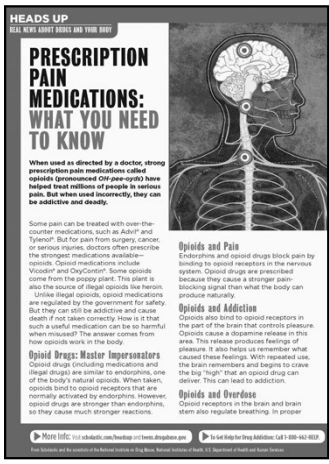
HEADS UP
REAL NEWS ABOUT DRUGS AND YOUR BODY

PRESCRIPTION PAIN MEDICATIONS: WHAT YOU NEED TO KNOW

When used as directed by a doctor, strong prescription pain medications called opioids (pronounced *OH-pee-oyds*) have helped treat millions of people in serious pain. But when used incorrectly, they can be addictive and deadly.

Some pain can be treated with over-the-counter medications, such as Advil® and Tylenol®. But for pain from surgery, cancer, or serious injuries, doctors often prescribe the strongest medications available—opioids. Opioid medications include Vicodin® and OxyContin®. Some opioids come from the poppy plant. This plant is also the source of illegal opioids like heroin.

Unlike illegal opioids, opioid medications are regulated by the government for safety. But they can still be addictive and cause death if not taken correctly. How is it that such a useful medication can be so harmful when misused? The answer comes from how opioids work in the body.

Opioid Drugs: Master Impersonators

Opioid drugs (including medications and illegal drugs) are similar to endorphins, one of the body's natural opioids. When taken, opioids bind to opioid receptors that are normally activated by endorphins. However, opioid drugs are stronger than endorphins, so they cause much stronger reactions.

Opioids and Pain

Endorphins and opioid drugs block pain by binding to opioid receptors in the nervous system. Opioid drugs are prescribed because they cause a stronger pain-blocking signal than what the body can produce naturally.

Opioids and Addiction

Opioids also bind to opioid receptors in the part of the brain that controls pleasure. Opioids cause a dopamine release in this area. This release produces feelings of pleasure. It also helps us remember what caused these feelings. With repeated use, the brain remembers and begins to crave the big "high" that an opioid drug can deliver. This can lead to addiction.

Opioids and Overdose

Opioid receptors in the brain and brain stem also regulate breathing. In proper

More Info: teens.drugabuse.gov/headsup and teens.drugabuse.gov

To Get Help for Drug Addiction: Call 1-800-662-HELP

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

HEADS UP
REAL NEWS ABOUT DRUGS AND YOUR BODY

Prescription Pain Medications: What You Need to Know

Statistics show that the abuse of prescription opioids—a type of pain medication—is a serious problem in the United States. In 2015, 4.4 percent of high school seniors reported using the prescription opioid Vicodin® for nonmedical reasons. More Americans die every year from overdosing on prescription opioids than die from illicit drugs such as cocaine or heroin. This article explains the risks of opioid pain medications and how opioids work in the body, and gives students advice about precautions that can lower their risk of addiction and overdose.

NIH National Institute on Drug Abuse

SUBJECT	COMMON CORE STATE STANDARDS	NEXT GENERATION SCIENCE STANDARDS	NATIONAL SCIENCE EDUCATION STANDARDS
• Science Literacy • English Language Arts • Health/Life Skills • Math (Graphs and Statistics)	• RST.7 Integrate information from a text and graph • W.9 Draw evidence to support analysis and reflection	• LS1.A Structure and Function • LS1.D Information Processing	• Structure and Function in Living Things • Personal and Community Health

Critical-Thinking Questions:

1. Explain how opioid medications work in the brain. How are they different from natural endorphins in the brain? *(Prescription opioids have a similar structure to endorphins, a type of chemical in the brain that blocks pain and contributes to feelings of pleasure and relaxation. Opioid medications act on the same receptors in the brain, brain stem, spinal cord, and other parts of the nervous system as endorphins do. These medications, however, have a stronger effect than endorphins; they are capable of blocking severe pain and flooding the brain's reward center with large amounts of dopamine, which puts a person at risk for addiction. If too much is taken, these drugs can cause a person to stop breathing.*

2. What are three examples of prescription opioid misuse and/or abuse? Cite evidence from the article. *(Taking medication that was prescribed to anyone other than yourself; taking medication at higher doses than was prescribed; taking medication not to treat pain but to experience a "high.")*

3. Why might abuse of prescription opioids lead a person to start using heroin? *(Prescription opioid pain medications and heroin are both opioids and therefore have similar effects on the body. If a person becomes addicted to prescription opioids, he or she may start taking heroin to achieve the same result.)*

Writing Prompts:

- ***Grades 6–8:*** What are the risks of misusing prescription opioid pain medications? Use evidence from the article to support your answer.
- ***Grades 9–10:*** Use evidence from the article to explain why prescription drug abuse is as dangerous to your health as illegal drug abuse.
- ***Grades 11–12:*** How is dependence different from addiction?

Paired Reading:

- ***Grades 6–12:*** "Mind Over Matter: Opioids" **teens.drugabuse.gov/educators/nida-teaching-guides/mind-over-matter-teaching-guide-and-series/opioids**
- ***Grades 6–12:*** "Straight Talk on Prescription Drugs" **headsup.scholastic.com/students/straight-talk-on-prescription-drugs**
- ***Grades 6–12:*** "Prescription Stimulants" **headsup.scholastic.com/students/prescription-stimulants**

Additional Sources:

- **Website: teens.drugabuse.gov/drug-facts/opioids-and-pain-relievers**
- **Videos: headsup.scholastic.com/students/video-collection**

Additional Tools for Lesson

Visit **scholastic.com/headsup/opioids/tools** for grade-tiered resources that support teaching this lesson and article:

- Expanded Answer Key for Critical-Thinking Questions and Work Sheet
- Tiered Adaptations of Critical-Thinking Questions
- Academic and Domain-Specific Vocabulary Lists
- Additional Writing Prompts
- Expanded Paired-Text Reading Suggestions
- Expanded Standards Charts for Grades 6–12

Resources and Support

- Teaching resources: **headsup.scholastic.com/teachers** and **teens.drugabuse.gov**

STUDENT WORK SHEET: The skills sheet on the reverse side has students analyze data regarding opioid prescriptions and overdose deaths from these medications. Critical-thinking questions help them link the data to what they learned in the article. See the "Additional Tools" document (details in gray box above) for guidelines and answers on how to evaluate student responses.

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STUDENT WORK SHEET

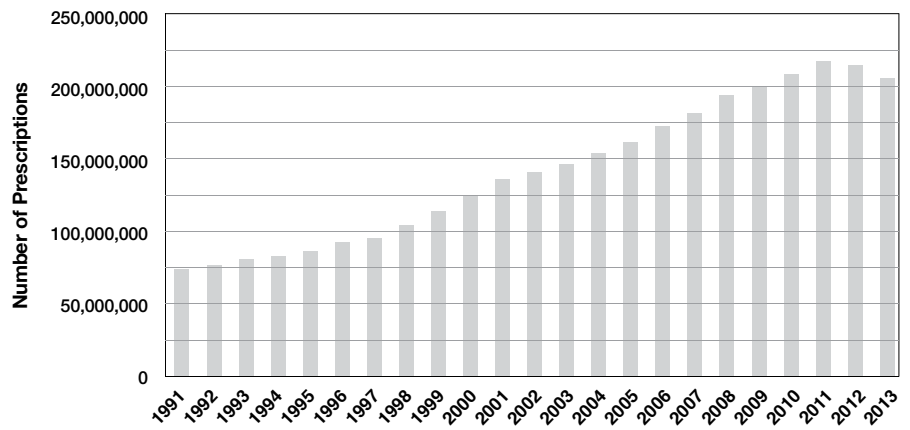
Prescription Opioid Use and Abuse

If a person takes too much of a prescription opioid, it can lead to a potentially deadly overdose. In recent years, public health officials have observed that the number of deaths caused by overdoses on opioid drugs is on the rise. What is causing this alarming increase? Some scientists see a relationship between the increasing number of overdose deaths and the rising number of prescriptions given during the past decade. Complete the activity below to analyze recent trends in opioid use and abuse.

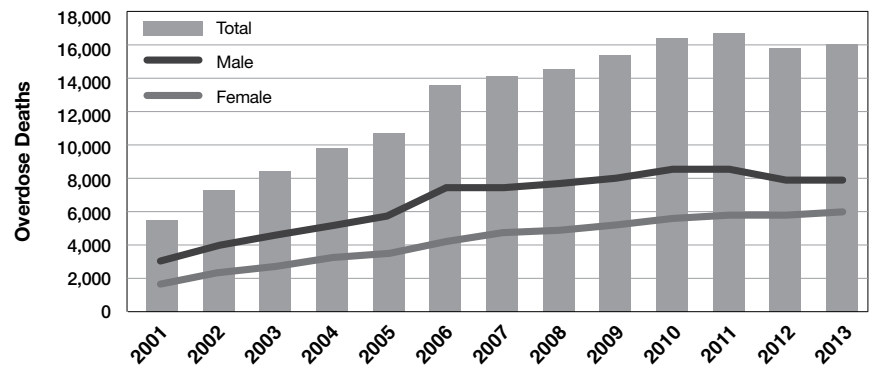
Directions:

Study the graphs on the right. Then use the data and the information in the article "Prescription Pain Medications: What You Need to Know" to answer the questions that follow.

Number of Opioid Prescriptions



Overdose Deaths From Prescription Opioids



Think It Through:

1. Roughly how many more prescriptions for opioids were given out by pharmacies in the U.S. in 2013 compared with 1991?
2. Approximately how many more people died from prescription opioid overdoses in 2013 than 2001?
3. Use data from the second graph to describe how the number of prescription opioid overdose deaths has changed over time for both men and women.
4. What evidence suggests that the number of opioid prescriptions could be linked to the number of overdose deaths? Use evidence from the graphs and the article to explain your answer.
5. Many scientists are urging the medical community to improve the way prescription opioids are prescribed. That may include using other, less powerful medications more often. Do you agree with this recommendation? What factors might scientists and doctors be considering? Use evidence from the graphs and from the article to support your answer.

ADDITIONAL TOOLS:

"Prescription Pain Medications: What You Need to Know" From *Heads Up*

Grades 6–8, 9–10, and 11–12

Dear Teacher,

The following tools are additional support to enrich the teaching of the *Heads Up* lesson plan and student article "Prescription Pain Medications: What You Need to Know."

What you'll find:

- **1A) Suggested Answers and Tiered Adaptations of Lesson Critical-Thinking Questions**
- **1B) Suggested Answers for Student Work Sheet**
- **2) Academic and Domain-Specific Vocabulary Lists**
- **3) Additional Writing Prompts**
- **4) Expanded Paired-Text Reading Suggestions**
- **5) Expanded Standards Charts for Grades 6–12**

For copies of the Teacher's Guide and student article, visit scholastic.com/headsup/opioids.

Note on Text Complexity: The student article "Prescription Pain Medications: What You Need to Know" was written for middle and high school students. For readers at a lower reading level, a grades 4–5 version of the article is available at scholastic.com/headsup/opioids/leveled.

1A Suggested Answers and Tiered Adaptations of Lesson Critical-Thinking Questions

scholastic.com/headsup/opioids

Have students use evidence from the text of the article "Prescription Pain Medications: What You Need to Know" when responding to the Critical-Thinking Questions. Suggested answers are provided in italics after each question.

Question 1:

- **Grades 6–8:** Explain three reactions that can happen in the body when a person takes opioids.
- **Grades 9–10:** Explain how opioid medications work in the brain. How are they different from natural endorphins in the brain? Cite evidence from the text.
- **Grades 11–12:** Explain how misusing prescription opioids could lead to addiction.

(Prescription opioids have a similar structure to endorphins, a type of chemical in the brain and body that blocks pain and contributes to feelings of pleasure and relaxation. Opioid medications act on the same receptors in the brain, brain stem, spinal cord, and other parts of the nervous system as endorphins do. When a person takes opioid drugs (medications or illegal drugs), it activates the reward system and causes feelings of pleasure, affects signals in the brain stem that slow breathing and cause relaxation, and reduces pain by acting on receptors in the spinal cord. Opioid medications and drugs, however, have a stronger effect than endorphins; they are capable of blocking severe pain and flooding the brain's reward center with large amounts of dopamine, which puts a person at risk for addiction. If too much is taken, these drugs can cause a person to stop breathing.)

***(Additional Answer Information for Grades 11–12:** Misusing prescription opioids could cause a person to develop physical dependence, so he or she experiences withdrawal symptoms if he or she stops using the opioids. This could lead to further opioid misuse and the development of habitual drug taking. If the habit of drug taking becomes strong enough, addiction can develop, and the person will continue to take drugs despite negative consequences.)*

Question 2:

- **Grades 6–8:** What is the risk of misusing opioid medicines?
- **Grades 9–10:** What are three examples of prescription opioid misuse and/or abuse? Cite evidence from the article.
- **Grades 11–12:** Why do you think it's important to have programs to take back unused pills from opioid prescriptions? Support your answer with evidence from the text.

(Examples of opioid misuse are taking medication that was prescribed to anyone other than yourself, taking medication at higher doses than was prescribed, and taking medication not to treat pain but to experience a high. If a person takes too much of an opioid drug, it can lead to a deadly overdose by causing the person to stop breathing. Misusing the drugs can increase the risk of dependence and addiction.)

***(Additional Answer Information for Grades 11–12:** Having unused prescriptions around makes it easier for people to misuse them either accidentally or intentionally.)*

Question 3:

- **Grades 6–10:** Explain how a person could become physically dependent on an opioid drug, and how this impacts a person's body.
- **Grades 11–12:** Why might abuse of prescription opioids lead a person to start using heroin?

(If a person takes an opioid medication for a long time, his or her body can develop a tolerance to the drug, meaning he or she needs to take more of the drug to achieve the same result. Long-term use can also cause the body to produce fewer endorphins and opioid receptors. This is called physical dependence. The result is that when people go off the drug, they experience withdrawal symptoms.)

***(Additional Answer Information for Grades 11–12:** If a person becomes addicted to opioids, he or she may seek out any way possible to satisfy his or her cravings for the drugs. Prescription opioid pain medications and heroin are both opioids and therefore have similar effects on the body. If a person becomes addicted to prescription opioids, he or she may start taking heroin to satisfy his or her craving for opioids and avoid withdrawal.)*

1B Suggested Answers for Student Work Sheet

scholastic.com/headsup/opioids/worksheet

1. Roughly how many more prescriptions for opioids were given out by pharmacies in the U.S. in 2013 compared with 1991? *(Roughly 206,000,000 in 2013, minus 75,000,000 in 1991 = 131,000,000 more prescriptions in 2013.)*
2. Approximately how many more people died from prescription opioid overdoses in 2013 than 2001? *(Roughly 16,000 in 2013, minus 5,500 in 2001 = 10,500 more deaths in 2013.)*
3. Use data from the second graph to describe how the number of prescription opioid overdose deaths has changed over time for both men and women. *(The number of opioid overdose deaths has increased in both men and women between 2001 and 2013. In the last few years, the numbers of deaths of men has dropped slightly.)*
4. What evidence suggests that the number of opioid prescriptions could be linked to the number of overdose deaths? Use evidence from the graphs and the article "Prescription Pain Medications: What You Need to Know" to explain your answer. *(The number of opioid overdose deaths has increased at the same time as the number of prescriptions of these drugs has increased. Misusing these medications increases a person's risk of overdose and addiction. If there are more prescriptions for opioids, there are a greater number of people using them, and thus a greater number at risk for misusing them and overdosing.*
5. Many scientists are urging the medical community to improve the way prescription opioids are prescribed. That may include using other, less-powerful medications more often. Do you agree with this recommendation? What factors might scientists and doctors be considering? Use evidence from the graphs and from the article to support your answer. *(Answers will vary but may include that the number of opioid overdose deaths has increased in recent years. At the same time, the number of prescriptions of these drugs has increased. Opioids are very powerful, which makes them an important tool for treating patients' severe pain, but these drugs have a high risk for addiction. If they are used less often, there may be fewer people who become addicted to them or who have an overdose. Doctors should only prescribe them when there is no other alternative. Doctors should closely monitor people who are taking them to make sure abuse is not occurring.)*

2 Academic and Domain-Specific Vocabulary Lists

scholastic.com/headsup/opioids/article

The vocabulary words below are drawn from the "Prescription Pain Medications: What You Need to Know" student article and work sheet. This vocabulary can be previewed with students prior to reading or reinforced with students afterward. Encourage students to incorporate these words into their writing and discussion of "Prescription Pain Medications: What You Need to Know" article and work sheet.

Leveled definitions are provided for grades 6–8 and 9–12. Unless otherwise noted, all definitions below are sourced or adapted from:

- **Grades 6–8:** *Wordsmyth Children's Dictionary*
- **Grades 9–12:** *Merriam-Webster Collegiate Edition*

Suggested Methods of Learning and Reinforcement: Students can construct understanding by drawing the words' definitions; organizing concept maps that include word parts, synonyms, antonyms, and examples; composing memory aids that explain the words or use them in a meaningful context; and employing the words to create newspaper articles, stories, or poems.

Tip: The vocabulary sheet that follows on the next page can be folded in half and reproduced for distribution to students. The blank part of the paper can be used for students to record notes or questions.

Fold here before reproducing

Vocabulary From "Prescription Pain Medications: What You Need to Know" Grades 6–8

- **activation** *(noun)*: the process of causing something to turn on or work
- **addictive** *(adjective)*: habit-forming, causing an irresistible need. People who suffer from drug addiction have trouble stopping their drug use even when they really want to and even after it causes terrible consequences to their health and other parts of their lives. This is because addiction is a disease that changes how the brain works.
- **brain stem** *(noun)*: the lower part of the brain that connects to the spinal cord and controls some automatic functions, such as breathing
- **compulsively** *(adverb)*: uncontrollably
- **dopamine** *(noun)*: a chemical that helps transmit signals in the brain and is associated with feelings of pleasure
- **endorphin** *(noun)*: a natural chemical in the brain that causes feelings of relaxation, pleasure, and pain relief
- **opioid** *(noun)*: a chemical that produces relaxation, pleasure, and pain relief
- **overdose** *(noun, verb)*: a larger amount of a drug than prescribed by a doctor; to take too much of a drug so that you become sick or die
- **perception** *(noun)*: awareness through the senses
- **quadruple** *(verb)*: to multiply something by four
- **receptor** *(noun)*: a structure on the surface of a cell that binds to specific chemicals to send messages within the body
- **regulate** *(verb)*: to control
- **substance use** *(noun)*: drug or alcohol use
- **substance use disorder** *(noun)*: a brain disorder that leads to the repeated use of drugs and/or alcohol despite significant harm, such as health problems, disability, and failure to meet major responsibilities in life. Addiction is a substance use disorder.

Vocabulary From "Prescription Pain Medications: What You Need to Know" Grades 9–12

- **activation** *(noun)*: the process of causing something to turn on or work
- **addictive** *(adjective)*: habit-forming, causing an irresistible need. People who suffer from drug addiction have trouble stopping their drug use even when they really want to and even after it causes terrible consequences to their health and other parts of their lives. This is because addiction is a disease that changes how the brain works.
- **brain stem** *(noun)*: the lower part of the brain that connects to the spinal cord and controls some automatic functions, such as breathing
- **compulsively** *(adverb)*: uncontrollably
- **dopamine** *(noun)*: a neurotransmitter that helps relay signals in the brain and is associated with feelings of pleasure
- **endorphin** *(noun)*: a natural chemical in the brain that attaches to opioid receptors and produces pain relief and pleasure
- **opioid** *(noun)*: a chemical that binds to opioid receptors in the human body, causing relaxation, pleasure, and pain relief
- **overdose** *(noun, verb)*: a lethal or toxic amount of a drug; to take a lethal or toxic amount of a drug
- **perception** *(noun)*: awareness through the senses
- **quadruple** *(verb)*: to multiply something by four
- **receptor** *(noun)*: a protein on the surface of a cell that binds to specific chemicals in order to transmit messages within the body
- **regulate** *(verb)*: to control or adjust so that a certain standard is maintained
- **substance use** *(noun)*: drug or alcohol use
- **substance use disorder** *(noun)*: a brain disorder in which long-lasting changes to brain circuits cause compulsive drug seeking and drug use, despite negative consequences such as health problems, disability, and failure to meet major responsibilities at work, school, or home. Addiction is a substance use disorder.

3 Expanded Writing Prompts for "Prescription Pain Medications: What You Need to Know"

scholastic.com/headsup/opioids/article

To encourage and assess close reading of the student article "Prescription Pain Medications: What You Need to Know," use the following writing prompts for quick five-minute "freewrites" of a few sentences each. Instruct students to include evidence from the text in their responses.

Grades 6–8

- **[Skill: Textual Evidence]** What are the risks of misusing prescription opioid pain medications? Use evidence from the article to support your answer.
- **[Skill: Persuasive Writing]** Suppose someone you know was prescribed an opioid medication for severe pain. What advice might you give him or her?

Grades 9–10

- **[Skill: Textual Evidence/Making Inferences]** Explain why the author called opioid drugs "master impersonators."
- **[Skill: Persuasive Writing]** Use evidence from the article to explain why prescription drug abuse is as dangerous to your health as illegal drug abuse.

Grades 11–12

- **[Skill: Textual Evidence]** How is dependence different from addiction?
- **[Skill: Persuasive Writing]** Automatic refills of certain powerful drugs are not allowed. If a patient needs more of these medications, they need to be seen again by a doctor. Do you think all opioids should be regulated in this way? Support your answer with evidence from the text.

4 Expanded Paired-Text Reading Suggestions for "Prescription Pain Medications: What You Need to Know"

scholastic.com/headsup/opioids/article

Deepen student learning of "Prescription Pain Medications: What You Need to Know" with the following paired-text reading suggestions and prompts for writing and discussion.

Informational Text: "Mind Over Matter: Opioids" teens.drugabuse.gov/educators/nida-teaching-guides/mind-over-matter-teaching-guide-and-series/opioids

Writing Prompt for Grades 6–8:

- What are two facts about how opioids affect the body that are supported both by "Mind Over Matter: Opioids" and "Prescription Pain Medications: What You Need to Know"?

Writing Prompt for Grades 9–12:

- Using the information in "Mind Over Matter: Opioids" and "Prescription Pain Medications: What You Need to Know," craft a persuasive argument convincing a friend not to try opioids outside of a doctor's care.

Informational Text: "Straight Talk on Prescription Drugs" headsup.scholastic.com/students/straight-talk-on-prescription-drugs

Writing Prompt for Grades 6–8:

- Synthesize facts from both "Straight Talk on Prescription Drugs" and "Prescription Pain Medications: What You Need to Know" to explain how prescription pain medications affect how the brain works. Provide examples on how these changes could affect a person's life.

Writing Prompt for Grades 9–12:

- Synthesize what you learned in both "Straight Talk on Prescription Drugs" and "Prescription Pain Medications: What You Need to Know" to explain why it is especially important for parents to dispose of unused prescription opioid medications.

Informational Text: "Prescription Stimulants" headsup.scholastic.com/students/prescription-stimulants

Writing Prompt for Grades 6–8:

- Explain how the effect of stimulants on the body is similar to and different from that of opioid medications. Use evidence from "Prescription Stimulants" and "Prescription Pain Medications: What You Need to Know" to support your answer.

Writing Prompt for Grades 9–12:

- Compare the ways "Prescription Stimulants" and "Prescription Pain Medications: What You Need to Know" explain how prescription medications can be misused. What is one fact about prescription drug abuse that you understand better by reading both texts?

5 Expanded Grades 6–12 Standards Chart

scholastic.com/headsup/opioids

The "Prescription Pain Medications: What You Need to Know" student article, lesson plan, work sheet, and Additional Tools document support higher standards by giving students opportunities to practice key literacy skills while acquiring scientific knowledge relevant to health, life skills, and current events.

Subject	Common Core State Standards for English Language Arts	Next Generation Science Standards	National Science Education Standards
• Science Literacy • English Language Arts • Health/Life Skills • Math (Graphs and Statistics)	• RI.1 & RST.1 Cite textual evidence • RI.2 & RST.2 Central idea and details • RST.7 Integrate information from a text and graph • W.1 Write arguments • W.7 Synthesize multiple texts when writing • W.9 Draw evidence to support analysis and reflection • RST.4 Domain-specific vocabulary • RST.6 Author's purpose • RST.8 Evaluate a claim • RST.9 Compare and contrast two texts	• LS1.A Structure and Function • LS1.D Information Processing	Grades 6-8 • Structure and Function in Living Systems • Regulation and behavior • Personal Health Grades 9-12 • Behavior of organisms • Personal and Community Health

Surprising Facts

Opioids can make you throw up—this can even happen to someone given opioids by a doctor—which is why many people don't like taking them.

Your brain makes its own versions of opioids, called endogenous opioids. These chemicals act just like opioid drugs, attaching to opioid receptors in your brain. Endogenous opioids help your body control pain. If you've ever felt pleasantly relaxed after exercising a lot, that feeling was probably caused by the release of these natural chemicals (sometimes called "endorphins") in your brain.

The Search Continues

There is still a lot that scientists don't know about the effects of opioids on the brain. Maybe someday you will make the next big discovery!

Until then, join me—Sara Bellum—in the magazines in my series, as we explore how drugs affect the brain and nervous system.

For printed copies of this publication contact:
NIDA DrugPubs
1-877-643-2644
drugpubs.drugabuse.gov

NIH
National Institute on Drug Abuse

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MIND OVER MATTER

The Brain's Response to Opioids

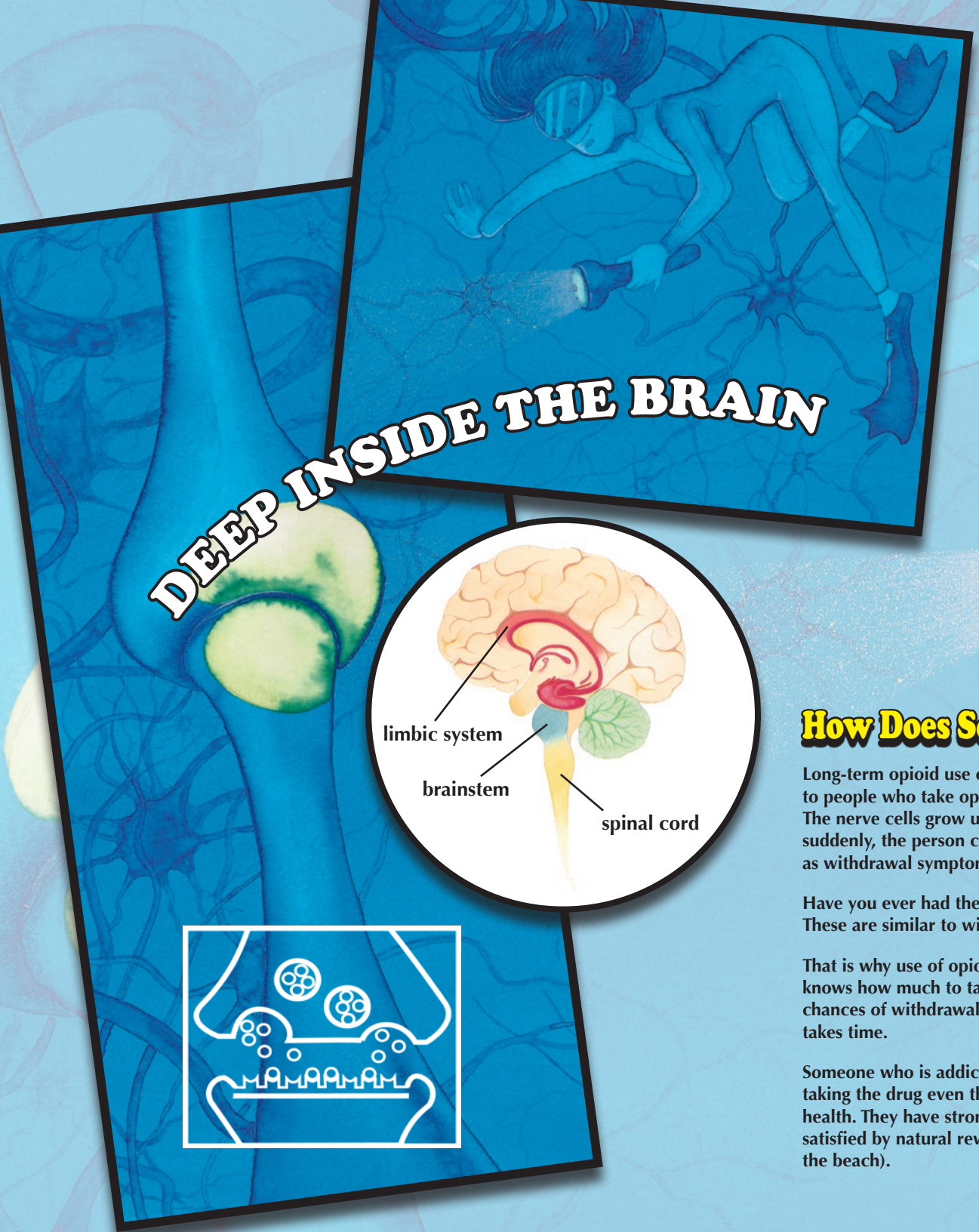
Hi, my name's Sara Bellum. Welcome to my magazine series exploring the brain's response to drugs. In this issue, we'll investigate the fascinating facts about opioids.

If you've ever seen *The Wizard of Oz*, then you've seen the poppy plant—the source of a type of drug called an opioid. When Dorothy lies down in a field of poppies, she falls into a deep sleep. No wonder the Latin name of this plant—*Papaver somniferum*—means "the poppy that makes you sleepy."

Opioids can be made from opium, which comes from the poppy plant, or they can be made in a lab. Either way, they can be helpful medicines—they are used as powerful painkillers, they are sometimes prescribed to control severe diarrhea, and they can also be found in cough medicine. Maybe you've heard of drugs called Vicodin, morphine, or codeine. These are examples of opioids. When used properly as medicine, they can be very helpful. But opioids used without a prescription, or taken in other ways or for different reasons than the doctor prescribed, can be dangerous and addictive.

Heroin is another example of an opioid, but it isn't used as a medicine—it's used to get high.

National Institute on Drug Abuse



How Do Opioids Work?

Opioids look like chemicals in your brain and body that attach to tiny parts on nerve cells called opioid receptors. Scientists have found three types of opioid receptors: *mu, delta,* and *kappa* (named after letters in the Greek alphabet). Each of these receptors plays a different role. For example, *mu* receptors are responsible for opioids' pleasurable effects and their ability to relieve pain.

Opioids act on many places in the brain and nervous system, including:

- the **limbic system**, which controls emotions. Here, opioids can create feelings of pleasure, relaxation, and contentment.
- the **brainstem**, which controls things your body does automatically, like breathing. Here, opioids can slow breathing, stop coughing, and reduce feelings of pain.
- the **spinal cord**, which receives sensations from the body before sending them to the brain. Here too, opioids decrease feelings of pain, even after serious injuries.

Whether it is a medication like Vicodin or a street drug like heroin, the effects of opioids (and many other drugs) depend on how much you take and how you take them. If they are injected, they act faster and more intensely. If opioids are swallowed as pills, they take longer to reach the brain and are much safer.

How Does Someone Become Addicted to Opioids?

Long-term opioid use changes the way nerve cells work in the brain. This happens even to people who take opioids for a long time to treat pain, as prescribed by their doctor. The nerve cells grow used to having opioids around, so that when they are taken away suddenly, the person can have lots of unpleasant feelings and reactions. These are known as withdrawal symptoms.

Have you ever had the flu? You probably had aching, fever, sweating, shaking, or chills. These are similar to withdrawal symptoms, but withdrawal symptoms are much worse.

That is why use of opioids should be carefully watched by a doctor—so that a person knows how much to take and when, as well as how to stop taking them to lessen the chances of withdrawal symptoms. Eventually, the cells will work normally again, but that takes time.

Someone who is addicted to opioids has other problems as well. For example, they keep taking the drug even though it may be having harmful effects on their life and their health. They have strong urges to take the drug—called cravings—and they no longer feel satisfied by natural rewards (like chocolate, TV, or a walk on the beach).

Maybe you've heard of drugs called heroin, morphine, or codeine. These are examples of opioids. If someone uses opioids again and again, his or her brain is likely to become dependent on them.

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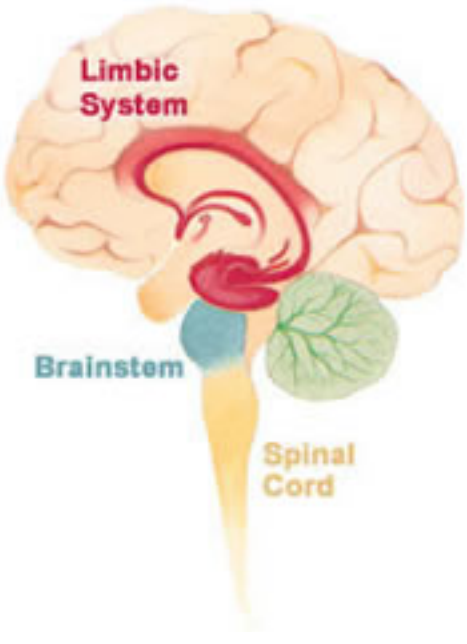
Opioids look like chemicals in your brain and body that attach to tiny parts on nerve cells called opioid receptors. Scientists have found three types of opioid receptors: *mu*, *delta*, and *kappa* (named after letters in the Greek alphabet). Each of these receptors plays a different role. For example, *mu* receptors are responsible for opioids' pleasurable effects and their ability to relieve pain.

Opioids act on many places in the brain and nervous system, including:

- the **limbic system**, which controls emotions. Here, opioids can create feelings of pleasure, relaxation, and contentment.
- the **brainstem**, which controls things your body does automatically, like breathing. Here, opioids can slow breathing, stop coughing, and reduce feelings of pain.

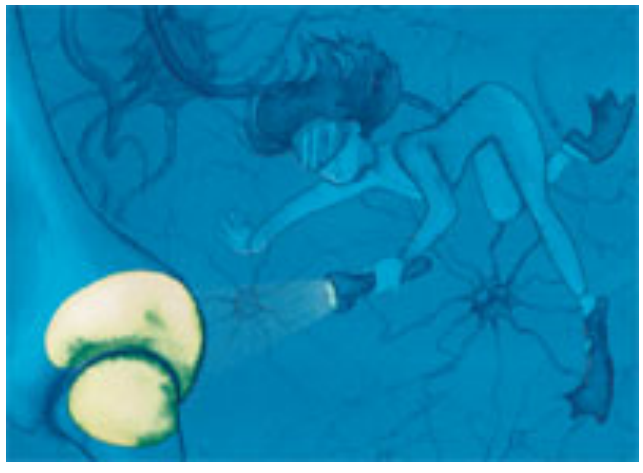


- the **spinal cord**, which receives sensations from the body before sending them to the brain. Here too, opioids decrease feelings of pain, even after serious injuries.

Whether it is a medication like Vicodin or a street drug like heroin, the effects of opioids (and many other drugs) depend on how much you take and how you take them. If they are injected, they act faster and more intensely. If opioids are swallowed as pills, they take longer to reach the brain and are much safer.

How Does Someone Become Addicted to Opioids?

Long-term opioid use changes the way nerve cells work in the brain. This happens even to people who take opioids for a long time to treat pain, as prescribed by their doctor. The nerve cells grow used to having opioids around, so that when they are taken away suddenly, the person can have lots of unpleasant feelings and reactions. These are known as withdrawal symptoms.



Have you ever had the flu? You probably had aching, fever, sweating, shaking, or chills. These are similar to withdrawal symptoms, but withdrawal symptoms are much worse.

That is why use of opioids should be carefully watched by a doctor—so that a person knows how much to take and when, as well as how to stop taking them to lessen the chances of withdrawal symptoms. Eventually, the cells will work normally again, but that takes time.

Someone who is addicted to opioids has other problems as well. For example, they keep taking the drug even though it may be having harmful effects on their life and their health. They have strong urges to take the drug—called cravings—and they no longer feel satisfied by natural rewards (like chocolate, TV, or a walk on the beach).

Surprising Facts

Opioids can make you throw up—this can even happen to someone given opioids by a doctor—which is why many people don't like taking them.

Your brain makes its own versions of opioids, called endogenous opioids. These chemicals act just like opioid drugs, attaching to opioid receptors in your brain. Endogenous opioids help your body control pain. If you've ever felt pleasantly relaxed after exercising a lot, that feeling was probably caused by the release of these natural chemicals (sometimes called "endorphins") in your brain.

The Search Continues

There is still a lot that scientists don't know about the effects of opioids on the brain. Maybe someday you will make the next big discovery!

Until then, join me—Sara Bellum—in the magazines in my series, as we explore how drugs affect the brain and nervous system.

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Straight Talk on Prescription Drugs

A teen reporter interviews the director of the nation's leading research agency on drug abuse and addiction

First published 2010

Overall teen drug use is declining, but prescription-drug abuse remains high. This is mainly because teens do not see the dangers, says one of the nation's top scientists.

"Teenagers believe that if a doctor gives a drug to you, it cannot be so terrible to abuse," says Dr. Nora D. Volkow, director of the National Institute on Drug Abuse in Bethesda, Md. "They think prescribed drugs are safer to abuse than illegal drugs. They are not."

In a sit-down interview with teen reporter Marie French, Dr. Volkow explains why prescription-drug abuse can be just as dangerous as illegal drugs in terms of health risks and addiction.

What's the worst that can happen?

"Death," says Dr. Volkow.

What are the effects of prescription-drug abuse—either one-time or long-term use?

DR. VOLKOW: There isn't much research on one-time use, so it's hard to say overall what the negative effects may be, except, of course, that you may overdose. Another risk is that you may love the way it makes you feel, and that starts to change your brain. The brain is wired to learn very rapidly about things that you like, that give you pleasure. So if, for example, you take a prescription painkiller and you like it, you might take it again in the future. And if you keep taking it, you could become addicted, which is why I say, Why risk it?—unless it's something a physician prescribes for you to treat a problem. **Do you really want to reach a point where you are doing something only because you cannot stop, as if you've lost control of your own brain?** It's just not worth it.

What's the likelihood of someone becoming addicted to prescription drugs?

DR. VOLKOW: Your likelihood of becoming addicted is dependent on a number of factors—the drug itself, how you take it, your genes, and your age. If you abuse a pain medication like OxyContin®, **the risk of becoming addicted can be equivalent to that of heroin**—especially if you snort or inject the drug. Actually, if a teen starts with a prescribed painkiller and gets hooked, he or she may shift to heroin because it is cheaper.

What long-term health effects do addicted teens face?

DR. VOLKOW: When you become addicted, there are many negative health and social effects. With smoking, there is damage to your heart and lungs, and it puts you at risk for a variety of cancers. When you are an alcoholic, you increase your risk of getting into an accident or damaging your liver and your brain. Even if you are not addicted, when you are high or drunk, you become uninhibited and could do things you wouldn't ordinarily do—like drive drunk or drugged. **When you become addicted to drugs, they rule your behavior. The things that are normally important to you become unimportant.** You may get into fights with your family, even steal from them. **If you have ever loved someone who is addicted, then you know it's pretty horrible.**

I've heard of people taking stimulants, like Adderall® or Ritalin®, when they have a test—like the SATs. Why shouldn't they?

DR. VOLKOW: There are many reasons why you shouldn't do it. One is that there is not really good scientific evidence that stimulants will even improve your performance—unless you are being treated for ADHD.

So some students may take these drugs to help them stay awake at night to study, but coffee does the same thing. **The disadvantage of stimulants over coffee is that, for people who are vulnerable, they may become psychotic and paranoid.** That's not the best way to go into an exam.

More than 50 percent of teens have reported getting the prescription drugs they abuse from their friends or from their home medicine cabinets. Does that show a need for physicians to be more aware when they're prescribing drugs?

DR. VOLKOW: Absolutely. You are touching on the responsibility of physicians and parents. **Anyone prescribing an addictive medication should consider the risks and determine what's most helpful for each patient.** For example, you might just need two or three days of a prescription or maybe just an over-the-counter pain reliever will do. Once a prescription medication is in your medicine cabinet, it could become a temptation for abuse. It is for this very reason that we are working to raise awareness of this concern among medical students, physicians, and dentists—as well as parents, many of whom don't realize they are leaving something potentially dangerous around for their kids to abuse.

"People who are addicted end up taking drugs—not to feel high and good—but instead to feel less bad."
—Dr. Nora D. Volkow

What would you say to teenagers to stop them from abusing prescription drugs?

DR. VOLKOW: Well, I think kids start abusing them because they want to get high or feel good at a party. Or they want to use them to help them study, lose weight, or for pain relief. We've already discussed some of the reasons not to use stimulants to study or painkillers without a prescription. But as far as getting high—my advice is that there are many things that can make you feel very good that don't require drugs. Sports, for example, or dancing, or going out with friends. It's whatever you like. You really don't need drugs. You don't. **When you take drugs, your brain resets itself.** So what that means is that when you take a drug—especially when you keep taking it—and its effects eventually wear off, you become much less sensitive to normal pleasures, like social interactions, going to a movie, chocolate. Now, that tends to recover, especially if you are just taking drugs occasionally. But if you continue, then the capacity of the brain to recover becomes diminished. When you're addicted, you will feel less pleasure in general. People who are addicted end up taking drugs—not to feel high and good—but instead to feel less bad. They feel awful when they are not taking the drug.

Resources:

http://teens.drugabuse.gov
NIDA's teen site containing information, videos, games, and real stories about drug abuse (including prescription drugs) and its consequences.

http://teens.drugabuse.gov/blog
NIDA's teen blog features the latest news from NIDA, as well as answers to teen questions about drugs and drug abuse.

http://findtreatment.samhsa.gov
A searchable directory of drug treatment centers sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA) for those seeking treatment. You can also reach the referral hotline at 1-800-662-HELP.

Printables

Download a print copy of:
NIDA9-INS1_Stu_Mag.pdf

(Image credits: Photo of reporter Marie French: Janet French; Photo of Marie French and Dr. Nora D. Volkow © Rachel Lienesch)

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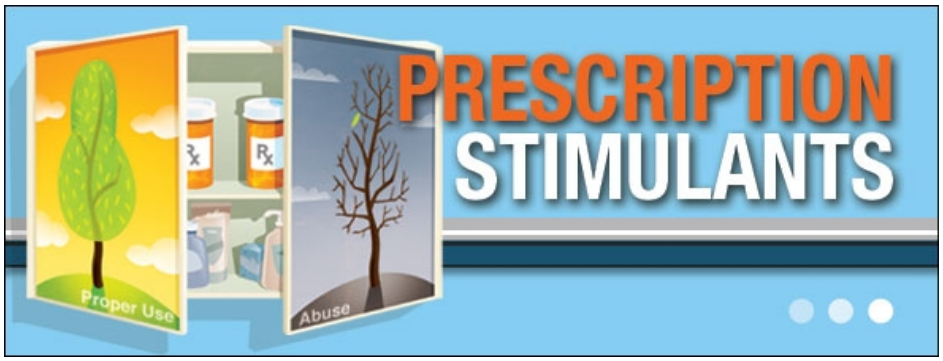


Prescription Stimulants

When used as prescribed, prescription stimulants are safe drugs that help millions of teens. But abusing them is dangerous and can be addictive.

First published 2011

The most recent *Monitoring the Future* survey shows a disturbing fact: Prescription stimulants such as Adderall® and Ritalin® are two of the drugs most frequently abused by high school seniors, with 6.5 percent reporting nonmedical use of Adderall® in the past year.[1] Doctors prescribe stimulants to treat attention deficit hyperactivity disorder (ADHD), narcolepsy (a sleep disorder), and, occasionally, depression.

When taken as prescribed, these medications help a lot of people. Unfortunately, they are too often abused by being taken in doses and/or in ways other than intended, or by being used by someone for whom they were not prescribed. Prescription stimulants are powerful drugs, and when they are abused there can be serious health consequences, including addiction. Read on to get the facts about prescription stimulants and why abusing them is dangerous.

PROPER USE

What Are Prescription Stimulants?

Prescription stimulants include medications such as methylphenidate (Ritalin® and Concerta®) and amphetamines (Dexedrine® and Adderall®). These medications, which are in the same class of drugs as cocaine and methamphetamine ("meth"), increase alertness, energy, and attention. Like all stimulant drugs, prescription stimulants increase levels of dopamine in the brain. Dopamine is a neurotransmitter associated with pleasure, movement, and attention.

How Do Prescription Stimulants Treat ADHD?

People with ADHD have problems maintaining attention (e.g., fidgeting or trouble concentrating), and may be more hyperactive and impulsive than others of the same age. For teens, this can result in difficulty with completing schoolwork or other tasks. Doctors prescribe stimulants such as Concerta® and Adderall®, sometimes in combination with counseling, to treat these symptoms. These stimulants can have a calming effect on people with ADHD that helps them focus, dramatically improving their ability to stay organized and complete tasks.

When prescribed, stimulant medications are usually started at a low dose and gradually increased until symptoms subside, or until side effects become problematic. When taken as directed, prescription stimulants produce slow, steady increases of dopamine in the brain. Scientists think that these gradual increases may help to correct abnormal dopamine signaling that may occur in the brains of

people with ADHD.

Why Do They Require a Prescription?

Prescription stimulants are strong medications, and their proper use needs a doctor's supervision. The first step is an accurate diagnosis of a physical or mental disorder, such as ADHD, by a qualified doctor. Then, if appropriate, stimulants may be prescribed. A doctor should monitor both the positive and possibly negative effects of the medication to make sure it's treating symptoms as intended.

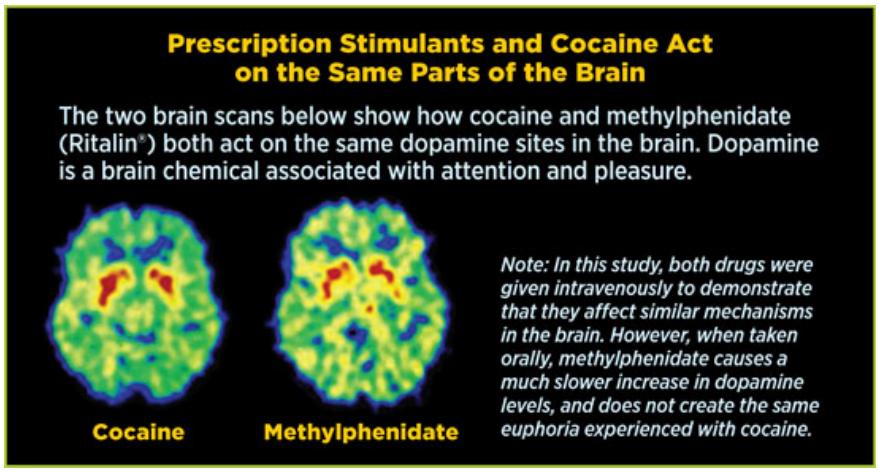
ABUSE

Why Are Prescription Stimulants Abused?

Many teens report abusing prescription stimulants to get high because they mistakenly believe that prescription drugs are a "safer" alternative to illicit drugs. Teens also report abusing prescription stimulants to try to lose weight or increase wakefulness and attention. Some even abuse them to get better grades. Research, however, shows that stimulant abuse is actually linked to poorer academic performance. Why? Because people who abuse stimulants often take other drugs and engage in behavior that puts their academic performance at risk (e.g., skipping classes).

Is Abusing Prescription Stimulants Dangerous?

Yes. In fact, taking prescription stimulants in high doses, or by injection, smoking, or snorting, can affect the brain in ways similar to cocaine or other drugs of abuse (see below). Prescription stimulant abuse can result in abnormally high levels of dopamine, producing euphoria, an intense feeling of happiness. This increases the risk for abusing again, and ultimately for becoming addicted.



Abusing prescription stimulants can also result in increased blood pressure, heart rate, and body temperature, as well as nausea, headaches, anxiety, psychosis, seizures, stroke, and heart failure. Individuals who chronically abuse prescription stimulants may experience withdrawal symptoms when they stop using them. These symptoms can include fatigue, depression, and disturbed sleep patterns. Although not life threatening, these symptoms often prompt a return to drug use.

You are abusing prescription stimulants if . . .	Risks
. . . you take them to cram for a test.	Stimulants can help you stay awake, but they can also make you feel jittery, anxious, irritable, and even paranoid. Stimulants may improve certain skills (e.g., focused attention) at the expense of others (e.g., creative thinking). There is no evidence that stimulants improve academic performance in someone who does not have ADHD.
. . . you take them to try to lose weight.	Abusing stimulants can decrease appetite, which can lead to weight loss and malnutrition. Plus, when a person stops taking the stimulants, he or she usually gains the weight back, and sometimes puts on a few more pounds. Thus, stimulants do not provide a long-term weight-loss solution, and chronic use increases the risk of addiction and other health consequences.
. . . you take them to get high.	To get high on stimulants, people may take them in higher doses than prescribed or by routes other than oral (e.g., snorted, smoked, or injected). This practice increases the risk of serious health consequences. High doses can cause blood vessels to narrow, forcing the heart to work harder, and possibly lose its normal rhythm. This could lead to a heart attack or a stroke.

Important Resources

- For more information on drugs, go to **http://teens.drugabuse.gov** or **www.scholastic.com/headsup**.
- For immediate help with a crisis, call 1-800-273-TALK.
- To locate a treatment center, call 1-800-662-HELP or visit **http://findtreatment.samhsa.gov**.

Printables

Download a print copy of:
NIDA9-INS3_Stu Mag.pdf

1 "Monitoring the Future survey, Overview of Findings 2010," National Institute on Drug Abuse, http://drugabuse.gov/newsroom/10/mtf10overview.html.