

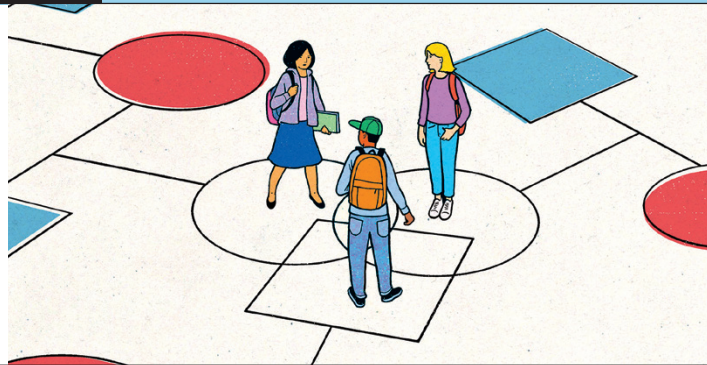
Heads Up: Real News About Drugs and Your Body

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

STUDENT ARTICLES INSIDE

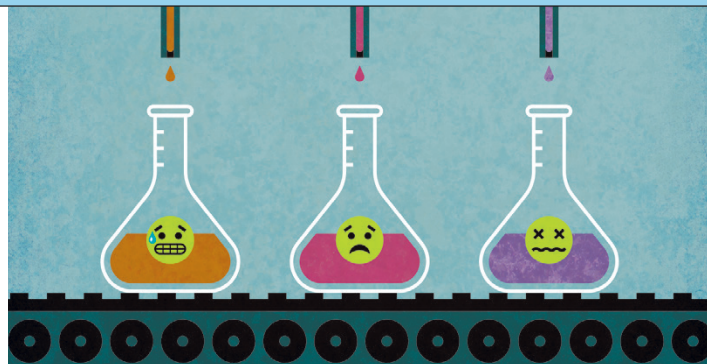
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- For this Heads Up **Student Edition Compilation** refer to **NIH Pub No. 18-DA-8032**.
- For the accompanying Heads Up **Teacher Edition Compilation** refer to **18-DA-8033**.

HOW DO GENES AFFECT ADDICTION?



Experts in genetics are discovering how genes can affect a person's risk of becoming addicted to drugs or alcohol. Their studies could help prevent and treat this illness.

W Why do some people become addicted to alcohol, tobacco, or other drugs while some do not? That's one important—and complex—question scientists are trying to answer.

Many different factors act together to affect a person's risk for addiction. **Environmental factors**—such as stress, peer pressure, and the strength of family relationships—play a role. The risk for becoming addicted is also strongly influenced by **biological factors**, including age and gender.

Scientists now know that another important biological factor is a person's **genes**—the units of hereditary material that are

passed down from parent to child. Researchers are studying the link between genes and addiction to learn how to better prevent and treat this potentially deadly illness.

Genes and Heredity

All of your traits, from your hair color to your eyesight, are influenced by your genes. These segments of DNA contain instructions for making the proteins that are used to build the body's cells. These proteins also direct all of the processes that occur inside your cells.

Genes in the human body can have different forms, called **variants**. The slight differences between these variants cause individuals to have distinct

characteristics, such as blue eyes versus brown. You inherit genes from your parents, which is why family members typically share similar traits.

Scientists have now identified some genes that are linked to addiction. They have found certain gene variants that occur more often in people who are addicted to alcohol, tobacco, or other drugs.

This means that a person who has one of these gene variants is at a greater risk for developing an addiction than someone who doesn't. Because people inherit genes from their parents, individuals who have family members who struggle with addiction may be at a greater risk for addiction. However, genes alone are not a cause of addiction.

Risk Doesn't Equal Addiction

Most people with high-risk genes will not become addicted to alcohol or drugs. Likewise, a person without a genetic risk can still become addicted. Scientists estimate that genetics accounts for roughly half of a person's likelihood of developing an addiction.

Other biological and environmental factors in a person's life that influence the likelihood of addiction include:

- **Risk factors**, such as having friends who use drugs and experimenting with drugs during adolescence, when the brain is still developing. Risk factors can increase a person's chances of addiction.
- **Protective factors**, such as strong family relationships and getting involved in after-school clubs and hobbies. Protective factors can decrease a person's chances.

Individuals can help keep themselves safe by trying to increase protective factors and eliminate risk factors in their environment.

Age: An Important Risk Factor

One of the most important risk factors for addiction is the age at which a person starts to use alcohol, tobacco, or other drugs.

The brain, which continues to develop until a person's early to mid-twenties, is much more vulnerable to addictive substances while it is developing. Studies have shown that addiction is much more likely in people who start using substances in their adolescence.

One of the most important things you can do to decrease the risk of addiction is to protect your brain from addictive substances while it is still developing.

FUTURE TREATMENTS

By studying how genes affect addiction, scientists hope to improve how we prevent and treat the disorder. Much research aims to understand how a specific gene affects the way a person's brain responds to alcohol or drugs.

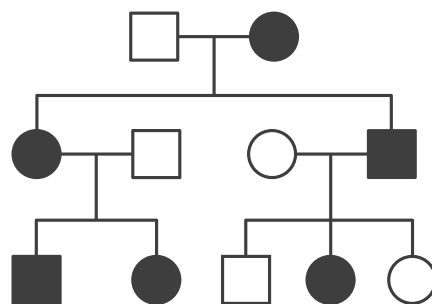
Researchers have discovered genes that affect how nicotine, the addictive drug found in cigarettes, changes the activity of the brain circuits that control functions such as attention, appetite, and habit formation. People who have high-risk variants of genes that control nicotine's effects are more likely to transition from occasional cigarette smoking to regular use and nicotine addiction.

This information is helping scientists develop better treatments for addiction. For instance, studies have shown that medications used to treat nicotine addiction are particularly helpful for people who have high-risk nicotine genes. In the future, scientists may even be able to develop medications that can reverse the effects of high-risk genes.

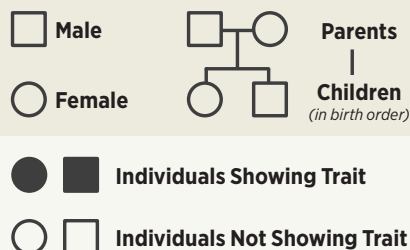
TRACKING GENES

A **pedigree** (example at right) is a diagram scientists use to study traits among family members. Scientists may use pedigrees to investigate the way certain traits, including diseases such as addiction, are influenced by genes.

Different symbols are used to represent each person, with lines showing family connections and colors showing a trait. If a trait occurs repeatedly through different generations, it can mean that genes are an influence.



KEY:



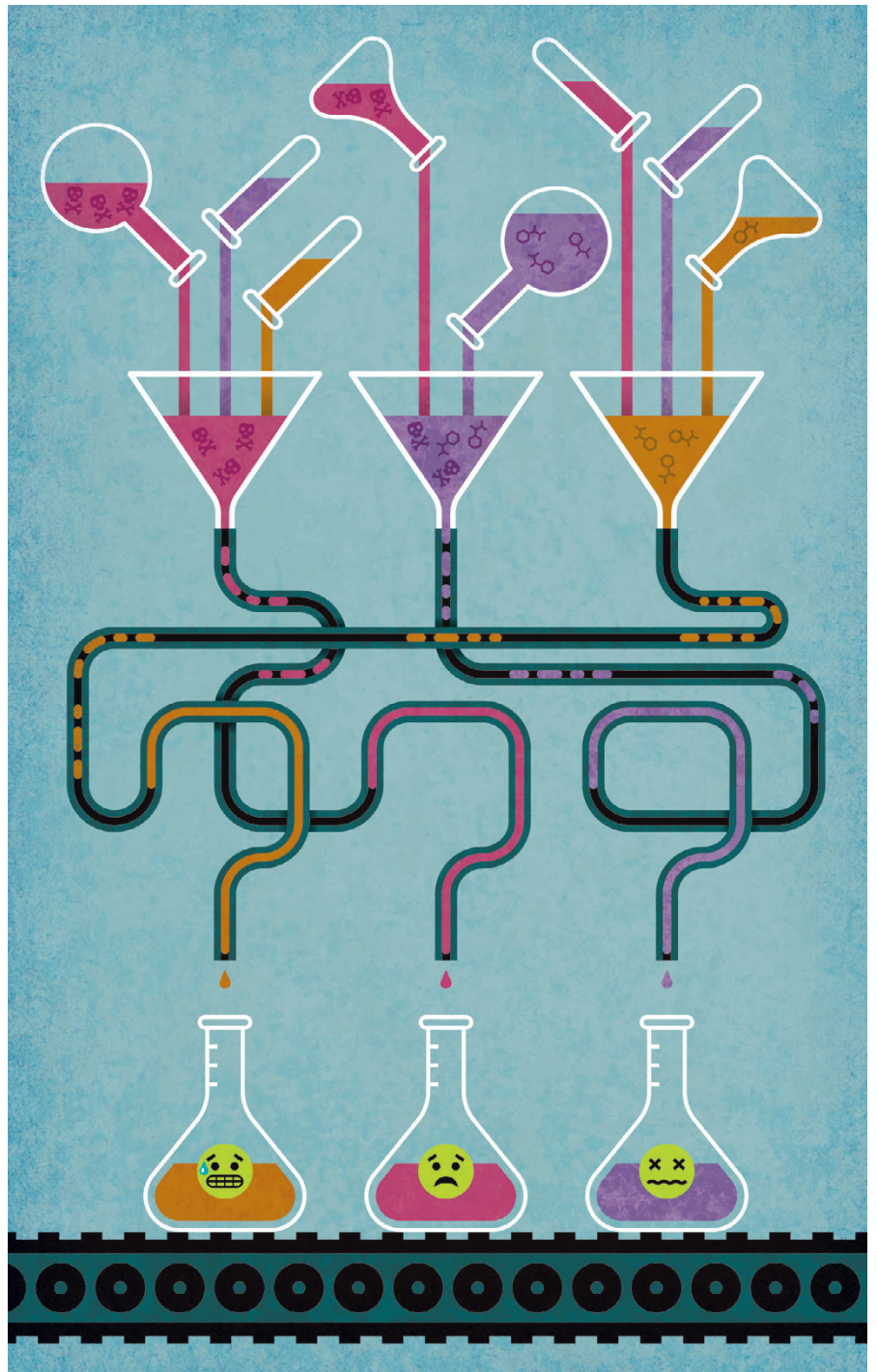
NOT FIT FOR HUMAN CONSUMPTION

You probably know that drugs that don't come from a pharmacy or other legal distributor can be dangerous. But they also may not be what they seem.

IN RECENT YEARS, emergency room doctors have reported a growing number of overdoses related to the use of certain types of **synthetic drugs**. Most drugs—even the ones that help people—are synthetic, which means that they're produced by mixing and creating chemicals in laboratories.

The ones that are prescribed by doctors and bought in pharmacies or other legal retailers are tested to make sure that they are safe.

But now synthetic drugs are also being made in illegal or unregulated laboratories, mostly in foreign countries. The makers of these drugs create chemicals that act like other drugs, such as marijuana or prescription pain medications. The drugs are then sold on the street, online, or in gas stations or other stores, and are often marked with misleading labels.



While many drugs pose a risk for addiction and overdose if they are misused, these counterfeit synthetic drugs can carry additional risks. There is no way to know what chemicals the drugs contain or in what amounts. A product bought on the street or online may look the same as a familiar drug. It may even look identical to a pill a person

would buy in a pharmacy. But the drugs can contain completely different chemicals and be much more powerful, and potentially deadly.

Read the sidebar below to learn more about the dangers of counterfeit synthetic drugs.

Bottom line: Never take any prescription drug that is not prescribed for you and is not bought in a pharmacy.

TAKE ACTION



>> If someone you know has a bad reaction to what you think is a synthetic drug, **call your local poison control center at 1-800-222-1222.**

>> If they stop breathing, collapse, or have a seizure, **call 911 immediately.**

MORE INFO: For additional facts about drugs and health, visit scholastic.com/headsupandteens.drugabuse.gov.

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

DANGEROUS EFFECTS OF SYNTHETIC DRUGS



OPIOIDS

Example: Fentanyl

Opioids are powerful drugs

that doctors prescribe to relieve pain. They can be **extremely addictive** and even **deadly** if they are misused. **Fentanyl** is a synthetic opioid that is much stronger than other opioids. It is prescribed only to treat extreme pain in patients with cancer or following surgery.

Recently, there has been a rise in the illegal production of fentanyl. Illegally made fentanyl is often mixed with other drugs or hidden in fake prescription medications that are sold on the street. Users may not know they are taking it.

A surge in deadly overdoses related to opioids has been linked in part to products that contain hidden fentanyl. It is never safe to take prescription drugs that are not prescribed for you or that are bought anywhere other than at an official pharmacy because you don't know what chemicals they really contain.

CANNABINOIDS

Examples: Spice, K2

Often called “synthetic marijuana,”

these drugs are made of dried plant material that is sprayed with chemicals. These chemicals, called **synthetic cannabinoids**, are similar to THC, the main active ingredient in marijuana. But they are much more powerful than THC. The drugs can cause **paranoia and violent behavior** as well as serious health problems, including **seizures, heart attacks, and death**. Studies have also shown that the drug called Spice can be **addictive**.

In 2016, 130 people were treated over three days in New York City for **overdosing on synthetic cannabinoids**. Health officials believe that the cause was a powerful batch of **K2**. Because the laboratories that make these products are not regulated, each batch can be very different, even if the packaging looks the same.

CATHINONES

Example: “Bath Salts”

Fake “bath salts”

are different from the products used in your bathtub. These bath salts are synthetic drugs that contain chemicals called **cathinones**, which are designed to be similar to stimulant drugs such as amphetamine and MDMA (also known as Ecstasy or Molly). But these drugs can have more powerful effects. They can **increase heart rate and blood pressure** as well as **cause hallucinations and paranoia**.

Intense cravings have been reported by people who use bath salts. That's a sign that they have become **dependent on the drug**.

Makers of illegal synthetic drugs, including bath salts, sometimes try to avoid the law by labeling products as “Not for Human Consumption.” Many states have passed laws to stop this practice.

Be a Science Fact-Checker

Learn how to evaluate science-based claims in the media.

IF YOU HAVE EVER SCANNED NEWS STORIES on social media, you've likely scrolled through headlines that make surprising or false science claims. Some, such as those that say Earth is flat, can be relatively easy to spot. But articles that are misleading—as opposed to outright fake—may be harder to recognize.

For instance, social media is packed with articles about how different behaviors or products affect your health. These scientific claims should be supported by evidence collected through rigorous scientific research. Unfortunately, many health claims found in internet articles are not backed up by solid evidence.

In 2008, the *New York Daily News* published an online article titled “Sugar as Addictive as Cocaine, Heroin.” It discussed a study that investigated the effects of sugar on rats. The scientists found evidence that rats on a high-sugar diet developed a physical dependence on it. In addition, they saw that the diet caused changes in brain areas related to addiction. But the study didn't compare these changes with the effects of cocaine or heroin. It also didn't show that these brain changes happen in humans, which a reader might not realize based on the headline. Ultimately, the headline claim was not supported by evidence collected in the study.

Most science articles from reputable sources are accurate. But it's important to think critically about what you read and where you get your information. Asking some simple questions can often help you determine if the latest health story is based on solid science—or if it shouldn't be believed.



Five Questions to Ask as You Evaluate a Science or Health Article



1) Where is the story published?

Some websites publish articles that are not checked for accuracy. Information published by reliable organizations, such as legitimate news agencies or government sites like the National Institutes of Health, goes through rigorous fact-checking procedures. If you aren't sure about the reliability of a site, ask a librarian or teacher for advice.

2) Does the headline make a very surprising claim?

Headlines are sometimes exaggerated to catch readers' attention. Read the story carefully to see if the author presents scientific evidence to back up the headline. If the article suggests something very

different from other studies or doesn't provide supporting evidence on the topic, you should be more skeptical.

3) What is the original source?

When scientists conduct research, a detailed description of their study methods and results is usually first published in peer-reviewed scientific journals. Before an article can be published, researchers from the same field analyze the method the scientists used to make sure the scientific process was carried out carefully. If the research was not peer-reviewed, it may not be reliable.

4) Who conducted the research?

Sometimes the people who conduct scientific studies may have a bias. For example, a company that makes a health

product may carry out a study about how it affects humans. The fact that the company wants to sell the product may affect how data in the study are interpreted. Find out if the research was paid for by a company that would benefit from a particular outcome. If so, it may be unreliable.

5) Who or what did the scientists study?

Scientists often do research on animals to learn about health topics. Animal studies are critical in developing treatments for human disease. But finding something in mice doesn't always mean it is true in humans. Sample size is also important. The results of a medical study are more reliable if a large number of people are included in the study.

ID the Site



The ending of a URL provides clues on how to evaluate the content on a website.

.com = commercial
Often for-profit companies

.edu = educational institution
Often universities

.gov = government
Usually federal, state, and local agencies

.net = network
Could be any site

.org = organization
Could be any site

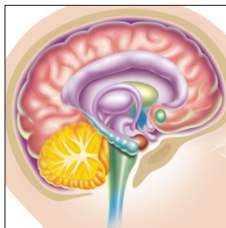
MORE INFO:

For additional facts about science and your health, visit [scholastic.com/headsup](https://www.scholastic.com/headsup) and [teens.drugabuse.gov](https://www.teens.drugabuse.gov).

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Articles



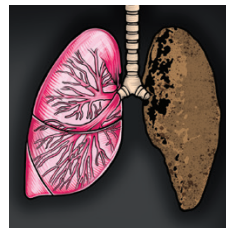
Articles and infographics on the effects of drugs

Videos



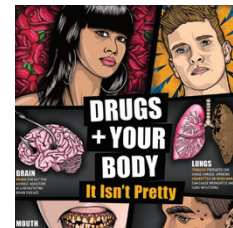
Videos that illustrate the science of drug misuse

Interactives



Interactives that explore important scientific info

Posters



Posters on the impact of drugs on a person's brain, body, and life

COMPILATION 2017-18: Student Edition

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