

Manifestation of Adult Attention-Deficit/Hyperactivity Disorder and Available Treatment Options

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Educational Objectives

After reading this article, the reader should be able to:

- Describe the manifestations of adult ADHD and identify common comorbidities.
- Describe pharmacological options in the treatment of adult ADHD.
- Review the efficacy of drugs used to treat adult ADHD.

Introduction

For many years, attention-deficit/hyperactivity disorder (ADHD) was considered a neuropsychological condition occurring strictly during childhood and adolescence. However, approximately 30% to 70% of children with ADHD continue to have symptoms into adulthood.¹ The estimated U.S. prevalence of adult ADHD is 1% to 7%.² In the last few years, the manifestation of the condition in adults has garnered increased attention, and the body of evidence supporting treatment modalities for this population is growing.

In this article, we aim to identify medications that have been studied in the treatment of adult ADHD and to present the evidence regarding their effectiveness. We conducted a MEDLINE literature search from 1995 to the present, using various combinations of the key words “ADHD,” “ADD,” “attention,” “deficit,” “hyperactivity,” “disorder,” and “adults.” We then performed a “snowball search” from the references of the relevant articles to identify additional studies published before 1995. Although the evaluation of measurement tools is outside the scope of this article, it is important for readers to bear in mind the complexity of comparing studies that use different outcome measures.



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Diagnosis and Clinical Features

Only about 20% of adults with ADHD have been given the proper diagnosis.³ Adults without a previous diagnosis of ADHD sometimes present to their primary care provider with

self-reported symptoms suggestive of ADHD. The diagnosis of adult ADHD can be challenging because these self-reported symptoms are not objectively verifiable.

The *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (*DSM-IV*), emphasizes both inattention and impulsivity/hyperactivity, but these symptoms may be subtle and difficult to elicit in adults. Symptoms are usually longstanding, and the growing consensus is that disinhibition may be a cardinal feature.⁴ Disinhibition may be manifested as poor self-regulation and difficulty with focused attention and goal-directed thought and action.

Although children with symptoms of ADHD are characterized as being constantly “on the go,” adults with these symptoms are considered to be “on edge.” Patients may have difficulty completing tasks or relaxing, and they are generally disorganized. Impulsivity may take the form of socially inappropriate behavior, such as interrupting or intruding on conversations.

ADHD can coexist with many psychiatric conditions such as depression, Generalized Anxiety Disorder (GAD), and bipolar disorder. The symptomatology of many of these conditions mirrors those of ADHD, making it difficult to “tease out” which condition is causing the range of symptoms described

by family members or the patient.

In a study of 56 adults who met the *DSM-IV* criteria for ADHD, the majority had additional psychiatric diagnoses; only seven subjects had a diagnosis of ADHD alone.⁵ Additional diagnoses included GAD (53%), dysthymic disorder (25%), and cyclothymic disorder (25%). Antisocial personality features were found in one fifth of adults with ADHD.⁴

Adults with ADHD are more likely to be unemployed or underemployed, to be smokers, and to have substance abuse and marital problems.⁶ These factors underscore the importance of proper diagnosis and treatment. In the attempt to extend the *DSM-IV* criteria to adult patients, problems may arise,⁷

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because the criteria were specifically developed for the diagnosis of ADHD in children. Although they are not free from inherent limitations of their own, the Utah Criteria for ADHD in Adults, on the other hand, were developed to reflect the distinct features of ADHD in adults.⁸

The first Utah criterion is a childhood history of ADHD. Patients must also experience symptoms of hyperactivity with poor concentration and at least two of the following:⁸

- affective lability
- hot temper
- an inability to complete tasks and disorganization
- stress intolerance
- impulsivity

Before evaluating the patient's presenting symptoms, the physician should establish a continuous developmental history of inattention and hyperactivity dating to at least age seven years. The evaluation of adult ADHD should also include an assessment of the impact of core ADHD symptoms on current functioning in the patient's occupation, schooling, and relationships. Clinicians may also consider obtaining information on attention, concentration, distractibility, and short-term memory, as well as other psychiatric disorders and substance abuse. If the results are equivocal upon this assessment, the patient should be referred for psychological evaluation.⁷

Pharmacological Therapy

Stimulants

A wealth of evidence supports the use of stimulants in the treatment of ADHD in children. According to the evidence-based clinical practice guideline for outpatient evaluation and management of ADHD produced by the Cincinnati Children's Hospital Medical Center, stimulants are first-line therapy in treatment plans requiring medications in children with ADHD.⁹ Stimulants approved for the treatment of ADHD in children include:

- methylphenidate (Concerta, Alza/McNeil Consumer; Daytrana patch, Shire; Focalin and Focalin XR, Novartis; Metadate CD, Metadate ER, Celltech; Methylin and Methylin ER, Mallinckrodt; Ritalin, Ritalin SR, Ritalin LA, Novartis).
- amphetamine salts (Adderall, Adderall XR, Shire).
- dextroamphetamine (Dexedrine, GlaxoSmithKline; Dextrostat, Shire).
- methamphetamine (Desoxyn, Ovation).
- pemoline (Cylert, Abbott).

Relatively little evidence exists, however, to support the use of these drugs in the treatment of adults with ADHD.

Methylphenidate

Several published studies have examined the effectiveness of methylphenidate (MPH) for adult ADHD, but the findings vary widely. In a sample of 23 adults with ADHD, Spencer et al. found an average response rate of 78% among subjects receiving MPH compared with 4% for placebo ($P < .0001$) in a

seven-week, double-blind, placebo-controlled, crossover study.¹⁰ In a study of similar design and sample size, Mattes et al. found that only 25% of those treated with MPH showed a clinical benefit.¹¹

Other trials have demonstrated response rates with MPH within this wide range of values. Wender et al. found a 57% moderate-to-marked therapeutic response rate;¹² Shekim et al., a 70% response rate;⁵ and Wood et al., a 73% rate.¹³ Kooij et al. also observed a variable response rate between 38% and 51% for MPH, compared with a range of 7% to 18% for placebo ($P < .05$).¹⁴

Overall, large, rigorous trials examining the efficacy of MPH for the treatment of adult ADHD are lacking. Most of the existing studies are small, and they vary widely in duration, diagnostic criteria, outcome measures, and indicators of response, not to mention overall response rates.

More recently, Spencer et al. published the results of a large, double-blind, randomized clinical trial of MPH in adult ADHD.¹⁵ To date, this is the largest study examining stimulant medications for adult ADHD available in the literature. A total of 146 subjects were assigned to receive either MPH or placebo. The investigators used the Clinical Global Impression (CGI) scale and the Adult ADHD Investigator System Report Scale to assess response to MPH treatment. Overall, they found a marked therapeutic response for MPH in the treatment of ADHD symptoms (76%) that exceeded the placebo response (19%) ($P < .0001$).

Amphetamine Salts

Despite the lack of conclusive evidence supporting MPH in adult ADHD, even fewer studies have evaluated the efficacy of amphetamine salts. In a seven-week, double-blind, placebo-controlled, crossover study, Spencer et al. found that 70% of those treated with amphetamines demonstrated a reduction on the ADHD Rating Scale of at least 30%, compared with only a 7% response rate with placebo ($P = .001$).¹⁶ The investigators also noted a dose relationship along a daily dose range of 20 to 60 mg.

In an open-label trial of low-dose amphetamine salts (10 mg), Horrigan and Barnhill observed a slightly lower response rate of 54% based on the CGI scale.¹⁷ Even though it might not be appropriate to compare the results of these studies—because the outcomes were based on different measurement tools—the lower response rates that they documented are consistent with the findings of a clear dose relationship, as suggested by the Spencer study.¹⁶ It is important to note that the Horrigan and Barnhill study was not placebo-controlled.¹⁷

The prescribing information for amphetamine salts cites a double-blind, randomized, placebo-controlled, parallel-group study of 255 adults with ADHD.¹⁸ This would clearly be the largest such trial examining the safety and efficacy of any stimulant medication in the treatment of adult ADHD, but the study has not been published.

As indicated in the prescribing information, the results suggest that significant improvements in ADHD symptoms occurred with amphetamine salts, compared with placebo, based on the ADHD Rating Scale.¹⁸ Subsequent to these findings, the U.S. Food and Drug Administration (FDA) has approved amphetamine salts for the treatment of ADHD in adults.

Dextroamphetamine

Only two published studies have examined the use of dextroamphetamine for adult ADHD. In one study, Taylor and Russo compared dextroamphetamine with guanfacine (Tenex, A.H. Robins), an alpha-2a agonist.¹⁹ The double-blind, placebo-controlled, crossover study suggested a similar response to the drugs. However, because the efficacy of these two drugs had not been previously established in this population, it is not known how these drugs compare with placebo.

In the second trial, the same investigators enrolled 22 adults in a randomized, double-blind, placebo-controlled crossover study to compare dextroamphetamine with modafinil (Provigil, Cephalon) and with placebo.²⁰ Both dextroamphetamine and modafinil led to improved scores on the *DSM-IV* ADHD Checklist, with statistical significance over placebo ($P < .001$). The results suggested that both agents might, in fact, have beneficial effects in adults with ADHD.

Pemoline

A paucity of evidence exists for the use of pemoline (Cylert, Abbott) in adults with ADHD, but overall, response rates are lower than those of other stimulant medications.^{13,21,22} On October 24, 2005, the FDA issued an alert stating that the overall risk of liver toxicity from pemoline outweighed the benefits of this drug.²³ Several months earlier, Abbott chose to stop sales and marketing of the drug in the U.S, as did all manufacturers of the generic brands.²³

Summary of the Stimulants

Additional rigorous, randomized controlled trials with large sample sizes, a standardized diagnosis, and standardized measures of response are necessary to fully understand the impact of stimulant medications on ADHD in adults. Furthermore, recent problems regarding the risk of cardiovascular effects and psychosis associated with stimulants have raised safety concerns. On February 9, 2006, the FDA's Drug Safety and Risk Management Advisory Committee voted to recommend a "black-box" warning describing the cardiovascular risks of stimulants in the treatment of ADHD.²⁴ On March 3, 2006, the FDA issued a memorandum regarding the incidence of psychiatric adverse events associated with ADHD medications based on postmarketing safety data. The 94-page publication describes a multitude of case reports suggesting a link between these medications and events such as psychosis, suicidality, aggression, violent behavior, and mania.²⁵ Additional common side effects of the drugs reviewed in this article are listed in Table 1.^{20,26,47,54-56}

Atomoxetine

Atomoxetine (Strattera, Eli Lilly), a selective norepinephrine reuptake inhibitor (SNRI), is indicated for the treatment of ADHD in children and specifically in adults.²⁶ As one of the only drugs with FDA approval for adult ADHD, atomoxetine has the most evidence available in the literature to support such use.

Two phase 3 trials ($n = 280$ and $n = 256$) examined the effects of atomoxetine in reducing adult ADHD symptoms of inattention and hyperactivity/impulsivity using the Conners Adult ADHD Rating Scale (CAARS).²⁷ Each trial was a 10-week,

multicenter, randomized, double-blind, placebo-controlled study. Adults who met *DSM-IV* criteria for ADHD, as assessed by clinical history and confirmed by the Conners' Adult ADHD Diagnostic Interview for *DSM-IV*, were enrolled if they had at least moderate symptom severity. In both studies, atomoxetine reduced ADHD symptoms more than placebo did. Reductions in CAARS- Investigator Rated total ADHD symptoms scores were -9.5 and -10.5 for atomoxetine in the first and second studies and -6.0 ($P = .005$) and -6.7 ($P = .002$) for placebo, respectively.

In aggregate, 8.5% of the subjects (or 23/270) receiving atomoxetine discontinued use because of adverse events. The most common reasons for discontinuation included insomnia ($n = 3$), chest pain ($n = 2$), palpitations ($n = 2$), and urinary retention ($n = 2$).²⁷

On September 29, 2005, the FDA requested the addition of a boxed warning to the package insert, stating that short-term studies of atomoxetine showed an increased risk of suicidal ideation in children and adolescents.²⁸ The risk of suicidal ideation in adults is not yet known.

Of the 526 patients enrolled in the two phase 3 trials, 385 (71.8%) voluntarily chose to enter a three-year, open-label continuation study.²⁹ The primary outcome measure was the Conners' Adult ADHD Rating Scale-Investigator Rated: Screening Version (CAARS-Inv: SV) total ADHD symptom score. All patients who chose to participate in the open-label continuation study received atomoxetine. The mean change in CAARS-Inv: SV total ADHD symptom score was -9.7 from a mean baseline score of 29.2, representing a 35.2% reduction ($P < .001$).²⁹

Fifty-eight subjects withdrew from the trial because of a lack of efficacy. Baseline demographic characteristics between the two treatment groups did not differ, but baseline symptom scores did, perhaps because patients who opted for the continuation study were those who responded best in the previous studies. The discontinuation rate attributable to adverse events during the open-label trial was 10.9%, compared with 8.5% during the acute studies.²⁹

Other Medications

A number of other drugs have been used in the treatment of adult ADHD with some degree of success. Tricyclic antidepressants, such as desipramine (Norpramin, Sanofi-Aventis), have been studied, as have bupropion (Wellbutrin, Wellbutrin Sustained Release (SR) and Extended Release (XL), Zyban, GlaxoSmithKline) and modafinil.

Bupropion

In one of the first studies examining the efficacy of bupropion in the treatment of adult ADHD, Wender and Reimherr treated 19 subjects with the dopamine reuptake inhibitor in an open-label fashion.³⁰ These subjects had been previously treated with either stimulants or monoamine oxidase (MAO) inhibitors. Fourteen of the 19 subjects experienced moderate-to-marked benefit from bupropion, and 10 of those chose to continue bupropion rather than their previous medication.

More recently, Wilens et al. conducted a six-week, double-blind, placebo-controlled, randomized trial in 40 adults; 21 received sustained-release bupropion, and 19 received placebo.³¹ In this study, bupropion was associated with a

greater reduction in ADHD symptoms (42%) than placebo (24%) ($P = .05$), according to scores on the CGI scale.

The Wilens team also performed a six-week open trial of bupropion in 36 adults with ADHD plus bipolar disorder.³² Although the study was not placebo-controlled, patients demonstrated significant reductions on the ADHD symptom checklist (-55% ; $P < .001$) and on the CGI scale (-40% ; $P < .001$), that were consistent with previous findings.

In one of the few comparative studies of medications to treat ADHD in adults, Kuperman et al. examined the effects of sustained-release bupropion, methylphenidate, and placebo.³³ The primary outcome measure of the randomized, double-blind, parallel trial was the response rate, based on improvements in CGI scores. Bupropion, methylphenidate, and placebo resulted in improvements of 64%, 50%, and 27%, respectively; however, the differences in response rates between the medications and placebo were not statistically significant ($P = 0.14$).

Although the study was small, with only 30 patients, it was powered to detect a significant treatment effect. However, the placebo response rate was considerably higher than expected.

Desipramine

One study is available examining the efficacy of desipramine in the treatment of adult ADHD.³⁴ The six-week, double-blind,

placebo-controlled study assessed the differences in the reduction of ADHD symptoms in adults receiving desipramine or placebo. The research suggests that 68% of subjects receiving desipramine responded to treatment, compared with none of the subjects who received placebo.

As with the stimulant medications, numerous studies have reported an association between the use of desipramine and the risk of cardiovascular effects.³⁵⁻³⁸ Wilens et al. found that desipramine induced statistically significant changes in blood pressure among adults with ADHD.³⁹ Stimulants and bupropion had the same effect.

Modafinil

In addition to the Taylor and Russo study,²⁰ which had compared modafinil with dextroamphetamine and placebo, one other study has evaluated modafinil in the treatment of adult ADHD. Turner et al. examined the effects of modafinil on cognitive effects such as short-term memory, visual memory, and spatial planning.⁴⁰ Although improvements for each of these measures were reported, it is difficult to compare the findings with studies of other medications in which measures of this type have not been used.

Summary of Other Medications

Among the nonstimulant drugs used for adult ADHD with-

Table 1 Medications Used to Treat Adult Attention-Deficit/Hyperactivity Disorder (ADHD)*

Drug	Formulation	Daily Dose†	Daily Dosage Schedule	Common Side Effects
Methylphenidate	5-, 10-, and 20-mg tablets 20-mg (slow-release) tablets 18- and 36-mg controlled-release tablets	20–100 mg	Twice to four times	Insomnia, decreased appetite/weight loss, headaches, “on edge”
Dextroamphetamine	5-, 10-, and 15-mg SR capsules 5 mg per 5 ml (elixir)	10–60 mg	Twice to three times	Insomnia, decreased appetite/weight loss, headaches, “on edge,” mild increases in pulse and blood pressure
Amphetamine salts‡	5-, 10-, and 20-mg tablets	10–60 mg	Twice to three times	Insomnia, decreased appetite/weight loss, headaches, “on edge,” mild increases in pulse and blood pressure
Desipramine	10-, 35-, 50-, 75-, 100-, and 150-mg tablets	100–300 mg	Once or twice	Dry mouth, constipation, vital sign and electrocardiographic changes; increased blood pressure
Bupropion	75- and 100-mg tablets	150–450 mg	Once or twice	Insomnia, risk of seizures (in doses above 6 mg/kg); contraindicated in bulimia
Modafinil	100- and 200-mg tablets	100–300 mg	Once	Headache, nausea, nervousness, insomnia, anxiety
Atomoxetine‡	10-, 18-, 25-, 40-, 60-, 80-, and 100-mg capsules	40–120 mg	Once or twice	Sleep disturbance, gastrointestinal tract distress, nausea, headache, mild increases in pulse and blood pressure

* Data from references 20, 26, 47, and 54–56.

† Denotes typical daily doses, which may exceed FDA-approved dosing.

‡ FDA-approved for adults with ADHD.

out specific FDA approval, bupropion and desipramine appear most often in the literature. Several additional drugs have been studied from time to time, but the results are not conclusive; most of the studies have been small and employ a less rigorous open-label design. Some of these medications include venlafaxine (Effexor, Wyeth),^{41–43} phenylalanine,⁴⁴ and levodopa (e.g., Larodopa, Roche).⁴⁵

Nonpharmacological Treatment Options

Educational and behavioral interventions should be used in conjunction with medication treatment. Cognitive behavioral therapy is effective in decreasing the significant social impact of ADHD. Behavioral treatment options include family therapy, organizational skills training, social skills training, and individual psychotherapy. Psychological treatment is recommended for coexisting mental health conditions, such as depression and anxiety. Some evidence of success exists for other interventions such as biofeedback and vitamins.^{46,47}

Risk of Medication Abuse

Providers should use caution when prescribing stimulants to patients with coexisting psychiatric and psychosocial conditions. Long-term marijuana or alcohol abusers may also report inattention and poor concentration, which raise the possibility of ADHD. Substance abuse often coexists with ADHD and can complicate ADHD diagnosis. Approximately 7% to 25% of individuals receiving treatment for substance abuse also have ADHD.^{48–50}

Oral methylphenidate does not produce a “high,” because it arrives at the brain slowly; however, injecting liquid methylphenidate or snorting crushed tablets or the contents of a caplet can cause a high similar to that of cocaine.^{51,52}

If there are concerns about substance abuse, stimulant drug therapy should be avoided. Because atomoxetine is not a stimulant, it carries a negligible risk of abuse and diversion. Thus, it may be a good treatment choice for patients who are at risk for substance abuse or who do not wish to take a controlled substance. In addition, the nonstimulant medications reviewed here do not carry the risk of abuse of stimulant medications. These medications may be beneficial if they can also treat existing comorbid psychiatric conditions.

Conclusion

If left untreated, adult ADHD is associated with exorbitant medical expenditures relating to symptoms and comorbidities.⁵³ Stimulants are considered first-line therapy for ADHD in children and adolescents, but large, rigorous, randomized controlled trials are needed to better understand the effects of these drugs in treating adult ADHD.

The first of such studies, published by Spencer et al.,¹⁵ should serve as a model for additional studies to help clinicians appreciate the benefits and risks associated with each of these drugs in adult ADHD. The two large phase 3 randomized, controlled trials and the open-label continuation study of atomoxetine represent the largest body of evidence supporting the use of any medication for the treatment of adult ADHD. These stud-

ies were conducted because the manufacturer sought approval of atomoxetine specifically for adults with ADHD.

Because most of the stimulant medications and other drugs used in the treatment of adult ADHD are available as generic versions, it is unlikely that studies of this magnitude will be conducted in adult populations. In addition, long-term studies examining the impact of ADHD agents in adults do not exist.

Comparing existing studies, which use different measures of outcomes, presents inherent challenges. Most of the measurement tools for ADHD are based on subjective patient-reported outcomes, and several different instruments were used in the studies reviewed here, including the CGI Scale, the ADHD Rating Scale, and the Conners Scale. Standardization of measurement instruments in future clinical research will help practitioners evaluate studies in the absence of comparative trials.

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Conflict-of-Interest (COI) Statement

Dr. Gagne states that he is an Outcomes Research Fellow at Ortho-McNeil Janssen Scientific Affairs, LLC. Dr. Singh has no relationships to disclose. Dr. Talati's fellowship is funded by Cephalon. The content of this article has been reviewed under Jefferson's Continuing Medical Education COI policy.

Continuing Education Questions for Physicians and Pharmacists

P&T® 2006;31(12):736-741

ACPE Program #079-999-06-024-H01

Expiration Date: December 31, 2007

TOPIC: Manifestation of Adult ADHD and Available Treatment Options

CME Accreditation

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of Jefferson Medical College and MediMedia USA, Inc.



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Jefferson Medical College of Thomas Jefferson University, as a member of the Consortium for Academic Continuing Medical Education, is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians. All faculty/authors participating in continuing medical education activities sponsored by Jefferson Medical College are expected to disclose to the activity audience any real or apparent conflict(s) of interest related to the content of their article(s). Full disclosure of these relationships appears on the last page of the article.

Continuing Medical Education Credit

This CME activity is designed to assist physicians and other health care professionals who are P&T committee members in making formulary decisions. Its goal is to increase participants' ability to recognize and treat important medical problems.

Jefferson Medical College designates this continuing medical education activity for a maximum of one Category 1 credit toward the Physician's Recognition Award (PRA) of the American Medical Association. Each physician should claim only those credits that he/she actually spent in the educational activity.

This credit is available for the period of one year from the date of publication.

Although forms will be processed when received, certificates for CME credits will be issued every six months, in February and August. Interim requests for certificates can be made by contacting the Jefferson Office of Continuing Medical Education at (215) 955-6992 or by going online to <http://jeffline.tju.edu/jeffcme/>.



Continuing Pharmacy Education Credit

The Department of Health Policy, Thomas Jefferson University Hospital, is approved by the Accreditation Council for Pharmacy Education (ACPE) as a provider of continuing pharmaceutical education and complies with the Criteria for Quality for continuing pharmaceutical education programming. This program (079-999-06-024-H01) is acceptable for 1.0 hour of continuing education credit (0.1 CEUs) in states that recognize ACPE-approved providers. Statements of Credit indicating hours/CEUs will be mailed within six to eight weeks to participants who completed this activity and submitted a completed evaluation with payment.

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1. Each CE article is prefaced by learning objectives for participants to use to determine whether the article relates to their individual learning needs.
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4. Complete the CE Registration and Evaluation Form. Type or print your full name and address in the space provided, and evaluate the activity as requested. In order for the form to be processed, all information must be complete and legible.
5. Payment of \$10 per exam is required for processing and maintenance of records. Make checks payable to P&T®. This processing fee is non-refundable.
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Thomas Jefferson University
Attn: Continuing Education Credit
1015 Walnut Street, Suite 115
Philadelphia, PA 19107
7. Be sure to mail the Registration, Evaluation Form, and \$10 payment within one year of the date of publication. After that date, this article will no longer be designated for credit and forms cannot be processed.

Continuing Education Questions for Physicians and Pharmacists

TOPIC: Manifestation of Adult ADHD and Available Treatment Options

APCE Program # 079-999-06-024-H01

CE Evaluation: Select the one best answer to each of the following questions, and record your response on the examination answer sheet. Complete the additional requested information. Forward the answer sheet, with appropriate payment, to the Department of Health Policy, Thomas Jefferson University Hospital, at the address indicated. A certificate of completion will be mailed within six to eight weeks of receipt of your exam/payment. (A minimum test score of 70% is required.)

Multiple Choice

Select the one correct answer.

1. **What is the estimated prevalence of adult ADHD?**
 - a. 1%–7%
 - b. 10%–15%
 - c. 16%–22%
 - d. 25%–30%
2. **Approximately what percentage of adults with ADHD have received the proper diagnosis?**
 - a. 5%
 - b. 20%
 - c. 50%
 - d. 80%
3. **Which set of criteria were developed to reflect the distinct features of ADHD in adults?**
 - a. DSM-IV criteria
 - b. NINDS/ADDA criteria
 - c. MINI criteria
 - d. Utah criteria
4. **Which of the following is the pre-conditional criterion for adult ADHD?**
 - a. hot temper
 - b. stress intolerance
 - c. childhood history
 - d. impulsivity
5. **Which of the following statements is true?**
 - a. Dextroamphetamine is approved by the FDA for the treatment of ADHD in adults.
 - b. The effectiveness of methylphenidate for adult ADHD varies widely according to the published literature.
 - c. Atomoxetine is a Schedule II medication.
 - d. Pemoline was withdrawn from the market because of bone marrow toxicity.
6. **Stimulant medications have “black box” warnings because of risk associated with which of the following?**
 - a. cardiovascular complications
 - b. psychosis
 - c. aggression
 - d. suicidality
7. **Which of the following medications are approved by the FDA for the treatment of ADHD in adults?**
 - a. methylphenidate and amphetamine salts
 - b. methylphenidate and atomoxetine
 - c. atomoxetine and amphetamine salts
 - d. atomoxetine and modafinil
8. **Which of the following medications has the lowest potential for abuse?**
 - a. methylphenidate
 - b. dextroamphetamine
 - c. amphetamine salts
 - d. desipramine
9. **Which of the following behavioral interventions could be used to decrease the social impact of ADHD in adults?**
 - a. family therapy
 - b. organizational skills training
 - c. individual psychotherapy
 - d. all of the above
10. **Which of the following medications is contraindicated in patients with bulimia?**
 - a. atomoxetine
 - b. modafinil
 - c. bupropion
 - d. desipramine

CE Registration and Evaluation Form

Date of publication: December 2006

Title: **Manifestation of Adult ADHD and Available Treatment Options**

Authors: **Joshua J. Gagne, PharmD, Madhusree Singh, MD, and Amy R. Talati, PharmD**

Submission deadline: **December 31, 2007**

ACPE Program # **079-999-06-024-H01**

Registration

Name: _____ Degree: _____

Street address: _____ Last 4 Digits of Social Security No. (Web ID): _____

City: _____ State: _____ Zip: _____ Telephone: _____

E-mail Address: _____ Check one: Physician Pharmacist Other

Time needed to complete this CE activity in hours: 0.5 hr 1 hr 1.5 hr 2 hr Other _____

Certification: I attest to having completed this CE activity. _____

Signature (required) _____ Date _____

Answer Sheet

Please fill in the box next to the letter corresponding to the correct answer

- | | | | | | | | |
|-------------------------------|----------------------------|----------------------------|----------------------------|--------------------------------|----------------------------|----------------------------|----------------------------|
| 1. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> | 6. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> |
| 2. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> | 7. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> |
| 3. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> | 8. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> |
| 4. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> | 9. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> |
| 5. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> | 10. a <input type="checkbox"/> | b <input type="checkbox"/> | c <input type="checkbox"/> | d <input type="checkbox"/> |

Evaluation

Rate the extent to which:

	Very High	High	Moderate	Low	Very Low
1. Objectives of this activity were met	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. You were satisfied with the overall quality of this activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Content was relevant to your practice needs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Participation in this activity changed your knowledge/attitudes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. You will make a change in <i>your practice</i> as a result of participation in this activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. This activity presented scientifically rigorous, unbiased, and balanced information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Individual presentations were free of commercial bias	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Adequate time was available for Q&A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Which ONE of the following best describes the impact of this activity on your performance:					
<input type="checkbox"/> This program will not change my behavior because my current practice is consistent with what was taught.					
<input type="checkbox"/> This activity will not change my behavior because I do not agree with the information presented.					
<input type="checkbox"/> I need more information before I can change my practice behavior.					
<input type="checkbox"/> I will immediately implement the information into my practice.					
10. Will you take any of the following actions as a result of participating in this educational activity (check all that apply)					
<input type="checkbox"/> Discuss new information with other professionals				<input type="checkbox"/> Consult the literature	
<input type="checkbox"/> Discuss with industry representative(s)				<input type="checkbox"/> Participate in another educational activity	
<input type="checkbox"/> Other _____				<input type="checkbox"/> None	

Send the completed form and \$10 payment (make checks payable to P&T) to: Department of Health Policy, Thomas Jefferson University, Attn: Continuing Education Credit, 1015 Walnut Street, Suite 115, Philadelphia, PA 19107.