Heads Up: Real News About Drugs and Your Body

Brought to you by Scholastic and the scientists at the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services

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Drugs and the Teen Brain

Adolescence is a critical time in brain development. That means teens are at greater risk of experiencing the harmful effects of drugs and alcohol.

"Taking chances isn't always bad—it's part of growing up. But not thinking through consequences can be dangerous when it comes to decisions about drugs and alcohol.

BY THE TIME YOU ARE A TEENAGER, many parts of your brain have developed so much that you may be able to perform complicated calculations and even have a sharper memory than some adults (like how you might be able to memorize your home's random 11-character Wi-Fi password—while your parents never can!).

But one critical part won't be developed until your mid-twenties—putting teens at a higher risk for the harmful effects of drugs and alcohol.

Under Construction

The key brain part that's still developing is the **prefrontal cortex** and it's the area you use in critical thinking, such as when you weigh pros and cons before making a decision.

Because the prefrontal cortex is not yet fully developed, teens automatically rely more on the **limbic system** to make decisions. This system's network of brain structures is linked to emotions and experiencing rewards rather than critical thinking.

Because their prefrontal cortex is in development, teens are more likely to make decisions based on what provides instant gratification, such as a feeling of happiness. This focus can lead them to take more risks than adults. For example, your peers might pressure you to do something you later regret, such as pulling a prank that lands you in trouble. Rather than thinking carefully about the negative outcomes, the teen brain focuses more on getting the reward of your friends' acceptance.

Of course, taking chances isn't always a bad thing—it helps you grow into an adult and become independent. But not thinking through consequences can be dangerous when it comes to decisions related to drugs and alcohol.

That's one reason teens are more likely than adults to binge drink. Binge drinking is when someone consumes four to five alcoholic drinks within a few hours. Teens may be less able than adults to judge when to stop drinking (remember: underdeveloped prefrontal cortex!). The scary part? Studies have shown that even a few sessions of binge drinking can cause harmful changes to a developing brain.

Addiction Risk

Teens are also at a higher risk of developing the disease of **addiction**. Scientists believe that addiction is closely linked to **dopamine**, a chemical that helps transmit signals in the brain. A person taking drugs causes a surge of dopamine in the brain.

Any rewarding activity, such as enjoying a slice of pizza, causes a dopamine release. But the surge is much higher and more intense with drugs. Over time, repeated drug use can "teach" the brain to seek the substances over other, healthier rewards. That is addiction.

Teens have a higher risk of addiction because their limbic systems are very sensitive to dopamine. As a result, they may crave drugs more strongly than adults. The earlier someone starts drug use, the higher his or her addiction risk.

Because the brain's **prefrontal cortex** (the part in charge of critical thinking) is not yet fully developed in teens, they rely more on the limbic system (which is tied to rewards and emotions) to make decisions.

Brain Changes

As you grow and learn, your body strengthens pathways between **neurons** (nerve cells) in the brain and gets rid of ones that aren't used. These connections, called **synapses**, determine how your brain processes information. The network of synapses is what supports everything from your memory to your ability to learn and feel emotions.

Exposing the teen brain to drugs can change how these pathways are organized and how the brain functions. The negative impact of drug use can cause problems with attention, memory, and problem solving that can last all the way through adulthood.

The good news is that by thinking through your actions now, you can have a positive impact on your brain for the rest of your life. Taking on challenges to build abilities and skills—such as learning a new sports move or picking up a foreign language—helps build new connections that make your brain stronger and better able to tackle future tasks. If you are good to your brain, it will be good to you.

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From Scholastic and the scientists of the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services

E-Cigarettes: A Dangerous Trend

The growing popularity of vaping devices is putting teens' health at risk.

> **"Almost all e-cigarettes contain nicotine, the same highly addictive chemical found in tobacco cigarettes."**

FEWER TEENS ARE SMOKING cigarettes than ever before. But in recent years another trend has replaced it. More middle and high school students now use electronic cigarettes than any other nicotine-containing product. In fact, according to a recent National Institutes of Health study, nearly a third of 12th-graders reported using vaping devices within the past year.

This trend has health officials concerned. Even though e-cigarettes are believed to be safer than tobacco, scientists know very little about the risks associated with them. After all, they have only existed for about 15 years. Most troubling: Almost all e-cigarettes contain nicotine, the same highly addictive chemical found in tobacco cigarettes.

What Are E-Cigarettes?

Also known as e-vaporizors or vape pens, e-cigarettes are battery-operated devices. Some look like tobacco cigarettes, but many designs look like everyday items such as pens or USB sticks. The devices often include replaceable cartridges or "pods," which contain a liquid that is a mix of different chemicals, such as flavor compounds and, in most cases, nicotine. When a person puffs on the device, called "vaping," the liquid inside is heated into a vapor that is inhaled.

Vapor vs. Smoke

The scariest part of the vaping trend is that teens don't perceive e-cigarettes to be hazardous to their health. This could be because e-cigarettes produce vapor instead of harsh smoke like traditional cigarettes do. Some even have candy-like flavors.

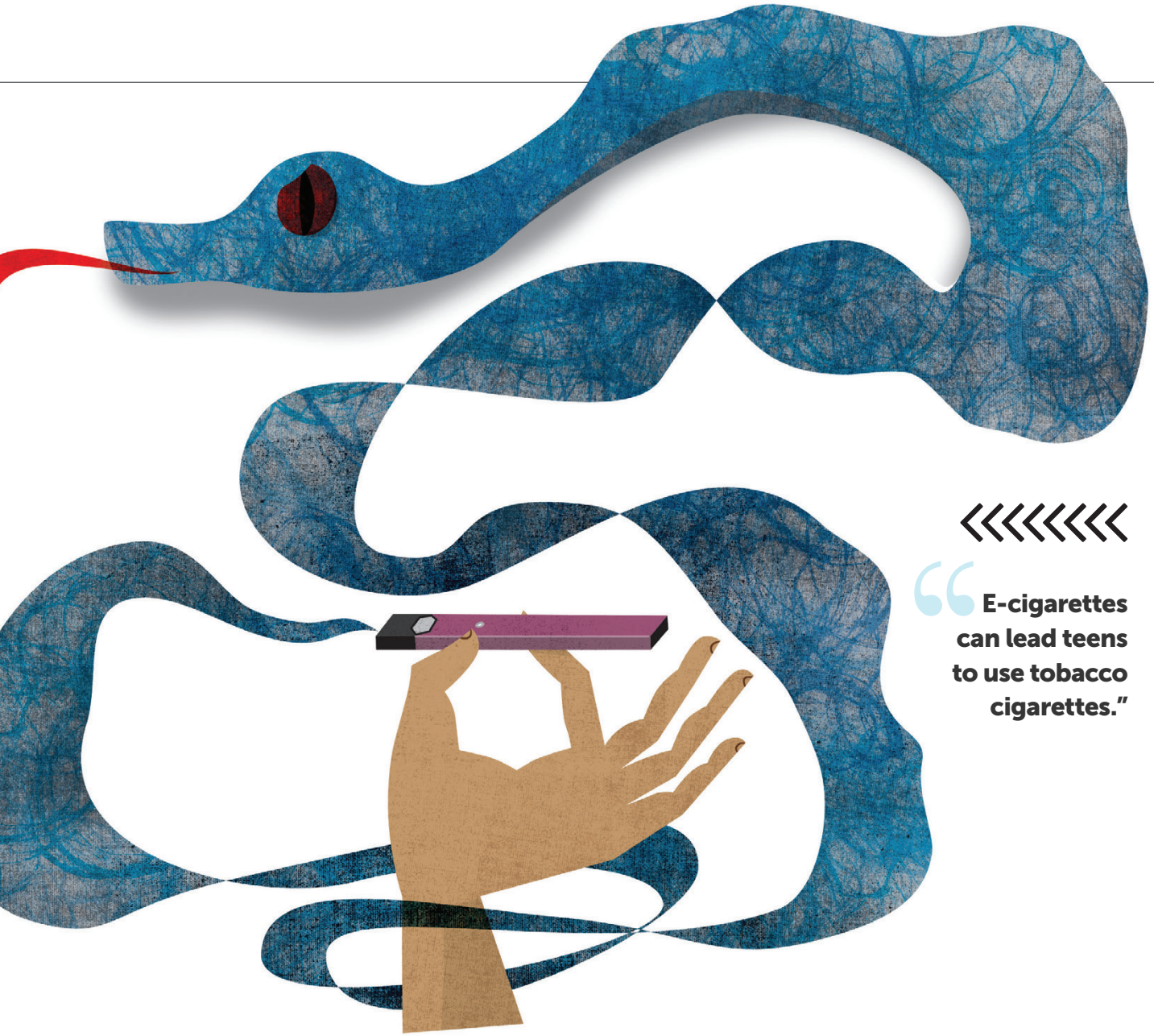
Incredibly, there was once a time when people didn't know the dangers of tobacco cigarettes. Up until the 1950s, doctors were frequently shown in ads promoting smoking. Now we know that tobacco smoke contains thousands of chemicals, including at least 70 known to cause cancer. It's also responsible for 480,000 U.S. deaths each year.

That's why health officials fear what we don't know yet about vaping. E-cigarettes are still so new that scientists haven't had time to determine all of their effects. Recent studies have revealed that some e-cigarette vapor contains cancer-causing substances. In addition, some e-cigarettes release other toxic materials, such as cadmium, a metal that can cause breathing problems.

They're Just as Addictive

One important risk we do know: Like tobacco, most e-cigarettes contain the highly addictive chemical nicotine. In fact, one cartridge can contain as much nicotine as a whole pack of tobacco cigarettes!

Scientists have found that people who use nicotine have a high chance of becoming addicted to it. This



"E-cigarettes can lead teens to use tobacco cigarettes."

is especially true for teens, who are at a higher risk of addiction than adults. Studies have shown that nicotine's effect on teens may make them more vulnerable to becoming addicted to other drugs too.

There is conclusive evidence that completely switching from traditional cigarettes to e-cigarettes provides health benefits to adults who already smoke. That's only because tobacco cigarettes are even less safe than e-cigarettes. E-cigarettes are not safe, however, for nonsmokers or teens. E-cigarettes can lead teens to use tobacco cigarettes. In a recent study, 30 percent of teen e-cigarette users started smoking tobacco cigarettes within six months of vaping for the first time, compared with only 8 percent of those who didn't vape.

What's Next?

Health officials are beginning to increase regulations on the devices to help keep teens safe. In most states, it is illegal to sell e-cigarettes to people under the age of 18, but teens are still getting them anyway. Officials are also cracking down on retailers who sell to teens illegally as well as on companies that are marketing e-cigarettes to young people.

Scientists are continuing to learn about the health effects of e-cigarettes. But there is already enough evidence about the dangers of e-cigarettes to make one thing clear: Using them is not worth the risk for teens.

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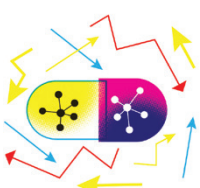
From Scholastic and the scientists of the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services

A Dangerous Mix

Learn why it's not safe to take medications with other substances.

If you take medications and mix them with other medications or substances, they can produce potentially dangerous effects.



YOU PROBABLY ALREADY KNOW anything you ingest can have an effect on your body, whether it's food, liquid, or medication. For instance, you know that if you drink coffee, the caffeine can help you stay awake. And an allergy pill can relieve your stuffy sinuses.

The active ingredients in prescription and over-the-counter (OTC) drugs are tested to make sure they are safe and will have the expected effect. But if you mix those medications with other medications or substances, intentionally or even by accident, they can produce potentially dangerous effects.

Interaction Alert

An active ingredient is the part of a drug that acts on your body. Combining substances can change the way an active ingredient works. This can increase the effect of that ingredient on your body, make it less effective, or have other unexpected results.

For example, prescription medications used to treat attention deficit hyperactivity disorder (ADHD), such as Ritalin, are stimulants. These drugs contain ingredients that increase alertness and attention, but can also increase heart rate and blood pressure. The decongestants in many OTC allergy and cold medications are also stimulants. As a result, taking Ritalin at the same time as a decongestant can cause an additional increase in heart rate and blood pressure. Over time, this can damage the heart.

Even with OTC drugs, you can accidentally exceed the dosage of an active ingredient. For example, think about when you have a cold. You may have a headache and take a pain reliever like Tylenol. Then an hour later you have a cough, so you take cold medicine. But many OTC cold treatments contain acetaminophen, Tylenol's active ingredient. Using these medications together can cause you to exceed the recommended dose of acetaminophen, increasing your risk for liver damage.

Even vitamins, herbal supplements, and foods can interact with medications. For example, the allergy medicine Allegra is less effective if taken with citrus fruit, including grapefruit and oranges. There is also evidence that the herbal supplement St. John's wort can interact with drugs that treat depression, such as Zoloft and Prozac. These interactions can increase the risk of dangerous side effects, including heightened body temperature and seizures.

DRUGS AND ALCOHOL: A TOXIC MIX

Drinking alcohol, taking illicit drugs, or misusing prescription medications like sedatives or opioid pain relievers is never safe for teens. These substances have powerful active chemicals that can harm the developing adolescent brain, pose a high addiction risk, or even lead to death. But when mixed with other drugs, the dangers are even greater.

Mixing alcohol with other substances is particularly dangerous because alcohol magnifies the effects of many drugs. For example, prescription opioids or sedatives can slow breathing and heart rate. So can many OTC cold or cough medicines. Taking these with alcohol can cause a person's breathing to slow so much that the person dies.

Alcohol also amplifies the impaired thinking and coordination that occurs with marijuana use. And when mixed with stimulants such as cocaine and methamphetamines, alcohol can dangerously increase a person's heart rate, blood pressure, and body temperature.

Prescription opioids (Vicodin, Oxycontin) are extremely powerful drugs that should never be mixed, especially with sedatives or alcohol. More than 30 percent of opioid overdoses in this country involve combining opioids with sedatives such as Valium or Xanax.

Protecting Yourself

Thankfully, medications must include labels with usage instructions and warnings about possible interactions. Always carefully read the label with an adult before taking anything, and talk to your doctor before starting a new medication if you are still taking an old one.

Also be mindful of potential interactions with vitamins and herbal supplements, which might not be labeled with warnings about interactions. Ask the pharmacist or your doctor to make sure these products won't interact with any medications you are taking.

Staying smart and reading labels carefully will keep you healthy and make sure your medicine is helping, not hurting you. After all, the whole point of taking medicines is to feel better, not worse!

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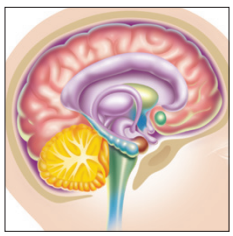

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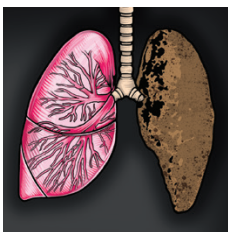

Interactives that explore important scientific info

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