

Smoking Cessation:

Options for Patients



By Jason Ludvig, BSc; and Mark Eisenberg, MD, MPH, FACC

Over 1.1 million individuals suffer a myocardial infarction (MI) each year in North America, and more than 20% of these individuals are habitual smokers.¹ Cigarette smoking promotes arteriosclerosis and is associated with an increased risk of sudden death, angina, peripheral vascular disease, and stroke.² Cardiac disease patients, who stop smoking, dramatically reduce their risk for recurrent coronary heart events to the level of healthy non-smokers within three years.³

Many clinical trials show that nicotine replacement therapies (NRTs) (*i.e.*, nicotine chewing gum, transdermal patches, and inhalers) and non-nicotine replacement therapies (*i.e.*, counseling and bupropion) effectively increase smoking abstinence rates. The incidence of smoking relapse, despite the relative success of cessation aids, remains high at 70% to 80%.⁴

The following article will give an overview of the health risks involved in smoking and discuss smoking cessation aids for patients with cardiac disease.

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Association of Cigarette Smoking With Heart Disease

Smoking greatly increases the risk of heart disease, and is an important factor in the primary prevention of MI. There is a synergistic effect when cigarette smoking is combined with other risk factors contributing to cardiovascular disease, such as high blood pressure, high serum cholesterol levels, obesity and diabetes mellitus. Mechanisms by which cigarette smoking is likely to contribute to recurrent MIs include reduced oxygen-carrying capacity of the blood; coronary vasoconstriction; increased myocardial work; and sharp increases in heart rate and blood pressure due to a rapid rise in arterial and venous plasma concentration of nicotine.⁵

Characteristics of Smoking Populations

Although there is ample evidence showing the health risks of smoking, nearly a quarter of all adults smoke. In the past decade, the prevalence of adolescent smoking has risen dramatically. Smoking among Canadian teenagers (aged 15 to 19) increased from 20% to 30% between 1992 and 1999.⁶ The sharp increase in adolescent smoking can be attributed to the large increase in marketing and promotional campaigns geared towards adolescents.⁷ To counter the targeting of young people by the cigarette industry, physicians need to follow guidelines to help identify young smokers and implement newly developed anti-smoking programs. Continual development of new strategies to help teenagers stay off cigarettes is required.

The Major Obstacle to Smoking Cessation

Nicotine addiction perpetuates itself by controlling the release of a cascade of neurotransmitters, depending on the intensity and rate of nicotine delivery to the brain. With prolonged exposure to nicotine, tolerance to these effects develops and the presence of nicotine in the brain becomes necessary to maintain normal function. The absence of neural transmitters (such as serotonin and dopamine), due to nicotine deficiency, leads to withdrawal symptoms. These symptoms range from anxiety and depressive symptoms to intense cravings and hunger.⁵ Cigarette smoking, due to nicotine dependence, is a difficult habit to break.

Techniques and Approaches to Smoking Cessation

Several smoking cessation aids have been developed in the past 20 years. These aids can be classified into two groups: nicotine and non-nicotine replacement therapy. NRTs include gum, patches and inhalers. NRTs wean the patients from cigarettes by supplying them with a weaker concentration of nicotine than that provided by cigarettes.

Non-nicotine replacement therapies include bupropion and counseling. Bupropion and NRTs are similar since they both act on neurotransmitter receptors in the brain. The difference between the two groups is that one treatment contains nicotine while the other treatment is nicotine-free.

Reports from clinical trials indicate that smoking cessation aids double quit rates and increase absolute smoking-abstinence rates by as much as 10% when compared with placebo treatments. Most patients enrolled in clinical

Cases

Case One

Mr. Jackson, 45, recently survived a myocardial infarction (MI) and wants help to quit smoking. He feels the need to smoke within the first five minutes upon waking and has been smoking a pack a day for the past 20 years. He has attempted to quit smoking a few times, but each effort ended in smoking relapse after only a few months.

Physical examination shows a mildly obese man with a blood pressure (BP) of 140/80 mmHg, heart rate of 70 bpm and a respiratory rate of 14. His father has coronary artery disease. Mr. Jackson has no personal or family history of seizure, nervous system disorders, brain tumor, or stroke. He takes ramipril 7.5 mg, atorvastatin 10 mg, and one tablet of acetylsalicylic acid 325 mg once a day, as well as metoprolol 50 mg and insulin twice a day.

Question: At this stage, which smoking cessation aid would be most suitable to help Mr. Jackson?

Case Two

Ms. O'Hare, 32, has smoked at least two packs a day for many years. She has a history of hypertension and diabetes. Her mother had a stroke at the age of 50. She takes ramipril 5 mg daily, and insulin twice daily. Physical examination shows a BP of 145/95 mmHg, heart rate of 77 bpm and respiratory rate of 13.

Question: Which smoking cessation aid is most appropriate for Ms. O'Hare?

Case Three

Mr. Howard, 50, has smoked less than a pack per day for the past 20 years. Last month, he had an acute MI and underwent coronary artery bypass grafting (CABG). His father was diagnosed with coronary artery disease at the age of 43. His brother had a seizure disorder at the age of 45. Mr. Howard takes ramipril 7.5 mg, atorvastatin 10 mg, and acetylsalicylic acid 325 mg daily, as well as metoprolol 50 mg, twice daily. During the physical examination, Mr. Howard had a BP of 138/88 mmHg, a heart rate of 76 bpm and a respiratory rate of 14.

Question: Which smoking cessation aid would you recommend to Mr. Howard?

See Case Discussions on page 44.

Table 1

Smoking Cessation Aids: Recommendations and Clinical Side Effects

Smoking Cessation Aid	Clinical Side Effects
Bupropion	<ul style="list-style-type: none"> • Recommended for post-MI patients \leq 2 weeks following an MI. • Contraindicated in patients with a personal or family history of seizure. • Headaches, tremors and insomnia are most common side effects.
Transdermal nicotine patches	<ul style="list-style-type: none"> • Recommended for post-MI patients $>$ 2 weeks following an MI. • Contraindicated in patients with severe arrhythmia and worsening angina • Rash is the most common side effect.
Nicotine chewing gum	<ul style="list-style-type: none"> • Fast delivery of nicotine, thus not recommended for post-MI patients. • Contraindicated in patients with severe arrhythmia and angina in female patients who are pregnant and/or lactating. • Throat irritation and nausea are the most common side effects.
Nicotine inhaler	<ul style="list-style-type: none"> • Fast delivery of large concentrations of nicotine raises heart rate and blood pressure, thus not safe for post-MI patients. • Contraindicated in patients with angina or coronary artery disease. • Coughing and throat irritation are the most common side effects.

trials are not as motivated as cardiac patients. Quit rates tend to be higher in cardiac patients. The side effects and safety concerns of each smoking cessation aid are listed in Table 1.

Bupropion: Bupropion (Zyban), an antidepressant that exhibits both noradrenergic and dopaminergic activity, is the first non-nicotine drug treatment for smoking cessation. The suggested course of the 12-week treatment is a daily dose of 150 mg for three days followed by a dose of 150 mg twice daily for the remainder of the treatment.⁸ Patients are supposed to quit smoking 10 to 14 days after they begin the treatment. By slowing the normal re-uptake of central nervous system (CNS) dopamine or preventing the normal breakdown of nicotine in the CNS, bupropion can alleviate or eliminate nicotine withdrawal symptoms.⁹

Bupropion is recommended for post-MI patients, less than and up to two weeks following an MI. It is contraindicated in patients with a personal or family history of seizure.

Transdermal Nicotine Patch: There are two types of patches available for smoking cessation: a 22 mg patch (Nicotrol) or a 21 mg patch (Nicoderm CQ) that is tapered to 14 mg and then 7 mg. The Nicotrol patch is used for 16 hours a day for six weeks without tapering at a dose of 22 mg/day. Nicoderm CQ is to be used for either a 16- or 24-hour period (to avoid insomnia) and is administered at 21 mg/day for six weeks, followed by two weeks at 14 mg/day and two weeks at 7 mg/day. The patch is best suited for patients with low nicotine dependence as defined by the Fagerström Tolerance Questionnaire.⁹

The transdermal patch is recommended for post-MI patients greater than two weeks fol-

lowing an MI and is contraindicated in patients with severe arrhythmia and worsening angina.

Nicotine Chewing Gum: Nicotine gum (Nicorette) is available in two doses: a 2 mg dose and a 4 mg dose. The 2 mg dose is suitable for individuals who smoke fewer than 25 cigarettes a day, and the 4 mg dosage is better suited for individuals who smoke at least 25 cigarettes a day.⁹ Smokers appear to receive the most benefit from nicotine gum when they chew at least one piece every one to two hours.¹⁰ Nicotine gum treatment requires careful monitoring and instruction so that the gum is chewed correctly.

Because nicotine chewing gum has a fast delivery of nicotine, it is not recommended for post-MI patients. It is also contraindicated in patients with severe arrhythmia and angina, as well as in pregnant and lactating women.

Nicotine Inhaler: Currently not available in Canada, the nicotine inhaler (Nicotrol) is a plastic rod containing a plug that provides a nicotine vapor when puffed. Although designed as an inhaler, it does not really function as one. Rather than delivering large amounts of nicotine to the lungs, as with other inhalers, the apparatus delivers the nicotine by way of the buccal mucosa. The same concentration of nicotine is delivered buccally, regardless of the puff size employed by the smoker.

Because the nicotine inhaler delivers large concentrations of nicotine very quickly, while raising the heart rate and blood pressure of the patient, it is not safe for post-MI patients. It is contraindicated in patients with angina or coronary artery disease.

Counseling: Counseling, or behavioral therapy, is most often used in populations that may otherwise experience adverse reactions to NRTs. Recently, counseling has been coupled with the use of other nicotine replacement and non-nicotine replacement therapies. The addition of counseling improves the outcome of

Table 3

Relating Drugs and Pathophysiology

Drug Class	Pathophysiology Which the Drug Reverses
Diuretic	Sodium abnormalities
Beta blockers	Increased cardiac output, heart rate
Alpha blockers	Increased vascular resistance
ACEIs, ARBs	Increased RAAS activity
CCBs	Response to vasopressor agents

ACEI = ACE inhibitor, ARB = Angiotensin II receptor blocker
 RAAS = Renin-angiotensin-aldosterone system
 CCB = Calcium channel blocker

the smoking cessation therapies, resulting in increases of smoking abstinence rates.¹¹

Safety of Smoking Cessation Aids

Although NRTs are found to be generally safe in cardiac patients, there is a recommendation, in a U.S. clinical practice guideline, to use bupropion over NRTs within the first two weeks following an MI.¹² Studies show that nicotine's sympathetic effects increase myocardial oxygen demand. This increase, coupled with the already reduced oxygen-carrying capacity of the blood, due to the carbon monoxide in cigarettes, can produce or exacerbate myocardial ischemia.⁵ Even though the patch contains nicotine, its slow release of nicotine does not produce any dangerous fluctuations in nicotine concentrations that can be found in the use of nicotine gum or the inhaler. Therefore, the gum and inhaler are not safe in high-risk cardiac patients because they rapidly deliver large concentrations of nicotine.

Case Discussions

Case One

The patient's desire for a cigarette upon awaking in the morning, in addition to the high number of cigarettes he smokes daily, are indicative of an above-average nicotine dependence. This patient should be given a smoking cessation aid coupled with counseling. Since the patient recently had an MI, and has no personal or family history of seizure disorder, bupropion, in conjunction with counseling, would be a good choice.

Case Two

This patient has a strong nicotine dependency. She has a family history of stroke which is a contraindication for bupropion use because of the increased risk of seizure. For these reasons, nicotine gum (4 mg dose) coupled with counseling is a good treatment choice.

Case Three


Although Mr. Howard is a habitual smoker, he smokes less than a pack per day. Nevertheless, his recent MI and CABG make it imperative that he quit smoking immediately. Because of his family history of a nervous system disorder, as well as his recent MI and CABG, a nicotine patch would be a good treatment option.

Future Clinical Implications

The past decade has seen several new smoking cessation aids become commonplace in helping cardiac patients quit smoking. Although these aids are effective, the overall quit rate is still very low. In the future, we should expect to see more efficient nicotine and non-nicotine replacement therapies.

Conclusion

Cardiac patients frequently make attempts to stop smoking. Unfortunately, patients often return to smoking after only a brief spell of abstinence. Smoking cessation aids have been shown to reduce absolute relapse rates in young, healthy, and non-motivated patients. Furthermore, in smokers who are highly motivated to quit, such as cardiac patients, the potential for smoking cessation aids is extremely promising. Therefore, when appropriate, physicians should encourage their patients to

use smoking cessation aids to help them quit smoking. 

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