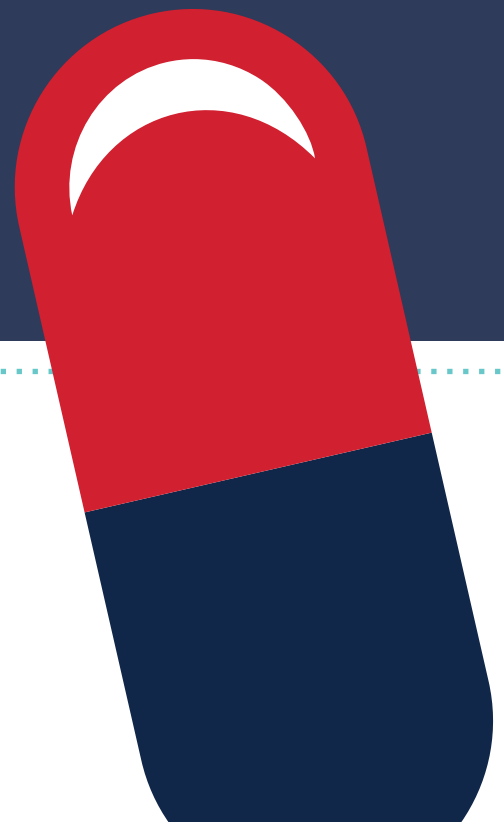


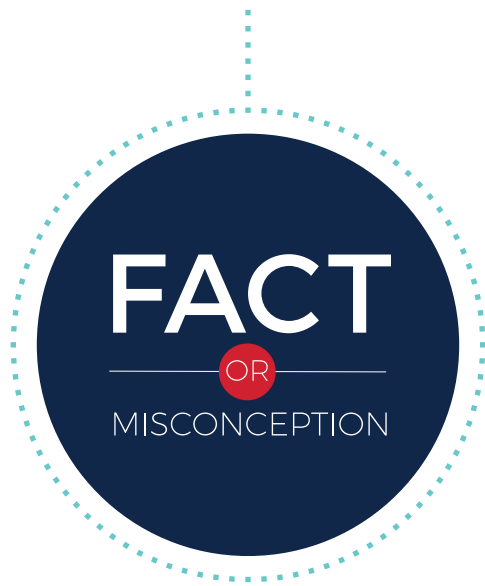
HIGH
SCHOOL

DIGITAL 1-DAY LESSON EDUCATOR GUIDE

Customized for [Prevention.org](https://www.Prevention.org)



LESSON OVERVIEW



In this lesson, students will examine misconceptions and facts about opioids. Through a series of investigations, they then will learn the science behind prescription opioid misuse and heroin use, overdose, and withdrawal. Students will discover that opioid use may start off as a choice, but it can become a chemical dependency.

The accompanying presentation was created with PowerPoint so that it can be used in a variety of classrooms. If you are using a laptop with an LCD projector, simply progress through the PowerPoint by clicking to advance. All of the interactive aspects of the presentation are set to occur on click. This includes images, animations, videos, answer keys, and text boxes. The corresponding videos are embedded in the slide. Hover over the video window to reveal the “play arrow” at the bottom. If you are using an interactive whiteboard, tap on each slide with your finger or stylus to activate the interactive aspects of the presentation. It does not matter where you tap, but you can make it appear as if you are making certain things happen by tapping them. In the notes for each slide, there will be instruction on how to proceed and information to support facilitating graphics and statistics.

Content Areas

Life Science, Anatomy and Physiology, Biology, Health and PE, Sports, Exercise, and Health Science

Activity Duration

1 class session (45 minutes)

Grade Level

Grades 9–12

Essential Questions

- What are opioids, and how do they impact the human body?
- What are neurons and neurotransmitters, and what part do they play when opioids enter the body?
- What are the effects of opioid use on the brain?

Materials

- Chart paper and markers
- Access to the Internet
- Student Activity Sheet: [Types of Opioids](#) (page 19, one per student)
- Student Activity Sheet: [Parts of a Neuron](#) (page 20, one per student)
- Student Activity Sheet: [Brain Basics](#) (page 21, one per student)

Objectives

- Analyze the misuse of opioids and suggest factors responsible for the progression from misuse to physical dependency.
- Explain how opioid misuse affects the brain and other body systems.
- Explain information processing by following sensory information through neural transmission.

BACKGROUND INFO



The misuse of opioids such as heroin, morphine, and prescription medications is a serious national problem that affects the health, social, and economic welfare of communities. There are approximately 144 drug overdose deaths per day in the United States with 63% of those deaths related to pharmaceutical opioids or heroin. About 15 million people indicated misusing or abusing prescription painkillers in 2014 while nearly one in five teens say they have used prescription medicine at least once in their lifetimes to get high. To address this complex problem, federal agencies are working to inform patients, parents, teens, pharmacists, and educators about the dangers of opioid misuse.

This guide was created to give educators ideas and strategies for presenting the content in the digital lesson. It provides slide-by-slide details for educators to be prepared to engage, explain, discuss, and effectively facilitate the content in the presentation. The presentation is designed to cover one 45-minute class session, but it is flexible, depending on the student's needs and time available.

During the lesson, students will learn that opioids are drugs that are derived from the opium poppy plant or are synthetic equivalents, such as methadone and fentanyl. Heroin is an illegal opioid, but many opioids are legal. Opioids are

commonly prescribed in forms of medications that relieve pain and reduce the intensity of pain signals reaching the brain. Prescription opioid misuse is the use of a medication without a prescription. This may mean taking more than prescribed or for the feeling of being high. Prescription medications that are examples of opioids include hydrocodone (e.g., Vicodin®), oxycodone (e.g., OxyContin®, Percocet®), morphine (e.g., Kadian®, Avinza®), and codeine. Opioids act by attaching to specific opioid receptors. Endorphins are naturally produced in our bodies to help manage pain. When opioid drugs attach to these receptors, they also reduce the awareness of pain.

After considering several facts vs. misconceptions, students will examine the adverse effects of opioids on the nervous system. They will learn that opioids act upon the opioid receptors in our nervous system, and many parts of our nervous system are affected by opioid misuse. Different messages are communicated through our bodies using neurotransmitters. A person's experiences when misusing a drug match to a specific neurotransmitter whose activity it disrupts.

Simply put, when opioids enter the body, they make us feel extremely happy. That positive feeling may make someone want to take the substance again. What is not obvious, is how opioids are hijacking the pleasure center of the brain. This region is normally activated by healthy activities, like eating and sleeping, but it is also activated during the misuse of opioids. Opioids target this part of the brain by flooding it with dopamine, a type of chemical signal that makes people feel good. Long-term misuse can lead the body to produce less dopamine over time, causing cravings.

Students will begin to uncover that, with all these changes in the human nervous system, drug misuse is no longer a choice. When opioids are misused for pleasure they can lead to physical and chemical changes in our bodies. These changes can prevent us from controlling the impulse to continue misusing opioids. The initial decision is typically voluntary but can lead to tolerance and dependence.

BACKGROUND INFO

Embedded within this lesson is a clip from the video "Chasing the Dragon: The Life of an Opiate Addict," a documentary aimed at educating students and young adults about the dangers of addiction. This video was released by the FBI and DEA in an effort to combat the growing epidemic of prescription drug misuse and heroin use. There are graphic descriptions of the impact opioid misuse can have on the body including bodily fluid (vomiting, blood, open wounds) and violence, as well as strong language. Instructors should watch this clip prior to sharing with students to determine if it is appropriate for the audience.

At different points in the lesson, students may be tempted to share personal information about opioid misuse by themselves or others. As always, be sure to follow school or district policies about the sharing of personal information about minors.



ENGAGE

SLIDES
1-6

ENGAGE

Overview: Students will identify and justify their beliefs about a series of facts and misconceptions related to opioid misuse.

Students will be introduced to what an opioid is, the different types of drugs that are classified as opioids, and common reasons why they are taken.

ENGAGE

WHAT DO YOU KNOW ABOUT **OPIOIDS**? DISCUSS

- In 2017, there were approximately 192 drug overdose deaths per day in the United States.
- 68% of those deaths are related to pharmaceutical opioids or heroin.
- About 11.1 million people indicated misusing prescription painkillers in 2017.
- Nearly one in seven teens say they have used prescription medicine at least once to get high.

OPERATION PREVENTION

SLIDE 1

Arrange students in small groups (3-4) and hang a blank sheet of chart paper for each group in different areas of the room.

Depending on the size of your groups, use Cooperative Learning Roles and assign or have students choose their role:

- **Leader** – Makes sure everyone’s voice is heard.
- **Time Keeper** – Encourages the group to stay on task.
- **Recorder** – Compiles group members’ ideas and writes them down
- **Presenter** – Shares the group’s work with the larger group
- **Errand Monitor** – Leaves group to get supplies or to request help from the facilitator

Ask: “What do you know about opioids?” and instruct student groups to list everything they know or think they know about opioids, using the chart paper to capture their ideas.

At set intervals, ask students to rotate to the different charts posted around the room. Ask them to put an “A” by items they agree with and put an “D” by the items they disagree with. They should decide whether they agree or disagree with the information as a group, not individually. They will need to come to a consensus in order to “vote A or D” for each statement on the chart.

Introduce the concept of a misconception by asking students how they define it. A **misconception** is an idea or opinion that is incorrect because it is based on a mistaken thought or understanding. Ask students to define myth. A **myth** is a widely held but false belief or idea.

Invite students to revisit their chart papers and identify what they think the biggest misconceptions or myths are about opioids. Have them mark the top five with an “M”.

Review each chart and have students share out what they designated as their top five misconceptions or myths about opioids.

Click on the slide to reveal statistics about America’s opioid epidemic. Explain to students that opioids are drugs that influence the nervous system to reduce feelings of pain. Heroin is an illegal opioid, but many opioids are legal. Opioids are commonly prescribed in forms of medications. Students might have heard of Vicodin®, OxyContin®, Percocet®, morphine, and codeine. These are all types of prescription opioids.

If time allows, students can review <https://www.asam.org/docs/default-source/advocacy/opioid-addiction-disease-facts-figures.pdf> and compare their statements to the facts in the document.

ENGAGE



SLIDES 2-3

Combine the small groups to form two large groups of students.

Explain that there are many misconceptions about opioid misuse. It is important to be able to separate truth from misconception.

Distribute two index cards to each group: one with “Fact” written and one with “Misconception.”



Read aloud the first statement on slide 2 and invite students to discuss their response as a group. Invite each group to hold up the card they think is correct. Reveal the correct answer and explain using statements below. Repeat for each statement.

Fact or Misconception: Addiction is Rare

Misconception: Anyone can be affected by drug misuse and abuse. There are no barriers that make anyone safe from this issue.

Fact or Misconception: When used to treat pain, prescription opioid drugs are not addictive.

Fact: Prescription drugs are the most rapidly growing class of abused drugs.

Fact or Misconception: Only certain people are at risk of abusing opioid drugs

Misconception: Many factors determine the likelihood that someone may become addicted to a drug. This includes both inherited and environmental factors.

Fact or Misconception: Prescription opioids are the most rapidly growing class of abused drugs.

Fact: Opioids have been linked to nearly 68 percent of drug overdoses in the U.S. In 2017, there were 192 drug overdose deaths per day in the United States. 68% of those deaths are related to pharmaceutical opioids or heroin.

Fact or Misconception: Opioids work in your body the same way that over-the-counter pain relief medications do.

Misconception: Prescription pain relief medication interacts with your body differently than over-the-counter (OTC) medications.

ENGAGE

SLIDES 2-3 CONT.

WHAT DO YOU **THINK?**

- Addiction is rare.
- When used to treat pain, prescription opioid drugs are not addictive.
- Only certain people are at risk of misusing opioid drugs.
- Prescription opioids are the most rapidly growing class of misused drugs.

OPERATION PREVENTION

Fact or Misconception: It is easy to quit opioid dependency if you are disciplined.

Misconception: Addiction to opioid prescription drugs and/or heroin is very strong. It alters the body and the mind, and professional help is often necessary to get away from the addiction.

WHAT DO YOU **THINK?**

- Opioids work in your body the same way that over-the-counter pain relief medications do.
- It is easy to quit opioid dependency if you are disciplined.
- Prescription opioids and heroin affect your body the same way.
- Heroin affects the body but not the brain.

OPERATION PREVENTION

Fact or Misconception: Prescription opioids and heroin affect your body the same way.

Fact: Prescription opioids and heroin both interact with our body by attaching to a specific receptor in the brain.

Fact or Misconception: Heroin affects the body but not the brain.

Misconception: Heroin affects both brain and body and can cause people to become physically and psychologically dependent on it to perform normal daily functions.

After all of the statements have been reviewed, lead a discussion using the following guiding questions:

- Which fact or misconception statement is most surprising?
- What misconception do you think is most common with teens your age, and why?
- Which misconception do you think is most important for teens your age to understand, and why?
- How can you use this information to make better decisions for yourself?

If time allows, invite students to respond to the final guiding question in writing.

ENGAGE



SLIDE 4

Have students get back into their small groups. Invite students to use the information from their chart papers, and information they obtained from reviewing the statements on slides 2-3, to develop a definition of what an opioid is. Students can capture this information on an index card or on the same chart paper.

Next, ask each group to share their definition of opioid. Invite students to vote and pick the three answers that best describe what opioids are and where they come from.

Then, click to display the definition of opioids. Compare the definition on the slide to student answers. Ask about potential discrepancies between their definitions and the one provided. Could any of these stem from misconceptions?

Have students brainstorm why someone their age might be prescribed an opioid. Anticipated responses include:

- After surgery
- After dental work
- After a serious injury (i.e., car accident)
- After a sports injury
- Cancer
- Illness that causes pain

ENGAGE

SLIDE 5

TYPES OF OPIOIDS		
Type of opioid	Where they come from	Examples
natural opioids (made from the plant)	alkaloids, that occur in plants such as the opium poppy	morphine codeine
semi-synthetic, man-made opioids	created in labs from natural opioids	hydrocodone, oxycodone, heroin
fully synthetic man-made opioids	completely man-made	fentanyl methadone, tramadol

The table shows the different types of opioids, how they are derived, and examples. But some of the information is missing. Ask students to fill in the chart on the slide using the word bank provided.

Missing words for students to choose from:

- Poppy
- Morphine
- Opioids
- Heroin
- Fully synthetic
- Opioids
- Man-made
- Fentanyl

Students can use the slide or the [Types of Opioids student activity sheet](#) (page 19) to complete the chart.

Then, reveal the correct answers by clicking on the slide. Discuss why opioids that are synthetic can be a problem (they are made much stronger than natural opioids, and street manufacturers can mix dangerous ingredients with them.)

Key Talking Points:

- Legal synthetic opioids are better, quicker acting, or longer acting, which can make them more addictive more quickly.
- Street manufacturers can tamper with synthetic opioids and make them more potent or rapid acting, which can cause problems.
- Crushing tablets and snorting them makes them much more dangerous.
- Synthetic opioids can be used safely if patients follow their doctors' orders and instructions.

ENGAGE



SLIDE 6

Challenge students to close their eyes and create a mental picture of what they think someone who is addicted to opioids might look like. Invite them to describe or sketch their mental image.

Have them think about these different aspects of someone who is addicted to opioids: What do they look like physically? How old are they? How do they act? What kinds of jobs or activities do they do? Where do they live?

Ask students to share their lists and/or pictures.

- Write the descriptions on a whiteboard for all students to see.
- What similarities or differences in the images can students identify?

Tell students that you are going to examine a common misconception that “addiction is a choice” by watching a video.

VIDEO LINKS:

- Anyone Can Become Addicted to Drugs – English
<https://vimeo.com/188196247>
- Anyone Can Become Addicted to Drugs – Spanish
<https://vimeo.com/188178805>

Discuss the descriptions on the whiteboard after viewing the video using the following guiding questions:

- Would you change your description after viewing the video? If so, why?
- Why might people think that addiction is a choice?

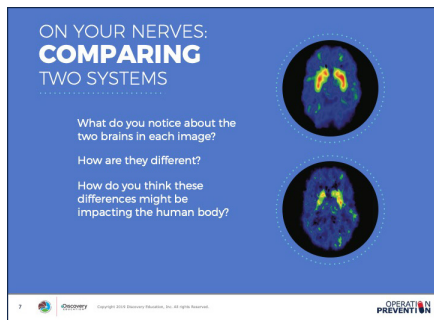
The Illinois Helpline is a statewide, public resource for finding substance use treatment and recovery services in Illinois. If you are concerned about someone, or struggling with a substance use disorder yourself, trained specialists will answer your questions and guide you to treatment options. Visit the website at helplineil.org or call 833-2FINDHELP.

EXPLORE

SLIDES 7-11

EXPLORE

Overview: Students will compare and contrast models of a healthy nervous system with the natural release of endorphins to prescription opioid misuse and heroin use. Students will be able to explain the chemical imbalances in each to describe why opioids are prescribed. The neuroscience concepts in this section will be discussed specifically in terms of the effects of opioids on the brain and body.



SLIDE 7

Ask students: Do you know which system of the body helps you learn? Or which system your dreams come from? (It is anticipated students will be able to identify the nervous system or the brain.)

Invite students to make observations of the two brain scans on the slide, at least one of which has been influenced by drugs. Instruct students to note the differences between the brains in the image. Then, challenge them to answer the three questions that appear on the slide:

- What do you notice about the two brains?
- How are they different?
- How do you think these differences might be impacting the human body?

Invite students to share their observations, and discuss as a class.

EXPLORE



SLIDE 8

This slide introduces the biological messages, sent through the nervous system, that can cause a person to misuse prescription drugs.

Begin by asking students: “How do you think disruptions or changes in the nervous system might impact our behavior?” Discuss their responses as a class.

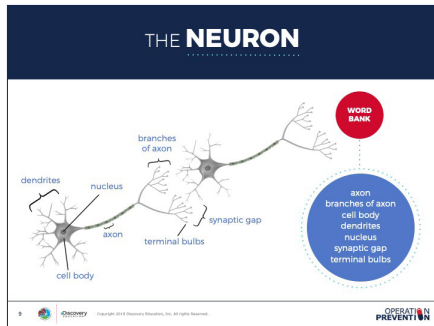
Click the [embedded link](#) in the slide to watch a clip (6:47-10:19) from the 2018 Virtual Field Trip “Opioids: Real People. Real Stories. Real Science.” The video clip highlights the biological processes that cause opioid misuse and addiction.

When students finish watching, ask: “How do you think what we learned about the nervous system can help explain the challenges faced by the people that want to stop misusing prescription opioids or using heroin?” “What role did the nervous system likely play in drug addiction in this video?” It is anticipated that students will identify the brain as part of the nervous system. Clarify with students that when opioids enter the body, they make us feel extremely happy. That positive feeling may make someone want to take the substance again.

Key Talking Points:

- When opioids enter the body, they hijack the reward center of the brain.
- The reward center of the brain is a region normally activated by healthy activities, like eating and sleeping, but it is also activated during the misuse of opioids.

EXPLORE

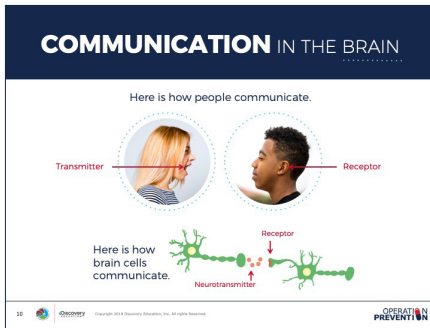


SLIDE 9

Invite students to take a look deeper inside the nervous system to learn how pain and pleasure messages travel to and from the brain. Remind students that the brain is impacted by opioid misuse and that our brain is part of a larger system in our bodies: the nervous system. We also know the nervous system helps us communicate information throughout our bodies.

- Ask students: “How are messages sent throughout our bodies?” and invite students to share out their ideas. The slide shows a diagram of two neurons. Remind students there are millions of neurons in our bodies communicating information through a vast network.
- Distribute the [Parts of a Neuron student activity sheet](#) (page 20). Explain that each term in the word bank completes one of the blanks in the diagram. Challenge students to identify where in the diagram to place the corresponding labels. Answers will be revealed with click of slide.
- Point out that the two neurons are not touching each other in the image. But, messages (like pain or pleasure messages) still have to get from one neuron to another to be able to travel to and from the brain. Ask: How do you think that happens?
- The answer? The synaptic gap (synapse). This is the small space between neurons, which the message must cross as it makes its way to and from the brain. The synaptic gap is where our body has receptors to transfer the messages of pain and pleasure throughout our bodies.

EXPLORE



SLIDE 10

Ask students to compare and contrast the diagram of the people talking with how neurons are communicating. Point out that neurotransmitters are like the words we use to talk to another person and give them instructions. The neurotransmitter that moves from one neuron to the next is specific to certain messages, the strength of these messages, and how long these messages continue to be conveyed.

Ask: “Based on what you have learned; how do you think drugs affect this process of messaging in the brain?” Anticipated responses include:

- Drugs interfere with the way neurons send, receive, and process signals.
- They can activate neurons because they act like similar natural neurotransmitters.
- They may activate the neurons differently and lead to abnormal messages.
- Could cause the brain to release large amounts of neurotransmitters.
- Disrupts normal communications.
- Can make us do things that we wouldn't normally do.

Key Talking Points:

- The messages that are sent from one neuron to the next are altered by the actions of the drugs on the neurotransmitters.
- Opioids put us at risk for causing damage to our brains and affecting neurotransmission.
- Drugs act on the messengers to change the message.
- Opioids attach to the same receptors as endorphins.

EXPLORE

MEET THE NEUROTRANSMITTERS AFFECTED BY OPIOIDS		
Neurotransmitter	How is it affected by opioids?	Functions Affected
Dopamine	Enhances and increases neurotransmitters released in the reward pathway	Pleasure and reward, movement, attention, memory
Endogenous opioids (endorphin and enkephalin)	Reduces excitability of neurons and creates the euphoric effect	Moderates hunger, thirst, and pain reactions; also involved in mood control
Gamma-aminobutyric acid (GABA)	Reduces its ability to stop the amount of dopamine produced	Slows neuron activity to reduce anxiety

SLIDE 11

The messages that travel across a synaptic gap are called neurotransmitters. Different neurotransmitters are specific to different types of messages. Explain to students that opioids mimic neurotransmitters and either excite or inhibit a response like euphoria or moodiness in the body.

This slide displays a chart that identifies and describes the neurotransmitters most often affected by prescription opioids, which functions they normally affect, and how they are affected by opioids.

Invite students to consider how each of the neurotransmitters, affected by opioids, could impact the human body by reviewing the chart and answering the following guiding questions:

Answers are in red:

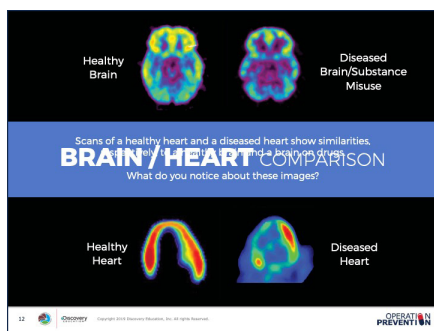
- Which neurotransmitter could cause dry mouth or an irritable mood? **endogenous opioids**
- Which neurotransmitter is responsible for overstimulating the nervous system creating a euphoric effect? **dopamine**
- Which neurotransmitter could cause sleepiness? **gamma-aminobutyric acid**

EXPLAIN

SLIDES 12-16

EXPLAIN

Overview: Students will analyze images produced by brain mapping to explain how opioid misuse can cause changes in areas of the brain related to judgment, decision making, learning and memory, and behavior control. Students will construct an explanation of how this is evidence of a brain disease. Students will learn and be able to explain how brain development during adolescence leads to additional risks on their bodies.



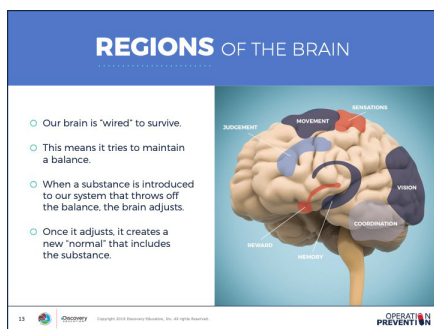
SLIDE 12

Ask students to consider how addiction is a disease by comparing the brain and heart images.

As students view the images on the slide, ask: "How are the diseased heart and the diseased brain similar?"

Key Talking Point:

- Disease reduces the ability of the organ to use energy, making it less effective in the body.



SLIDE 13

Review slide with students. Facilitate their understanding of the role each part of the brain plays and the processes for which it is responsible.

Distribute the [Brain Basics student activity sheet](#) (page 21) to provide students with information about the different parts of the brain.

Invite students to use this information to review the diagram in the slide and identify which parts of the brain are responsible for the highlighted processes. (For example, in the highlighted parts, 'judgment' is controlled by the frontal lobe, and 'sensations' are controlled by the parietal lobe.)

EXPLAIN

THE ADOLESCENT BRAIN

- Brains are still developing during adolescence.
- Our brain develops from back to front.
- The prefrontal cortex does not fully mature until about the age of 25.
- Development of the adolescent brain and behavior are closely linked.

STUDENT RESPONSES

Discovery Copyright © 2019 Discovery Education, Inc. All rights reserved. OPERATION PREVENTION

SLIDE 14

Divide the class into pairs of students. Invite students to use their completed [Brain Basics student activity sheet](#) as a reference and have each pair look at the information on the slide. Guide students to come up with as many factors that might influence risk based on adolescent brain development. Anticipated responses include difficulty controlling emotions, poor planning and judgment, and risky, impulsive behavior.

Ask students to share their lists with the whole class. Capture student ideas using chart paper or the provided space on the slide. Have students rank them in order from “most influential” to “least influential,” giving reasons for their rankings.

TOLERANCE & DEPENDENCE

Tolerance occurs as more of a substance is needed to produce the same effect as the first time it is taken.

- Receptors are being filled on a regular basis.
- Brain chemistry alters to accept this change.
- To feel the same level of euphoria, an individual takes more and more.

Dependence occurs as removal of the substance causes negative physical effects to the body.

- Individual's body begins to need the drug for their body to feel normal.
- If the individual stops, they often feel sick and achy.

Discovery Copyright © 2019 Discovery Education, Inc. All rights reserved. OPERATION PREVENTION

SLIDE 15

Share with students that we have learned opioids can have many different impacts to our brain and body. When opioids are misused they can lead to physical and chemical changes in our bodies. These changes can lead to a lack of impulse control resulting in the continued misuse of opioids. The initial decision is typically voluntary but can lead to tolerance and dependence.

Invite students to use the slide to identify similarities and differences in a person that has developed a tolerance to one that is dependent on the misuse of opioids.

Anticipated Student Responses:

- When the body adapts to the drug, and requires more of it to achieve a certain feeling, an individual has developed a tolerance.
- A person that is dependent on a drug will experience withdrawal symptoms when use of the drug is suddenly reduced or stopped.

Ask students: “How could you now explain their challenges with withdrawal?”

Anticipated Student Responses:

- Opioids flood the brain with dopamine, resulting in a signal causing people to feel good.
- Long-term misuse can lead the body to produce less dopamine over time, causing cravings that can lead to tolerance or physical dependency.
- Opioids can change our brain chemistry.
- Opioids can lead us to make bad decisions or be impulsive.

EXPLAIN

KEY POINTS

- Opioid use can cause changes in your brain.
- Judgment, decision making, learning and memory, and behavior control are areas of the brain influenced by opioid use.
- The adolescent brain is more at risk for addiction since it is still developing.
- Tolerance and dependence are key terms we should understand about why we can become addicted.

SLIDE 16

Key Points:

- Opioid use can cause changes in your brain.
- Judgment, decision making, learning and memory, and behavior control are areas of the brain influenced by opioid use.
- The adolescent brain is more at risk for addiction since it is still developing.
- Tolerance and dependence are key terms we should understand about why we can become addicted.

TYPES OF OPIOIDS

Directions:

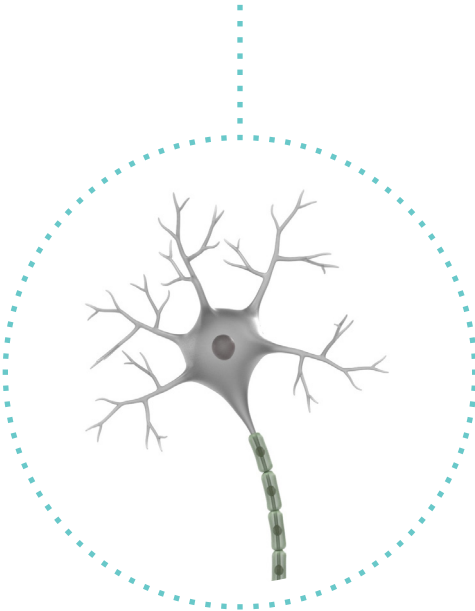
The table below shows the different types of opioids, how they are derived, and examples. But some of the information is missing. Using the word bank, complete the chart with the correct answers.

Word bank:

- poppy
- morphine
- opioids
- heroin
- fully synthetic
- opioids
- man-made
- fentanyl

Type of opioid	Where they come from	Examples
Natural opioids (made from the plant)	Alkaloids, that occur in plants such as the opium codeine
Semi-synthetic, man-made 	Created in labs from natural opioids	Hydrocodone, oxycodone,
..... man-made 	Completely methadone, tramadol

PARTS OF A NEURON



Directions:

Each term in the word bank completes one of the blanks in the diagram on the slide. Using the following definitions, identify where in the diagram to place the corresponding labels.

Word bank:

- Axon
- Branches of axon
- Cell body
- Dendrites
- Nucleus
- Terminal bulbs
- Synaptic gap

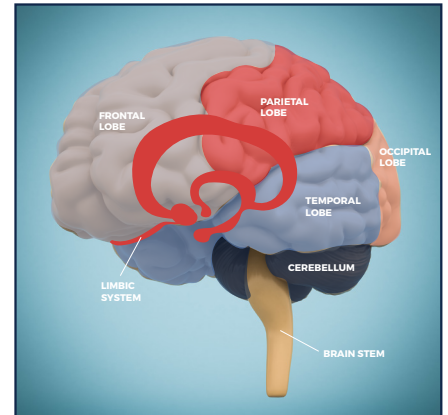
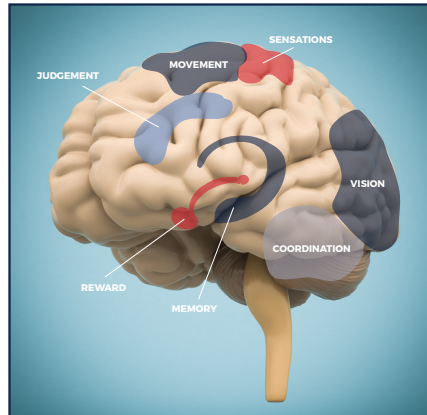
Definitions:

- The cell body contains the nucleus, which determines whether the message will continue down the axon to be sent to another neuron.
- Dendrites receive the impulse, or message, from another neuron and send it to the cell body.
- The axon is the long part of the neuron that takes the message from the cell body to the terminal bulbs.
- The terminal bulbs are at the sending end of the neuron. They release the neurotransmitters into the synaptic gap.

BRAIN BASICS

Directions:

Listed below are descriptions of different parts of the brain. Using this information and the image on slide 13, identify which parts of the brain are impacted by opioid misuse.



Description	Does this system appear to be impacted by opioid misuse? Why or why not? Use evidence from the brain scan in your response.
<p>The brainstem controls basic functions that humans need to survive. These include breathing, sleeping, and maintaining a heart rate. These functions are involuntary, which means they happen without our thinking about them.</p>	
<p>The cerebral cortex is divided into several areas. Different areas control different functions. For example:</p> <ul style="list-style-type: none"> ○ Thinking and reasoning happen in the frontal lobe of the cerebral cortex. Processes in the frontal lobe allow us to plan, make decisions, and solve problems. ○ Other areas in the cerebral cortex process sensory information. These processes allow us to see, feel, hear, taste, and touch. 	
<p>The limbic system consists of many different brain structures. Together, they control and regulate how we experience pleasure. When a behavior causes us to feel pleasure, we are likely to repeat that behavior. This “reward circuit” in the brain reinforces behaviors that are necessary to our survival. Processes in the limbic system also shape how we experience positive and negative emotions.</p> <ul style="list-style-type: none"> ○ Eating, socializing, and other healthy behaviors activate the limbic system and give us pleasure. However, misusing and abusing drugs also activate the limbic system. ○ Using drugs can also affect our moods by changing processes in the limbic system that shape emotions. 	

NATIONAL STANDARDS

This lesson plan has been developed based on the following national standards:

Next Generation Science Standards

LS1.A: Structure and Function

Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

PS1.B: Chemical Reactions

Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy. (HS-PS1-4),(HS-PS1-5)

LS1.D: Information Processing, Grade Band Endpoints

By the end of grade 12: In complex animals, the brain is divided into several distinct regions and circuits, each of which primarily serves dedicated functions, such as visual perception, auditory perception, interpretation of perceptual information, guidance of motor movement, and decision making about actions to take in the event of certain inputs. In addition, some circuits give rise to emotions and memories that motivate organisms to seek rewards, avoid punishments, develop fears, or form attachments to members of their own species and, in some cases, to individuals of other species (e.g., mixed herds of mammals, mixed flocks of birds). The integrated functioning of all parts of the brain is important for successful interpretation of inputs and generation of behaviors in response to them.

National Health Education Standards Addressed

1.12.9 Analyze the potential severity of injury or illness if engaging in unhealthy behaviors.

CCSS.ELA-LITERACY

CCSS.ELA-LITERACY.RST.11-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

CCSS.ELA-LITERACY.RST.11-12.7

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

CCSS.ELA-LITERACY.RST.11-12.9

Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.