

BREAKING NICOTINE'S CHOKEHOLD

Established nicotine replacement therapies combined with behavioural counselling could offer the best chance of **BEATING NICOTINE ADDICTION**.



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▲ Smoking cigarettes remains the leading preventable cause of death worldwide.

“Early in my career, I met people who told me they found it easier to quit heroin than cigarettes,” says Scott Leischow, research professor in the College of Health Solutions at Arizona State University. “This highlights how profoundly difficult it can be to break the smoking addiction.”

Smoking cigarettes remains the leading preventable cause of death worldwide; killing more than eight million people each year, according to the WHO. In the US, the CDC estimated that 12.5% of adults were ‘current smokers’ in 2020. The CDC also estimated that cigarette smoking cost the US more than \$600 billion in 2018 — through the burden of smoking-related

diseases, addiction support, and lost productivity from illness and premature death.

Most adult cigarette smokers want to stop, and many can and do quit for good: since 2002 there have been more former smokers than current smokers (CDC, 2022). But the social aspects of smoking and other lifestyle factors can make this a very difficult process. Various activities and tools are available to those who are trying to quit. Nicotine replacement therapies (NRTs), smoking cessation medicines and counselling are the only established, FDA-approved methods for quitting cigarette smoking and tackling nicotine addiction in the US¹.

Many people turn to e-cigarettes to quit their tobacco counterpart, but these are not FDA-approved. They do offer consumers an alternative, cleaner option to smoking tobacco, but also run the risk of keeping people in the nicotine addiction cycle. Long-term data on their effect on health are also lacking. With a history that stretches back almost 40 years, the value of NRTs, smoking cessation medications and behavioural therapy as means for quitting is well-established. While all these methods can help get people away from combustible cigarettes, the end goal of quitting nicotine is a more difficult challenge that should not be ignored.

HOW NICOTINE AFFECTS THE BODY

Cigarette smoke contains more than 7000 chemicals, including 70 carcinogenic substances like arsenic². Heart disease can develop in smokers because of exposure to chemicals like nicotine and carbon monoxide — which, along with other toxic chemicals, can cause irreversible lung damage. Nicotine and other inflammatory chemicals can also lead to diabetes: according to CDC, people who smoke are 30–40% more likely to get type 2 diabetes than people who don’t smoke. Although not considered deadly on its own, nicotine can nevertheless have detrimental effects.

Acetylcholine, the most abundant neurotransmitter in the human body, conveys chemical messages between nerve cells in almost every organ. Nicotine is structurally similar to acetylcholine and can bind to acetylcholine receptors in the brain, heart, blood vessels and immune system: it can fundamentally change how the body functions.

Like most addictive drugs, nicotine generates feelings of pleasure and satisfaction by causing the release of dopamine. It also releases glutamate, which is involved in learning and memory; endorphins, which play a role in calming and sedation; and serotonin, which is implicated in mood modulation and appetite.

“Nicotine also affects stress levels and attention. It enhances the action of whatever is going on in the body,” says Neal Benowitz, professor emeritus of medicine at the University of California, San Francisco. “In the early morning, nicotine is stimulating like coffee. If you need to concentrate at work, nicotine helps you focus. It is not intoxicating like some other drugs — another reason why it is popular.”

Over time, nicotine has progressively less of an effect on receptors that release dopamine and other chemicals. Then, if a person doesn't have a cigarette, they suffer withdrawal symptoms like irritability, difficulty concentrating, depression and stress. The day's first cigarette often provides the best 'rush', and people smoke more heavily over time to replicate that satisfaction.

Cigarette smoke also has other addictive substances which heighten the challenges of quitting. “An enzyme in the brain called monoamine oxidase breaks down certain neurotransmitters like dopamine,” says Benowitz.



▲ NRTs, like patches or gums, can reduce the urge for a cigarette and help to prevent withdrawal symptoms.

Cigarette smoke includes compounds that inhibit monoamine oxidase, so when the nicotine releases dopamine, it stays around longer in regular smokers.

There are also genetic elements to addiction, so certain people are more susceptible to nicotine addiction than others. Some genes can even alter the efficacy of drugs like varenicline, which are designed to help people quit cigarettes by reducing cravings³.

BEYOND BIOLOGY

The familiarity of certain actions and social occasions also feeds the addiction cycle — if someone always smokes while driving, they associate sitting in a driver's seat with lighting a cigarette. Repetitive actions are soothing — and even watching someone strike a match can trigger a former smoker.

“The rituals associated with smoking are powerful,” says Leishow. “It's a classic interplay of biological and

socio-psychological drivers.”

The pairing of impulsive behaviours with a dose of nicotine and the resulting dopamine hit takes tight hold. “Smokers trying to quit say they feel like they're giving up a friend,” he adds.

To successfully quit smoking, therefore, requires more than just attending to physical effects on the body. “The reality is that the actual craving for a cigarette lasts only a few minutes,” explains Leishow. Distraction techniques are vital, and tailored counselling can help people to get past the most intense time. Cognitive behavioural therapy, which can help people change the way they think about and behave towards a specific problem, has proven successful in smoking cessation. Open group therapy sessions are also very useful because they provide people with a supportive network and a safe, honest space for discussion and advice. Leishow advocates that a range of options be available to those wanting to quit smoking.

COMBATING NICOTINE ADDICTION

NRTs are a long-established, FDA-approved method to help smokers break free from cigarettes. They come in a variety of forms, including gums, lozenges, and — most recently — mouth sprays. Oral inhalers provide the most similar experience to smoking a cigarette out of all NRTs.

Many NRTs are available without a prescription because they slowly deliver low levels of nicotine and are therefore less likely to be addictive. Short-acting NRTs, like gum or lozenges, can reduce the immediate urge for a cigarette. There are also long-acting prescription medications, like bupropion and varenicline, which bind to nicotinic receptors in the body. They prevent withdrawal symptoms and stop the feeling of reward that comes from smoking a cigarette. NRT patches have a similar long-term effect.

Many people use a combination of both short and long-acting NRTs when trying

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▲ When quitting smoking, distraction techniques and tailored counselling can help people to get past the most intense time.

to quit smoking. Such products are likely needed for a limited time because they do not reinforce nicotine addiction as e-cigarettes do.

Quitting becomes more comfortable with NRTs. But though they reduce withdrawal symptoms, they only address the biochemical aspects of smoking. “A smoking cessation treatment that works with 100%, or even 50% of people simply doesn’t exist,” says Leischow. To improve the chances of success, the ‘ritualistic’ aspects of smoking also need to be addressed. “Research shows that pairing varenicline or a combination of NRT medications with behavioural support is the most effective route.”

Smoking quit rates can increase in those offered NRTs, medications or both plus some form of behavioural therapy⁵. Behavioural counselling — in person or over the telephone — has been shown to increase the chances of a person quitting smoking and adhering to it by 10–20%, compared to those given medication alone. In-person therapies work

better than written or self-help information, especially when used with 8 to 12-week supplies of pharmacotherapy to increase the long-term success of quit attempts.

“One method I use is a ‘delayed quitting’ approach,” says Benowitz. “I’ll say: it’s OK not to quit now. Take varenicline or patches and these will reduce your urge to smoke — each cigarette will be less satisfying to you. Reduce your cigarette use, and it’ll be easier to quit in a month from now.” Benowitz also highlights the value of illustrating health risks, for example via lung function tests or telling the patient about carbon monoxide exposure. “These techniques help show that while a person might be feeling OK now, it would be wise to quit before chronic lung disease kicks in.”

CAUTION NEEDED WITH ALTERNATIVES

The need for harm reduction and cleaner alternatives to tobacco means that e-cigarettes have increased dramatically in popularity. E-cigarettes contain far

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fewer chemicals overall than cigarette smoke, but they are a relatively new technology, and longitudinal data regarding their safety are not yet available⁴. Researchers are airing significant concerns around young people who are vaping, having never smoked before.

Even though vaping may be a useful tool for helping some tobacco smokers quit³, it holds the risk of getting ‘trapped’ in the middle stage: still addicted to nicotine despite successfully quitting cigarettes.

“E-cigarettes are popular because the overall effect is very similar to cigarettes,” says Leischow. “The risks of using e-cigarettes are significantly

lower than a combustible cigarette. But does it mean that they’re safe? I would never call an e-cigarette safe.”

INFORMATION AND SUPPORT ARE KEY

Even when a person manages to stop smoking, the long-term effects of nicotine on the body can increase the likelihood of relapse. For example, when someone experiences a stressful life event, the cravings for nicotine can return because the body knows it will help elevate dopamine and other neurotransmitters to make the person feel better.

“Humans often look for short-term benefits — we make poor decisions for immediate gains, rather than thinking long term,” says Leischow. Integrating behavioural therapy into quitting can help smokers learn techniques to prevent relapse. Smoking cessation is often a two-stage process: quitting cigarettes and quitting nicotine altogether. NRTs and medications help with the withdrawals when cutting out tobacco. Along with behavioural therapies, these can carry the person through to fully quitting nicotine. Leischow emphasizes the need to help people fully understand their biological responses to nicotine and how behaviours feed into addiction. “Providing people with the right tools can help them understand and break the addiction cycle.” ■

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