

Summary

This module discusses two illegal drugs: heroin and cocaine. Many people consider cocaine and heroin to be hard-core “street” drugs, but increasingly, younger people in all kinds of communities across the country are using these dangerous drugs. Heroin and cocaine both have a huge impact on the health of the brain and the body. Abuse of these drugs changes the brain. Both are illegal and highly addictive. Sometimes these drugs are used in combination.

Through the content of the magazine and CD-ROM, students will learn how heroin and cocaine affect the brain and body. They will also explore information on the short- and long-term effects of these drugs, including addiction.

Learning Objectives

At the end of this module:

- Students can explain how heroin and cocaine use affects the brain and body.
- Students can explain how heroin and cocaine use affects normal neurotransmission.
- Students understand how heroin and cocaine can change the brain and cause addiction.

Background

HEROIN

Heroin belongs to a class of drugs called opioids, which also includes the painkillers codeine and morphine. Heroin comes from a natural substance extracted from the seedpod of the Asian poppy plant. It usually appears as a white or brown powder.

Slang terms for heroin include smack, H, skag, and junk. Other names refer to types of heroin produced in a specific geographical area, such as Mexican black tar.

Heroin is usually injected, sniffed, snorted, or smoked. Injection of the drug provides the greatest intensity and most rapid onset of symptoms. Almost immediately upon injection, the user is relieved of physical pain and discomfort and experiences pleasurable feelings. This false sense of well-being plays a part in the addiction to heroin. The drug “rush” is accompanied by a flushing of the skin.

Less pleasant aftereffects of heroin use include a dry mouth and heavy feeling in the limbs, which may be accompanied by nausea, vomiting, and severe itching. Abusers are generally drowsy for several hours. When heroin is used, mental functioning becomes clouded as the central nervous system, heart, and breathing slow down. In the case of overdose, this decrease in functioning can cause death.

Heroin and Neurotransmitters

The brain naturally contains receptors for opioids that are involved in breathing, perception of pain, emotion, and reward. When a person abuses heroin, the drug travels quickly to the brain and activates these receptors. Research suggests that this causes greater amounts of dopamine to be released into the reward system, resulting in an intense, short-lived rush. Long-term use of heroin can decrease the number of receptors and their sensitivity to the drug, so that users must use more and more heroin just to feel like they are functioning normally. This is addiction. The receptors that are sensitive to heroin are located in several parts of the brain, including the cerebral cortex and brain stem.

Long-term Effects, Addiction, and Withdrawal

Long-term effects of heroin abuse include addiction, infection of the heart lining and valves, and liver disease. For those users who inject the drug, there is a high risk of infectious diseases, including HIV/AIDS, collapsed lungs, and hepatitis B and C. Lung complications, including various types of pneumonia, may result from the overall poor health of the abuser as well as from heroin's effects on respiration. Death by overdose is not uncommon.

When addicted users stop taking the drug, they go through a severe withdrawal. Symptoms of withdrawal include restlessness, muscle and bone pain, inability to sleep, diarrhea, vomiting, cold flashes with goose bumps ("cold turkey"), and involuntary leg movements. A person who is going through withdrawal craves the drug and will do just about anything to get it.

COCAINE

Cocaine is a very addictive stimulant that is made from the leaves of the coca plant. It comes in two forms: powder and crystal ("crack"). Cocaine can be snorted, injected, or smoked. Immediately after use, cocaine produces feelings of happiness, increased energy, and alertness. This "high" is followed by feelings of depression, edginess, and a craving for more of the drug. People who use cocaine often don't eat or sleep regularly and may feel paranoid, angry, hostile, and anxious. Cocaine use can cause an increase in heart rate, muscle spasms, and convulsions. Breathing becomes faster. Users may sweat and have dilated pupils. Long-term health risks of cocaine use include damage to the nasal tissue, seizures, stroke, heart attack, and sudden death from overdose.

Slang terms for cocaine include blow, coke, flake, nose candy, powder, rock, snow, and white.

Cocaine and Neurotransmission

Normally, dopamine is reabsorbed into the neuron that released it after stimulating the neighboring neuron. Cocaine acts on the reward system by preventing this reabsorption of dopamine, resulting in a buildup of dopamine in the synapse. The excess dopamine continues to stimulate the neighboring neuron, producing strong feelings of pleasure. Because there is excess dopamine present in the

synapse, the neighboring neuron eventually decreases the number of dopamine receptors. As a result, the cocaine abuser needs more and more of the drug to achieve a high.

When cocaine is no longer taken, dopamine levels return to their normal lower concentration. Because there are now fewer dopamine receptors available, the dopamine is unable to fully activate nerve cells. At this point, a person is addicted to cocaine and experiences intense craving and withdrawal. Damage to the neurons and the process of neurotransmission can lead to many problems, including problems with memory and a disruption in the rate of learning. Cocaine is very addictive; withdrawal is very hard.

Long-term Effects, Addiction, and Withdrawal

Cocaine abusers eventually are unable to achieve the same effects from the drug as they did from their first experience. This is because they have developed a tolerance to the drug. At this point, they must repeatedly increase their doses in an attempt to obtain those initial effects again. When cocaine use is stopped, the person may feel a strong craving for more cocaine, accompanied by feelings of depression, anxiety, irritability, and paranoia.

Preparation

- Read the Background section of this module for more information about the effects of heroin and cocaine on the brain and body.
- Provide students with the Module 5 magazine *Drugs on the Street* for background knowledge.
- Determine which activities you want the class to complete.
- Arrange for computer lab time or prepare the classroom computer for students' Internet and CD-ROM use.
- Photocopy and pass out the Heroin and Cocaine Fact Sheet for students to complete during the lecture.
- Prepare transparencies and photocopies for the lesson.

Introduction



Reading: Begin by giving students adequate time to read the student magazine. Have students pay particular attention to the following sections: Background, Stats and Facts, and Science in the Spotlight.



Discussion: After students have read the magazine, ask the students what they know about heroin and cocaine. Record all thoughts on the chalkboard. Tell them that the goal of this lesson is to learn about cocaine and heroin. Facilitate a discussion about the brain, heroin, and cocaine using the following questions.

Heroin

- How is heroin used?
- What are the receptors in the brain that heroin binds to?
- What neurotransmitter is most affected by heroin abuse?
- How does the brain change as a result of heroin abuse?
- What happens in the brain that causes heroin addiction?

Time:

20–25 minutes

Handouts:

Module 5 magazine

Heroin and Cocaine
Fact Sheet**Cocaine**

- How is cocaine used?
- What are some of the effects of cocaine on the central nervous system?
- What neurotransmitter is affected by cocaine?
- How does the brain change as a result of cocaine abuse?
- What are the long-term effects of cocaine use?

Activities**Activity 1: Targeting the Central Nervous System**

Tell students that this is the fifth activity of their competition and the group that has the most number of complete base words will earn five points. Remind students which groups they are in. Have students sit with their groups.

1. Have the students review the magazine for this module. They should focus on how heroin and cocaine affect the central nervous system.
2. Have each group identify a vocabulary word used in this module. This word will be their “base word” for an acronym. Then have students come up with supporting words beginning with each letter in the base word. The words must directly relate to the base word. For example, if the base word is “COCAINE,” the supporting words could be Crack, Overdose, Craving, Anxiety, Insomnia, Nasal damage, and Edginess.

Time:

30 minutes

Supplies:

Pencil and paper

Module 5 magazine



Point out that heroin depresses the central nervous system, while cocaine stimulates it. Both are extremely addictive.

For each supporting word, students should write a sentence that describes its relationship with the base word (e.g., “Nasal damage is an effect of snorting cocaine.”). Give the students 10–15 minutes to complete their words. Tell them they will get one point for each supporting word they can come up with.



You can either give students base words to complete or have them come up with the base words on their own. If the group is more advanced, have them complete several words. Students can use any word that pertains to something they’ve learned in the module, or even the curriculum so far.

3. After each group has completed the word or set of words, have students share them with the class.
4. Record the winning group’s points on the Group Scorecard.



Activity 2: Talk It Out

Over the last 30 years, scientists have developed a large body of research documenting how cocaine and heroin affect the central nervous system and other body systems. Often this material is written in such a way that young people have a difficult time understanding it. Nonetheless, it is important that students have access to this information. During this activity, students will work together to interpret some recent research and put it into a format that their peers can understand.

1. Create six groups of students. Assign each group a topic according to the following chart:

	Heroin	Cocaine
Addiction	Group 1	Group 4
Brain/Nervous System	Group 2	Group 5
Body	Group 3	Group 6

Time:

45 minutes

Supplies

Poster board for each group

Markers

Computer for research

2. Ask each group to use the Web sites listed below or other related sites to deepen their understanding of the topic assigned to them.



Prior to the activity, add these sites to the classroom computer's "Favorites" drop-down menu.

www.nida.nih.gov/Infofax/cocaine.html

www.nida.nih.gov/Infofax/heroin.html

www.whitehousedrugpolicy.gov/drugfact/heroin

www.nida.nih.gov/ResearchReports/cocaine/cocaine.html

www.nida.nih.gov/ResearchReports/heroin/heroin.html

3. Have each group put its information into a poster that is simple and easy to understand that they will present to the class.






If poster board is unavailable, have students create a brochure instead.


4. After each group has completed a poster, have them present their poster to the class. Ask follow-up questions to reinforce important information.



The CD-ROM includes games and materials to supplement the information presented in the module. The room labeled "5" contains the following activities and specific information pertaining to this module:

- **Learning Objectives:** these are presented at the beginning of each CD-ROM module
- **Experiment: Heroin and Addiction:** students will conduct an experiment to observe the addictive properties of heroin
- **Rat Chow-lenge:** a fun game where players must jump over moving rat food cans to straighten the shelves in a supply closet
- **NT 210: Cocaine in the Brain:** this animated learning tool details how cocaine disrupts normal neurotransmission
- **Cycle of Addiction:** an informative poster where students will learn about the stages of addiction
- **Module Quiz:** this quiz is the final part of the module, intended to assess students' learning

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Have students write a short paragraph on how addiction to heroin or cocaine changes the brain. You can assist them with this by reading through the teacher's guide content. Then, have each student uniquely illustrate the concepts in a comic-book style. They can create neuron characters, neurotransmitter superheroes (dopamine), and villains (heroin or cocaine).
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Explain to the students that "Letters to the Editor" pages in local newspapers are an excellent way for people to get messages out about issues they care about. Have students write their own letter to an editor as a *Brain Power!* drug expert about the importance of drug education in the schools.

Key to Icons



Art



Science



History



Business



Social Studies



English



Math

Assessment

As students complete the activities in the module, observe whether they have mastered the following:

1. Can students explain the effects of heroin on the brain? Can they explain how these changes can result in addiction?
2. Can students explain the effects of cocaine in the brain? Can they explain how these changes can result in addiction?
3. Do students understand the connection between withdrawal symptoms and how the brain changes from the use of heroin and cocaine?
4. Do students understand the differences between the effects of each of these drugs on the body?
5. Did students participate in class activities and discussion? Did they engage in the topics?

RESOURCES FOR TEACHERS

National Institute on Drug Abuse (NIDA)

www.drugabuse.gov, 301-443-1124

This Web site contains information about drug abuse as well as a section designed specifically for parents, teachers, and students.

National Clearinghouse for Alcohol and Drug Information (NCADI)

<http://ncadi.samhsa.gov>, 1-800-729-6686

NCADI is the world's largest resource for information and materials concerning substance abuse. Many free publications are available here.

Mind Over Matter Teacher's Guide

http://teens.drugabuse.gov/mom/tg_intro.asp

This printable/downloadable teacher's guide accompanies NIDA's Mind Over Matter series. The series is designed to educate teens about the biological effects of drug abuse on the body and brain. Also available for free by calling 1-800-729-6686.

Buzzed: The Straight Facts About the Most Used and Abused Drugs from Alcohol to Ecstasy. Kuhn, C., Swartzwelder, S., and Wilson, W. New York: W. W. Norton & Company, 2003. A highly informative, detailed review of widely abused drugs.

RESOURCES FOR STUDENTS

Mind Over Matter

<http://teens.drugabuse.gov/mom>

Designed for teens, this site includes information about how different drugs, including opioids (heroin) and stimulants (cocaine), affect the brain. Also available for free by calling 1-800-729-6686.

Free Vibe

www.freevibe.com

Designed for teens, this site covers the risks and consequences of various drugs and provides news, advice, and real-life stories.

Heroin. Ferreiro, C. Philadelphia, PA: Chelsea House Publishers, 2003. Part of the "Drugs: The Straight Facts" series. Contains a thorough discussion of heroin, including history, effects, addiction, and related laws.

Cocaine. Wagner, H.L. Philadelphia, PA: Chelsea House Publishers, 2003. Part of the "Drugs: The Straight Facts" series. Contains a thorough discussion of cocaine, including history, effects, addiction, and the "business" of cocaine.