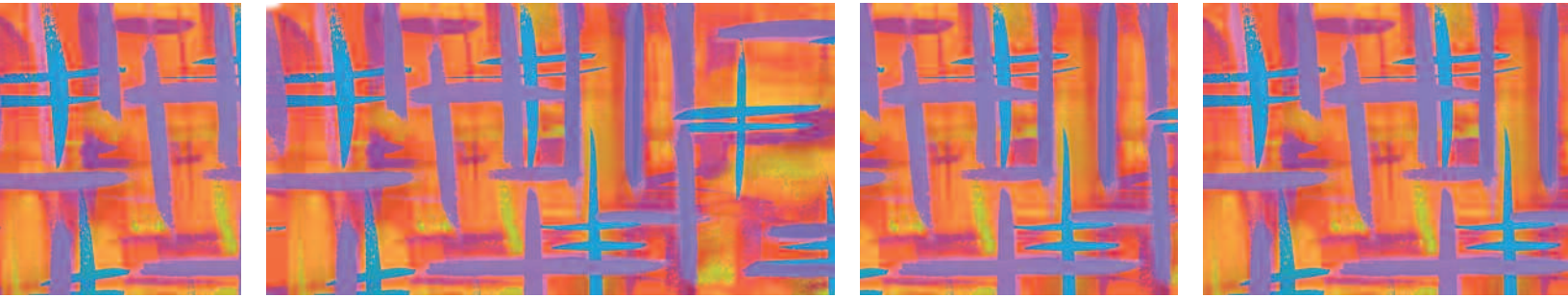


Adult ADHD: Issues and Answers

CME Newsletter of the Adult ADHD Program,
Department of Psychiatry, NYU School of Medicine



Nicotine: Friend or Foe in ADHD?

Nicotine is one of the most addictive pharmacoactive substances. Approximately 1 in 5 Americans still smokes despite well-documented health detriments that include cancer, cardiovascular disease, emphysema, and infertility.¹ Indeed, few of the devastating physiologic effects of smoking are traceable to nicotine itself since cigarettes contain hundreds of lethal compounds (many of which, like cyanide, are carcinogenic) that are introduced directly into the circulation via the lungs.

At the same time, nicotine, an alkaloid of the *Nicotiana tabacum* plant, or nicotically acting compounds possess some beneficial pharmacologic characteristics that are being studied as potential remedies for a wide range of diseases, including Alzheimer disease, parkinsonism, depression, anxiety, schizophrenia, pain, obesity, and, now, attention-deficit/hyperactivity disorder (ADHD). Also, people with depressive disorders, schizophrenia, and adult ADHD tend to smoke heavily, suggesting to researchers that nicotine may soothe their symptoms. To illustrate, an analysis of data on 4411 respondents aged 15 to 54 years from the National Comorbidity Survey showed that the lifetime smoking rates were 55% in those with a psychiatric diagnosis vs 39% in those with no such diagnosis ($P<0.001$).²

ADHD is a well-documented risk factor for smoking. One study showed that among current adult smokers, 35% with ADHD smoked daily as compared to 16% of non-ADHD controls.³ In another study, self-reported ADHD symptoms (inattention and hyperactivity/impulsivity) were associated with adult smoking, providing further evidence of a likely link between ADHD symptoms and risk for tobacco use.⁴

What purpose does nicotine serve in ADHD patients?

Smoking may be a form of self-medication in individuals with ADHD due to specific reinforcing mechanisms such as improvement of ADHD core symptoms, enhancement of moods and arousal, or a combination of both. In addition, the reinforcing effects of smoking may be potentiated by stimulant medication. New research shows that nicotine and its effects on cholinergic functioning may be valuable in treating some of the cognitive symptoms of adult ADHD.

Nicotine's impact on cholinergic functioning

The effect of nicotine on acetylcholine and cholinergic functioning is the focus of current research in adult ADHD. As early as 1996, Levin and colleagues showed that adults with ADHD experienced improved cognitive function while taking transdermal nicotine, presumably due to enhanced cholinergic function.⁵ One recent study examined the effects of transdermal nicotine treatment in young adults with ADHD-Combined subtype on cognitive domains including behavioral inhibition, delay aversion, and recognition memory.⁶ In that study, a significant ($P<0.05$) positive effect of nicotine was observed on the Stop Signal Reaction Time (SSRT) measure of the Stop Signal Task. The SSRT was improved without changes in Go reaction time or accuracy. A trend ($P=0.09$) was noted for nicotine to increase tolerance for delay and a strong trend ($P=0.06$) for nicotine to improve recognition memory. Thus, nonsmoking young adults with ADHD showed improvements in cognitive performance following nicotine administration in several domains central to ADHD. The results from this study support the premise that cholinergic neurotransmitter activity may be central to the cognitive deficits of ADHD and, in turn, may be a useful therapeutic target.

References

- Centers for Disease Control and Prevention (CDC). Cigarette smoking among adults—United States, 2004. *MMWR Morb Mortal Wkly Rep*. 2005;54(44):1121-1124.
- Lasser K, Boyd JW, Woolhandler S, et al. Smoking and mental illness: A population-based prevalence study. *JAMA*. 2000;284(20):2606-2610.
- Lambert NM, Hartsough CS. Prospective study of tobacco smoking and substance dependencies among samples of ADHD and non-ADHD participants. *J Learn Disabil*. 1998;31(6):533-544.
- Kollins SH, McClernon FJ, Fuemmeler BF. Association between smoking and attention-deficit/hyperactivity disorder symptoms in a population-based sample of young adults. *Arch Gen Psychiatry*. 2005;62(10):1142-1147.
- Levin ED, Conners CK, Sparrow E, et al. Nicotine effects on adults with attention-deficit/hyperactivity disorder. *Psychopharmacology (Berl)*. 1996;123(1):55-63.
- Potter AS, Newhouse PA. Acute nicotine improves cognitive deficits in young adults with attention-deficit/hyperactivity disorder. *Pharmacol Biochem Behav*. 2008;88(4):407-417.

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Statement of Need

The central feature of attention-deficit/hyperactivity disorder (ADHD) is inattention and/or hyperactivity-impulsivity inconsistent with the developmental level of the individual. The prefrontal deficits and hyperactive locomotor symptoms respond to stimulant medications, the primary class of drugs used to treat these patients. These agents increase the levels of dopamine and norepinephrine in the affected regions, resulting in a reduction of the locomotor and attentional symptoms characteristic of ADHD. Recent research, however, has implicated another set of receptors. The cholinergic receptors may have more to do with ADHD and its pathologies than previously thought, and nicotinic receptor agonists have been shown to improve working memory, learning, and attention. This may also explain the high rate of smoking seen in ADHD adults who use smoking as a form of self-medication. The interaction between stimulants treating ADHD and a new smoking cessation agent, varenicline, may inhibit the efficacy of varenicline and add to the already difficult task of smoking cessation in this patient population. Other research has addressed the bioavailability of methylphenidate in various formulations and the lack of efficacy of homeopathy in treating ADHD. Recently published research has focused on the psychosocial effects of ADHD and how to ameliorate them. This newsletter will report the latest findings on the mechanism of action of stimulants in ADHD patients and the newest findings on the effects of cholinergic receptors have on patients with ADHD. Recent findings on the efficacies of some homeopathic treatments will be discussed and the differences in bioavailability of various methylphenidate formulations will be addressed.

References

- Brod M, Johnston J, Able S, Swindle R. Validation of the adult attention-deficit/hyperactivity disorder quality-of-life scale (AAQoL): A disease-specific quality-of-life measure. *Qual Life Res*. 2006;15(1):117-129.
- Armsten AFT. Stimulants: therapeutic actions in ADHD. *Neuropsychopharmacology*. 2006;31(11):2376-2383.
- Wilens TE, Decker MW. Neuronal nicotinic receptor agonists for the treatment of attention-deficit/hyperactivity disorder: focus on cognition. *Biochem Pharmacol*. 2007;74(8):1212-1223.
- Wilens TE, Verlinden MH, Adler LA, Wozniak PJ, West SA. ABT-089, a neuronal nicotinic receptor partial agonist, for the treatment of attention-deficit/hyperactivity disorder in adults: results of a pilot study. *Biol Psychiatry*. 2006;59(11):1065-1070.
- Whitley HP, Moorman KL. Interference with smoking-cessation effects of varenicline after administration of immediate-release amphetamine-dextroamphetamine. *Pharmacotherapy*. 2007;27(10):1440-1445.

Learning Objectives

After completing this activity, you should be better able to:

- Identify possible reasons the incidence of smoking is higher among individuals with ADHD and discuss the evidence for the effect of ADHD on cholinergic function
- Evaluate new agents to aid smoking cessation and challenges to their use in the ADHD patient
- Discuss recent literature relating to the various treatment options for ADHD, including medication and psychotherapeutic techniques
- Explain issues surrounding the use of homeopathic remedies in adult ADHD and the benefits of disclosing an ADHD diagnosis on the psychosocial function of patients with ADHD

Method of Participation

Read this newsletter, complete the CME Posttest Answer Form and Activity Evaluation Form, and fax or mail the forms to Medical Education Resources, Inc. at the address listed. You will receive a certificate by fax or mail. There is no certificate processing fee.

Intended Audience

This activity was developed for psychiatrists, primary care physicians/internists, neurologists, and psychologists.

Effective Dates

Released: March 2008
Expires: March 31, 2009

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Use of Brand and Generic Names

Brand names of products for treating attention-deficit/hyperactivity disorder (ADHD) are used throughout this continuing medical education (CME) activity so that participants can distinguish among the many different formulations (duration of action, delivery system) of products with the same generic name.

Unlabeled Use Disclosure Statement

Participants are advised that this CME activity will contain references to unlabeled/unapproved/investigational uses of drugs to treat ADHD.

Disclaimer

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Nicotinic acetylcholine receptor blockers: The new drugs for ADHD?

Dopamine and norepinephrine are hypothesized to be important neurotransmitters in the mechanisms that fuel ADHD. However, evidence is growing to show that cholinergic neurotransmission, particularly involving neuronal nicotinic acetylcholine receptors (nAChRs), may be pivotal in ADHD pathophysiology. Nicotine has demonstrated procognitive effects in both humans and experimental animals and has produced signals of efficacy in small proof-of-concept adult ADHD trials.¹ Although adverse effects associated with nicotine, particularly emesis and nausea, can hinder its development as a potential therapy, a number of novel nAChR agonists with improved safety and tolerability profiles have been developed. Of these, ABT-418 and ABT-089 have both demonstrated signals of efficacy in adults with ADHD.^{2,3} Notably, tolerability issues that might be expected of an nAChR agonist were not observed at efficacious doses of ABT-089. Further understanding of the effects of novel neuronal nAChR agonists on specific aspects of cognitive functioning in ADHD is required to assess the full potential of this approach.

Because agents that target the nAChR improve working memory, learning, and attentional processes, they qualify as potential new treatment modalities for ADHD, pharmacologically distinct from stimulants and atomoxetine. Because of the addictive characteristics of nicotine, research has been done to identify compounds that exert cognitive effects similar to nicotine, without activating areas of the brain associated with drug reward. One subclass of agents that may meet these criteria is the full or partial agonists of the $\alpha_4\beta_2$ subunit of the nAChR. Published studies have shown promising results for these kinds of agents in the treatment of ADHD. In one study, 32 subjects received active drug for 3 weeks in a crossover design.² Results showed significant reductions in ADHD symptom scores, and a significantly greater proportion of patients were rated as improved while taking active drug compared with placebo. A more recent pilot study of 11 adults with ADHD showed that twice-daily doses of ABT-089 were superior to placebo on several measures, including the Conners' Adult ADHD Rating Scale (CAARS), the CAARS ADHD Index, Hyperactive/Impulsive scores, and Clinical Global Impression-ADHD Severity score.³ More studies on these and other nAChR agonists are expected to follow.

References

1. Wilens TE, Decker MW. Neuronal nicotinic receptor agonists for the treatment of attention-deficit/hyperactivity disorder: focus on cognition. *Biochem Pharmacol*. 2007;74(8):1212-1223.
2. Wilens TE, Biederman J, Spencer TJ, et al. A pilot controlled clinical trial of ABT-418, a cholinergic agonist, in the treatment of adults with attention deficit hyperactivity disorder. *Am J Psychiatry*. 1999;156(12):1931-1937.
3. Wilens TE, Verlinden MH, Adler LA, Wozniak PJ, West SA. ABT-089, a neuronal nicotinic receptor partial agonist, for the treatment of attention-deficit/hyperactivity disorder in adults: results of a pilot study. *Biol Psychiatry*. 2006;59(11):1065-1070.

Case study

A look at any photo taken of Sharon over the last 20 years will show a cigarette in her hand. This patient, 45, presents to the clinician's office for evaluation of chronic depression and for smoking cessation. She describes her 30-year history of depression with symptoms on most days. She has no other clear vegetative symptoms of depression except for early insomnia.

In her medical history, she notes a 2-pack/day cigarette smoking habit for the past for 25 years and she reported attempting to quit "cold turkey" numerous times without enduring success. She states that she smokes to help calm down and pay attention. "Smoking helps me get things done," she claims. She describes difficulty attending to tasks going back to elementary school. Teachers noted daydreaming, inattention, and disorganization on her first grade report card. These symptoms continue today. A recent review of her job in sales noted not listening in meetings, trouble initiating and completing tasks, trouble with time management, chronic lateness, and forgetfulness. The patient also acknowledges losing things at home and work and that her husband complains that she does not listen to him. She reports occasional restlessness and easy boredom, but denies impulsiveness and a need to be constantly busy. There is no other history of substance abuse disorder. No history of manic symptoms is reported. Her family history is notable for ADHD: inattentive subtype in her sister.

Based on the aforementioned information, the diagnoses for this patient are nicotine dependence, dysthymia, and inattentive ADHD. In attempting to treat all syndromes, bupropion 150 mg XL was initiated with titration up to 300 mg/day over several weeks. After 6 weeks, the patient reports significant decrease in inattention and improved task completion and organization. She has cut her smoking down to 1/2 pack/day and her mood is more euthymic.

Key points of this case:

1. The patient presented for smoking cessation and chronic depression, but ADHD was underlying her inability to quit smoking
2. If not specifically questioned for, the symptoms of ADHD were easy to overlook
3. The patient may have been unknowingly self-medicating her ADHD with nicotine
4. Bupropion XL was successful at treating all these disorders

Encourage patients to snuff out that butt

Patients who have a psychiatric diagnosis should be strongly encouraged to stop smoking to improve their general health. Many of the options and their costs are presented in [Table 1](#). A new agent for use in smoking cessation is varenicline, a partial agonist at the nicotinic $\alpha_4\beta_2$ receptor. A profile of this drug is listed in [Table 2](#). A direct comparison of varenicline with bupropion sustained-release has shown that varenicline is at least as good as and probably more effective than bupropion for smoking cessation.¹ In that study of over 1000 adults, the continuous abstinence rates for weeks 9 through 52 were 22% for varenicline vs 16% for bupropion SR, which trended toward statistical significance

Table 1.
Cost Comparison of Currently Available Smoking Cessation Therapies

Drug	Cost (\$)/30-Day Supply	Rx or OTC ^a
Bupropion SR	120	Rx
Nicotine gum	48 (108 pieces)	OTC
Nicotine inhaler	137	Rx
Nicotine lozenge	57 (108 pieces)	OTC
Nicotine nasal spray	100 (3 bottles)	Rx
Nicotine patch	120	OTC
Varenicline	125	Rx

^a Rx = prescription; OTC = over the counter.

($P=0.057$). At present, the number of subjects who have used varenicline in clinical trials is relatively small, and thus, some rare but serious adverse reactions may not have yet emerged. Thus, recommending varenicline for smoking cessation over bupropion may be premature. However, varenicline offers a new option to patients who cannot tolerate the side effects associated with nicotine-replacement therapy and bupropion. In terms of patients with ADHD, data suggest that addition of amphetamine to varenicline may negate the partial agonism of varenicline, resulting in reduction in the benefits of the drug for smoking cessation.² Other potential mechanisms for the drug interaction may also exist. Thus, varenicline may not aid smoking cessation in patients undergoing treatment with amphetamine and amphetamine-like drugs.

References

1. Gonzales D, Rennard SI, Nides M, et al; Varenicline Phase 3 Study Group. Varenicline, an $\alpha_4\beta_2$ nicotinic acetylcholine receptor partial agonist, vs sustained-release bupropion and placebo for smoking cessation: a randomized controlled trial. *JAMA*. 2006;296(1):47-55.
2. Whitley HP, Moorman KL. Interference with smoking-cessation effects of varenicline after administration of immediate-release amphetamine-dextroamphetamine. *Pharmacotherapy*. 2007;27(10):1440-1445.
3. Chantix [prescribing information]. New York, NY: Pfizer Inc, 2008.

Journal reviews

Prolonged-release methylphenidate effective, safe in adult ADHD

A new study has shown that prolonged-release methylphenidate is an effective treatment of ADHD in adults, with a safety profile consistent with methylphenidate use in pediatrics.¹ In this double-blind trial, 401 adults with ADHD (218 [54%] men; 18–63 years) were randomly assigned to receive prolonged-release osmotic release oral system (OROS) methylphenidate (18, 36, or 72 mg/day) or placebo for 5 weeks. The primary outcome was a change in total score on Conners' Adult ADHD Rating Scale (CAARS: investigator-rated) at end point compared with baseline.

Table 2.
A Profile of Varenicline³

Pharmacology	<ul style="list-style-type: none"> The efficacy of varenicline in smoking cessation is believed to be the result of the drug's activity at a subtype of the nicotinic receptor where its binding produces agonist activity while simultaneously preventing nicotine binding to $\alpha_4\beta_2$ receptors
Pharmacokinetics	<ul style="list-style-type: none"> Steady state is reached within 4 days of administration Absorption not affected by food
Dosing	<ul style="list-style-type: none"> Available in 0.5-mg and 1-mg tablets Labeling information recommends adjusting the dosage from 0.5 mg once daily for days 1–3 to 0.5 mg twice daily for days 4–7, with a final dosage of 1 mg twice daily Initiate 1 week before the patient's set quit date Indicated for 12 weeks of treatment; patients who have stopped smoking by the end of that time should receive an additional 12 weeks of therapy
Side effects	<ul style="list-style-type: none"> Mild/moderate nausea and vomiting are the most common adverse effects, occurring in approximately 30% of patients Other common adverse effects observed in >10% of patients include headache, insomnia, and abnormal dreams Adjusting the dosage over 1 week and taking after a meal with a full glass of water helps to decrease these effects
Drug interactions	<ul style="list-style-type: none"> Has been administered concurrently with warfarin, digoxin, transdermal nicotine, bupropion, cimetidine, and metformin without any clinically significant drug interactions Increased rates of nausea were reported when varenicline was given with nicotine replacement therapy (NRT) vs NRT alone

Treatment with 18, 36, and 72 mg/day prolonged-release methylphenidate, compared with placebo, was associated with significantly greater improvement in CAARS total symptom score from baseline to end point than placebo: mean change -10.6 ($P=0.01$), -11.5 ($P=0.01$), and -13.7 ($P<0.001$) vs -7.6, respectively. Responders ($\geq 30\%$ decrease) were 51%, 49%, and 60% vs 27% ($P<0.001$).

Group therapy may be useful in adult ADHD

A recent study suggests that cognitive-behavioral group rehabilitation can be suitable in treating adult ADHD.² In this study of 29 adults, rehabilitation consisted of 10 or 11 weekly sessions. Participants were assessed with self-ratings (checklist for ADHD based on the *Diagnostic and Statistical Manual of Mental Disorders*, Beck Depression Inventory II, Symptom Check List-90 [SCL-90], Brown ADD Scale for Adults [BADDSS]), and the ratings of their significant others (BADDSS) 3 months prior to treatment, at the beginning of treatment, and at treatment end. Rehabilitation resulted in reduced self-reported symptoms in 16 ADHD-related items of SCL-90, BADDSS total score, and BADDSS subdomains of activation and affect. This study lends credence to the need for effective nonpharmacological intervention in adult ADHD patients seen in clinical practice.

Bioavailability of methylphenidate similar regardless of formulation

The *d*-isomer of methylphenidate (*d*-MPH) is the pharmacologically active part of the original racemic mixture of methylphenidate (*d,l*-MPH; Ritalin LA). A modified release formulation with bimodal release of the pure *d*-enantiomer (Focalin XR) has been developed to enable a rapid onset of action and a sustained activity for once-daily administration. This formulation was intended to achieve a bimodal concentration-time profile as observed after administration of 2 immediate-release (IR) Focalin tablets. In a study of healthy volunteers, the pharmacokinetics of this *d*-MPH bimodal release formulation was compared with a *d*-MPH immediate-release formulation and a similar bimodal release formulation of *d,l*-MPH.³ Here, 25 volunteers received a single 20-mg dose of *d*-MPH bimodal release formulation, 2 10-mg doses of a *d*-MPH IR formulation given 4 hours apart, and a single 40-mg dose of *d,l*-MPH bimodal release formulation (1:1 ratio for *d:l* enantiomers). The wash out between treatments in this 3-way crossover study was 7 days. The results showed that the *d*-MPH bimodal release formulation generated 2 distinct *d*-MPH plasma concentration peaks and both peak concentrations and the time to peak were similar to those of the *d*-MPH IR formulation given 4 hours apart and the *d,l*-MPH bimodal release formulation. The 3 formulations had C_{max} and $AUC_{0-\infty}$ values of 15.5 ng/mL and 119 ng x hr/mL for bimodal release *d*-MPH, 17.9 ng/mL and 115 ng x hr/mL for *d*-MPH IR, and 16.4 ng/mL and 122 ng x hr/mL for *d,l*-MPH bimodal release, respectively. Thus, the 20-mg extended- (bimodal) release formulation of *d*-MPH (Focalin XR) demonstrated a bimodal concentration-time profile and was bioequivalent to 2 10-mg doses of immediate-release *d*-MPH (Focalin) and was bioequivalent to 40-mg extended- (bimodal) release *d,l*-MPH (Ritalin LA). The clinical significance of this study is that the formulations may be changed according to patient needs without serum concentrations of drug oscillating out of optimal therapeutic range.

Homeopathy may not be effective for adult ADHD

A recent *Cochrane Database Systems Review* has not found any evidence that homeopathic treatments can successfully control the symptoms of adult ADHD.⁴ Data from 4 eligible studies that included 168 patients showed that the forms of homeopathy evaluated did not suggest significant treatment effects for the global symptoms, core symptoms of inattention, hyperactivity or impulsivity, or related outcomes such as anxiety in ADHD. Thus, little current evidence exists for the efficacy of homeopathy in the treatment of ADHD. Development of optimal treatment protocols is recommended prior to any future randomized controlled trials.

Do ask, do tell?

ADHD disclosure may minimize social rejection

The vast majority of young adults with ADHD report interpersonal difficulties, which are likely exacerbated by others' negative perceptions of ADHD. Hence, researchers and clinicians have called for the development of attitude change strategies. One such strategy is preventative disclosure, in which a patient selectively informs and educates others about the condition. A recent study examined the effects of disclosure.⁵ Here, 306 young adults read vignettes that varied in a 2 (ADHD symptom presentation: hyperactive/impulsive vs inattentive) by 2 (preventative disclosure vs nondisclosure) design. A factor analysis of the questions following each vignette resulted in 2 factors: socially rejecting attitudes ($\alpha=0.82$) and potential benefits with treatment ($\alpha=0.61$). Results suggest that preventative disclosure may greatly reduce socially rejecting attitudes ($d=-0.95$). When ADHD was disclosed, respondents were more likely to report that the character would benefit from treatment ($d=0.39$). A patient presenting with hyperactive/impulsive symptoms, compared to a patient presenting with inattentive symptoms, was more likely to be viewed as potentially benefiting from treatment ($d=0.50$). If the results of the present study replicate with clinical samples, preventative disclosure could have a significant impact on the psychosocial functioning of people with ADHD.

References

1. Medori R, Ramos-Quiroga JA, Casas M, et al. A randomized, placebo-controlled trial of three fixed dosages of prolonged-release OROS methylphenidate in adults with attention-deficit/hyperactivity disorder. *Biol Psychiatry*. 2008; Jan 17; [Epub ahead of print].
2. Virta M, Vedenpää A, Grönroos N, et al. Adults with ADHD benefit from cognitive behaviorally oriented group rehabilitation: a study of 29 participants. *J Atten Disord*. 2008; Jan 11; [Epub ahead of print].
3. Tuerck D, Wang Y, Maboudian M, et al. Similar bioavailability of dexamethylphenidate extended (bimodal) release, dexamethylphenidate immediate release and racemic methylphenidate extended (bimodal) release formulations in man. *Int J Clin Pharmacol Ther*. 2007;45(12): 662-668.
4. Coulter MK, Dean ME. Homeopathy for attention deficit/hyperactivity disorder or hyperkinetic disorder. *Cochrane Database Syst Rev*. 2007;(4):CD005648.
5. Jastrowski KE, Berlin KS, Sato AF, Davies WH. Disclosure of attention-deficit/hyperactivity disorder may minimize risk of social rejection. *Psychiatry*. 2007;70(3):274-282.

Posttest

Please select only one answer for each question. Circle the letter corresponding to the correct answer on the answer form on the next page.

1. Despite smoking's well-documented health detriments, how many Americans still smoke?
 - A. 1 in 2
 - B. 1 in 3
 - C. 1 in 4
 - D. 1 in 5
2. One study showed that among current adult smokers, how many more people with ADHD smoked daily as compared to non-ADHD controls?
 - A. More than twice as many
 - B. More than 3 times as many
 - C. More than 4 times as many
 - D. More than 5 times as many
3. Nicotine appears to affect the function of which neurotransmitter?
 - A. Dopamine
 - B. Serotonin
 - C. Acetylcholine
 - D. Norepinephrine
4. What are the 2 main side effects associated with nicotine?
 - A. Somnolence and agitation
 - B. Nervousness and anxiety
 - C. Nausea and vomiting
 - D. Sleep interference and loss of energy
5. What is a true statement about nicotinic acetylcholine receptor blockers?
 - A. They are pharmacologically similar to atomoxetine
 - B. They are pharmacologically dissimilar to psychostimulants
 - C. They tend to erode working memory
 - D. All of the above
6. Data suggest that addition of which drug to varenicline may negate the partial agonism of varenicline, resulting in elimination of the benefit of varenicline for smoking cessation?
 - A. Amphetamine
 - B. Methylphenidate
 - C. Atomoxetine
 - D. Guanfacine
7. Which statement about varenicline is not true?
 - A. Steady state is reached within 4 days of administration
 - B. Absorption is not affected by food
 - C. Nausea and vomiting are the most common adverse effects
 - D. It can interact with bupropion and cimetidine
8. Which over-the-counter smoking cessation therapy is the most expensive for a 30-day supply?
 - A. Varenicline
 - B. Nicotine patch
 - C. Nicotine nasal spray
 - D. Nicotine gum
9. A recent pharmacokinetic study found that the 20-mg extended- (bimodal) release formulation of *d*-MPH was bioequivalent to:
 - A. Two 10-mg doses of immediate-release *d*-MPH
 - B. 40-mg extended-release dose of *d,l*-MPH
 - C. Both A and B
 - D. Neither A nor B
10. A recent *Cochrane Database Systems Review* discussed in this issue found that which therapy has not been proven to be effective in controlling ADHD symptoms?
 - A. Acupuncture
 - B. Homeopathy
 - C. Group therapy
 - D. Rolfing

Adult ADHD: Issues and Answers

Successful completion of the posttest examination (at least 70% correct) and activity evaluation is required to earn a maximum of .75 AMA PRA Category I Credits™. Statements of Credit will be awarded upon successful completion of the posttest and evaluation.

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Posttest Answer Form	
(Circle the correct answer to each question)	
1. A B C D	6. A B C D
2. A B C D	7. A B C D
3. A B C D	8. A B C D
4. A B C D	9. A B C D
5. A B C D	10. A B C D

To receive credit, you must answer 7 of the 10 posttest questions correctly, complete all forms, and submit them by March 31, 2009.

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Signature _____ Date _____

Activity Evaluation Form

Please circle the appropriate rating in answer to the questions that follow:

- How would you rate the content of this CME activity?
 Poor 1 2 3 4 5 Outstanding
- How relevant was the content of this activity to your practice?
 Not relevant at all 1 2 3 4 5 Very relevant
- To what degree were you able to meet each of the learning objectives of the activity? Please respond to each learning objective listed below:
 - Identify possible reasons the incidence of smoking is higher among individuals with ADHD and discuss the evidence for the effect of ADHD on cholinergic function
 Poor 1 2 3 4 5 Outstanding
 - Evaluate new agents to aid smoking cessation and challenges to their use in the ADHD patient
 Poor 1 2 3 4 5 Outstanding
 - Discuss recent literature relating to the various treatment options for ADHD, including medication and psychotherapeutic techniques
 Poor 1 2 3 4 5 Outstanding
 - Explain issues surrounding the use of homeopathic remedies in adult ADHD and the benefits of disclosing an ADHD diagnosis on the psychosocial function of patients with ADHD
 Poor 1 2 3 4 5 Outstanding
- Based on your knowledge and experiences, the level of the activity was:
 Basic Appropriate Complex
- How would you rate the activity overall?
 Poor 1 2 3 4 5 Outstanding
- Do you believe this activity was fair, balanced, and free of commercial bias?
 - Yes No
 - If No, please state the reason:

- How much did this activity enforce your current clinical opinions?
 Not at all 1 2 3 4 5 A lot
- How much new information did you find in this activity?
 None 1 2 3 4 5 A lot
- As a result of this activity, will you alter your practice?
 Yes No
- If Yes, please describe any change(s) you plan to make:

- How committed are you to making these changes?
 Not at all committed 1 2 3 4 5 Very committed
- If No, why not? _____
- Additional comments about this activity?

- Do you feel future activities on this subject matter are necessary and/or important to your practice?
 Yes No
- Please list any other topics that would be of interest to you for future educational activities.



Adult ADHD: Issues and Answers

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We are pleased to also offer this issue of **Adult ADHD: Issues and Answers** online through the Adult ADHD Program at NYU School of Medicine Department of Psychiatry Web site at:

<http://www.med.nyu.edu/psych/psychiatrist/adultadhdnewsletter.html>

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