimulants have been abused for both “performance enhancement” and recreational purposes (i.e., to get high). For the former, they suppress appetite and facilitate weight loss, increase wakefulness, and increase focus and attention. Their euphoric effects usually occur when stimulants are crushed and snorted or injected. Some abusers dissolve the tablets in water and inject the mixture; however, complications can arise from this because insoluble fillers in the tablets can block small blood vessels.

What Adverse Effects Does Prescription Stimulant Abuse Have on Health?

Stimulants can increase blood pressure, heart rate, body temperature, and decrease sleep and appetite, which can lead to malnutrition and its consequences. At high doses, they can lead to serious cardiovascular complications, including stroke. Repeated use of stimulants can lead to feelings of hostility and paranoia.

Addiction to stimulants is also a very real consideration for anyone taking them without medical supervision, and is more likely to occur when the stimulant induces a rapid rise in brain dopamine, as is the case when they are taken in doses and routes other than those prescribed. If used chronically, withdrawal symptoms, including fatigue, depression, and disturbed sleep patterns can emerge when the drugs are discontinued.

How Widespread is Prescription Stimulant Abuse?

Monitoring the Future Survey

Each year, the Monitoring the Future (MTF) survey[†] assesses the extent of drug use among 8th, 10th, and 12th graders nationwide. For amphetamines and methylphenidate, the survey measures only past-year use, which refers to use at least once during the year preceding an

individual's response to the survey. Use outside of medical supervision was first measured in the study in 2001; it has been falling since then, with total declines of between 25 percent and 42 percent at each grade level. MTF data for 2007 indicate past-year non-medical use of Ritalin by 2.1 percent of 8th graders, 2.8 percent of 10th graders, and 3.8 percent of 12th graders.

Since its peak in the mid-1990s, annual prevalence of amphetamine use has fallen by more than half among 8th graders to 4 percent and by a third among 10th graders to 8 percent in 2007.

Amphetamine use peaked somewhat later among 12th graders, and has fallen by about a third to almost 8 percent in 2007. When asked, "What amphet-

amines have you taken during the last year without a doctor's orders?" 2.8 percent of all 12th graders reported they had used Adderall. Amphetamines rank fourth among 12th graders for past-year illicit drug use.

Other Information Sources

For more information on treating ADHD, visit the Web site for the National Institute of Mental Health, National Institutes of Health, at www.nimh.nih.gov.

For street terms searchable by drug name, street term, cost and quantities, drug trade, and drug use, visit www.whitehousedrugpolicy.gov/default.asp.

Data Source

[†] These data are from the 2007 Monitoring the Future survey, funded by the National Institute on Drug Abuse, National Institutes of Health, DHHS, and conducted annually by the University of Michigan's Institute for Social Research. The survey has tracked 12th graders' illicit drug use and related attitudes since 1975; in 1991, 8th and 10th graders were added to the study. The latest data are online at www.monitoringthefuture.org/

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