

Nicotine dependence

Definition

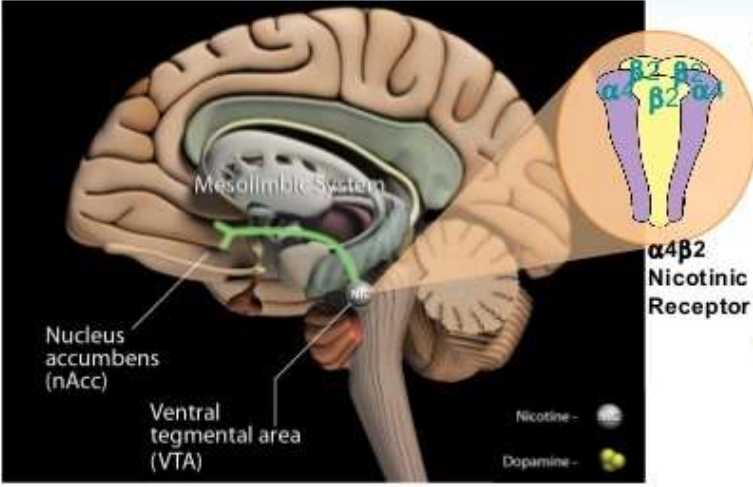
Nicotine dependence — also called tobacco dependence — is an addiction to tobacco products caused by the drug nicotine. Nicotine dependence means you can't stop using the substance, even though it's causing you harm.

Nicotine produces physical and mood-altering effects in your brain that are temporarily pleasing. These effects make you want to use tobacco and lead to dependence. At the same time, stopping tobacco use causes withdrawal symptoms, including irritability and anxiety.

While it's the nicotine in tobacco that causes nicotine dependence, the toxic effects of tobacco result from other substances in tobacco. Smokers have much higher rates of heart disease, stroke and cancer than nonsmokers do.

Regardless of how long you've smoked, stopping smoking can improve your health. Many effective treatments for nicotine dependence are available to help you manage withdrawal and stop smoking for good. Ask your doctor for help

Mechanism of Action of Nicotine in the Central Nervous System



The diagram illustrates the brain's reward pathway. The Mesolimbic System is shown in green, connecting the Ventral tegmental area (VTA) to the Nucleus accumbens (nAcc). A callout shows the structure of the $\alpha 4 \beta 2$ Nicotinic Receptor, which is a heteropentamer consisting of two $\alpha 4$ subunits and three $\beta 2$ subunits. A legend indicates that a grey sphere represents Nicotine and a yellow sphere represents Dopamine.

- ◆ Nicotine binds preferentially to nicotinic acetylcholine (nACh) receptors in the central nervous system; the primary is the $\alpha 4 \beta 2$ nACh receptor in the Ventral Tegmental Area (VTA)
- ◆ After nicotine binds to the $\alpha 4 \beta 2$ nACh receptor in the VTA, it results in a release of dopamine in the Nucleus Accumbens (nAcc), which is believed to be linked to reward

Symptoms

In some people, using any amount of tobacco can quickly lead to nicotine dependence. Signs that you may be addicted include:

- **You can't stop smoking.** You've made one or more serious, but unsuccessful, attempts to stop.
- **You experience withdrawal symptoms when you try to stop.** Your attempts at stopping have caused physical and mood-related signs and symptoms, such as strong cravings, anxiety, irritability, restlessness, difficulty concentrating, depressed mood, frustration, anger, increased hunger, insomnia, constipation or diarrhea.
- **You keep smoking despite health problems.** Even though you've developed problems with your lungs or your heart, you haven't been able to stop.
- **You give up social or recreational activities in order to smoke.** You may stop going to smoke-free restaurants or stop socializing with certain family members or friends because you can't smoke in these locations or situations.

Causes

Nicotine is the chemical in tobacco that keeps you smoking. Nicotine is very addictive when delivered to the lungs by inhaling tobacco smoke. It increases the release of brain chemicals called neurotransmitters, which help regulate mood and behavior. One of these neurotransmitters is dopamine, which may improve your mood and activate feelings of pleasure. Experiencing these effects from nicotine in tobacco is what makes tobacco so addictive.

Nicotine dependence involves behavioral as well as physical factors. Behaviors and cues that you may associate with smoking include:

- Certain times of the day, such as first thing in the morning, with morning coffee or during breaks at work
- After a meal
- Drinking alcohol
- Certain places or friends
- Talking on the phone
- Stressful situations or when you're feeling down
- Sight or smell of a burning cigarette
- Driving your car

To overcome your dependence on tobacco, you need to deal with the behaviors and routines that you associate with smoking.

Treatments and drugs

Smoking is the single most preventable cause of death in the U.S. Your health will benefit almost immediately if you stop smoking. Younger smokers who stop can have a normal life expectancy, and even older smokers who stop add years and quality to their life expectancy.

According to a report of the Surgeon General, a year after quitting, your risk of a heart attack drops sharply. After two to five years, your stroke risk may be reduced to that of a nonsmoker. And at 10 years, your risk of cancer may be reduced to about half that of a smoker.

Like most smokers, you've probably made at least one serious attempt to stop. But it's rare to stop smoking on your first attempt — especially if you try to do it without help. You're much more likely to stop if you use medications and counseling, which have both been proved effective, especially in combination.

Medications

Many treatments, including nicotine replacement therapy and non-nicotine medications, have been approved as safe and effective in treating nicotine dependence. Using more than one medication may help you get better results. For example, combining a longer acting medication with a short-acting nicotine replacement product may be beneficial. Talk to your health care provider about the right treatment for you.

If you're pregnant or breast-feeding, you smoke fewer than 10 cigarettes a day, or you're under age 18, talk to your doctor before taking any over-the-counter nicotine replacement products.

Nicotine replacement therapy

Nicotine replacement therapy gives you nicotine without the other harmful chemicals in tobacco smoke. Many people mistakenly believe that nicotine causes cancer, but that's not the case.

Nicotine replacement medications, including patches, gum, lozenges, nasal spray and inhaler, can help relieve difficult withdrawal symptoms and cravings. The best time to start using nicotine replacement medication is on the date you've set to stop smoking.

Some smokers start earlier in order to reduce smoking on their way to stopping altogether.

Most nicotine replacement products are available over-the-counter:

- **Nicotine patch (NicoDerm CQ, Habitrol, others).** The patch delivers nicotine through your skin and into your bloodstream. You wear a new patch each day. The treatment period usually lasts for eight weeks or longer. If you haven't been able to stop smoking completely after two weeks or so of treatment, ask your doctor for help in adjusting the dose of the patch or adding another medication.
- **Nicotine gum (Nicorette, others).** This gum delivers nicotine to your blood through the lining of your mouth. It's available in a 2-milligram (mg) dose for regular smokers and a 4-mg dose for heavy smokers. Nicotine gum is often recommended to curb cravings. Chew the gum for a few times until you feel a mild tingling or peppery taste, then park the gum between your cheek and gumline for several minutes. This chewing and parking allows nicotine to be gradually absorbed in your bloodstream. Avoid drinking or eating right before, while using, or right after nicotine gum. The goal is to reduce the amount and eliminate the need for the gum in about three months.
- **Nicotine lozenge (Commit, Nicorette mini lozenge).** This lozenge dissolves in your mouth and, like nicotine gum, delivers nicotine through the lining of your mouth. The lozenges are available in a 2-mg dose for regular smokers and a 4-mg dose for heavy smokers. Place the lozenge in your mouth between your gumline and cheek or under your tongue and allow it to dissolve. You'll start with one lozenge every one to two hours and gradually increase the time between lozenges. Avoid drinking anything right before, while using or right after the lozenge.

These nicotine replacement products are available by prescription:

- **Nicotine nasal spray (Nicotrol NS).** The nicotine in this product, sprayed directly into each nostril, is absorbed through your nasal membranes into your blood vessels. The nasal spray delivers nicotine a bit quicker than gum, lozenges or the patch, but not as rapidly as smoking a cigarette. It's usually prescribed for three-month periods for up to six months. Side effects may include nasal irritation.
- **Nicotine inhaler (Nicotrol).** This device is shaped something like a cigarette holder. You puff on it, and it delivers nicotine vapor into your mouth. You absorb the nicotine through the lining in your mouth, where it then enters your bloodstream. Common side effects are mouth or throat irritation and occasional coughing.

Non-nicotine medications

Medications that don't contain nicotine include:

- **Bupropion (Zyban, Wellbutrin).** The antidepressant drug bupropion increases levels of dopamine and norepinephrine, brain chemicals that are also boosted by nicotine. Bupropion may be prescribed along with a nicotine patch. Typically your doctor will advise you to start bupropion one week before you stop smoking. Bupropion has the advantage of helping to minimize weight gain after you quit smoking. Side effects may include sleep disturbance and dry mouth. If you have a history of seizures or serious head trauma, such as a skull fracture, you shouldn't take this drug.
- **Varenicline (Chantix).** This medication acts on the brain's nicotine receptors, decreasing withdrawal symptoms and reducing the feelings of pleasure you get from smoking. Typically your doctor will advise you to start varenicline one week before you stop smoking. Potential side effects include nausea, headache, insomnia and vivid dreams. Rarely, varenicline has been associated with serious psychiatric symptoms, such as depressed mood, agitation and suicidal thoughts.
- **Nortriptyline (Pamelor).** This tricyclic antidepressant has been shown to help smokers stop. It acts by increasing the levels of the brain neurotransmitter norepinephrine. It may be prescribed if other medications for stopping tobacco use don't help. Side effects may include dry mouth.

Counseling, support groups and other programs

Combining medications with behavioral counseling provides the best chance for establishing long-term smoking abstinence. Medications help you cope with withdrawal symptoms, while behavioral treatments help you develop the skills you need to avoid tobacco over the long run. The more time you spend with a counselor, the better your treatment results will be.

Several types of counseling and support can help with stopping smoking:

- **Telephone counseling.** No matter where you live, you can take advantage of phone counseling to help you give up tobacco. Every state in the U.S. has a telephone quit line, and some have more than one. To find the options in your state, call 800-QUIT-NOW (800-784-8669).
- **Individual or group counseling program.** Your doctor may recommend local support groups or a treatment program where counseling is provided by a tobacco treatment specialist. Counseling helps you learn techniques for preparing to stop smoking and provides support for you during the process. Many hospitals, health care plans, health care providers and employers offer treatment programs or have

tobacco treatment specialists who are certified to provide treatment for nicotine dependence. Nicotine Anonymous groups are available in many locations to provide support for smokers trying to quit. Some medical centers provide residential treatment programs — the most intensive treatment available.

- **Internet-based programs.** Several websites offer support and strategies for people who want to stop smoking. BecomeAnEX is free and provides information and techniques as well as blogs, community forums, ask the expert and many other features. Text messaging services, including personalized reminders about a quit-smoking plan, also may prove helpful.

Methods to avoid

There is no scientific evidence that these products work to help stop smoking and little is known about their safety.

- **Products claiming to deter smoking.** This includes products that change the taste of tobacco, special diets to curb nicotine cravings and vitamin combinations marketed as smoking cessation aids.
- **Herbs and supplements.** Homeopathic aids and herbal supplements are not regulated by the Food and Drug Administration (FDA), so they don't need to prove their effectiveness or safety.
- **Nicotine lollipops and balms.** Products containing nicotine salicylate are not approved by the FDA, and these products pose a risk for accidental use by children.
- **Electronic cigarettes (e-cigarettes).** Flavored mist containing nicotine that looks like smoke is puffed through a system that looks like a cigarette. Questions exist about the safety of e-cigarette vapor and the amount of nicotine provided.
- **Hypnosis.** Although no evidence supports the use of hypnosis in smoking cessation, some people say they find it helpful. If you choose to pursue hypnosis, talk to your doctor about finding a reputable hypnotherapist.

Tobacco in any form is not safe. This includes the use of:

- **Dissolvable tobacco products.** Tobacco pouches, lozenges, strips or other products contain small amounts of tobacco and nicotine you hold or dissolve in your mouth. These tobacco products are used by smokers in places where smoking is not allowed. There is no evidence they will help you stop smoking and little is known about their health effects.
- **Smokeless tobacco and snuff (snus).** These products contain nicotine in amounts similar to cigarettes and increase your risk of mouth and throat cancer, tooth and gum diseases, and other health problems.

- **Pipes and cigars.** These products have similar, though less frequent, health risks as cigarettes, and they are not a safe alternative.
- **Hookahs (narghiles).** These are water pipes that burn tobacco, and the smoke is inhaled through a hose. They are not safer than cigarettes. The water does not filter out toxins in the smoke, and the water and pipe have a risk of transmitting infections.
- **Flavored cigarettes.** Clove cigarettes (kreteks) and flavored cigarettes (bidis) carry the same health risks as smoking regular cigarettes and can cause additional health problems. Although they're not legal in the United States, they're still available in some countries.

Prevention

The best way to prevent tobacco dependence is to not smoke in the first place. The best way to prevent your children from smoking is to not smoke yourself. If you're a parent who smokes, the younger your children are when you quit, the less likely they are to become smokers themselves.

Even if you don't smoke, here are some things you might try as a parent:

- **Promote smoke-free environments.** Support legislation to make all workplaces smoke-free. Encourage smoke-free public places, including restaurants or other places where your teen may work.
- **Support legislation to increase taxes on tobacco products.** Higher prices discourage teens from starting to smoke. Higher prices on tobacco products, coupled with smoke-free workplace laws, are the most effective public health policies to reduce smoking in adults and prevent young people from ever starting.
- **Talk with your teenagers.** Ask whether their friends smoke. Most teenagers smoke their first cigarette with a friend who already smokes. Let your child know that other forms of tobacco, including cigars and smokeless tobacco, also carry significant health risks.
- **Learn what your children think about smoking.** Ask them to read this article so that you can discuss it together. You can be a great influence on whether your children smoke, despite what they see in movies and on the Internet.
- **Help your children explore personal feelings.** Use nonjudgmental questions and rehearse with them how they could handle tough situations regarding peer pressure and smoking.
- **Note the social repercussions.** Remind your teenager that smoking gives you bad breath and makes your hair and clothes smell.
- **Work with your schools.** Become active in community and school stop-smoking programs.

