



# Nervous System

## section 33 Effects of Drugs

### Before You Read

On the lines below, list some reasons that you might take legal drugs. Read the section to learn about the helpful and harmful effects of drugs on the body.

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### Read to Learn

#### How Drugs Work

A **drug** is a substance that alters the function of the body. Some drugs come from natural sources. Other drugs are made from artificial products. Legal and illegal drugs affect the body in many ways. Some drugs, such as pain killers, affect the nervous system. Other drugs have no effect on the nervous system. The drugs that cause changes in the nervous system work in one of four ways.

1. A drug can cause an increase in the amount of a neurotransmitter that is released into a synapse.
2. A drug can block a receptor site on a dendrite. This prevents the neurotransmitter from binding.
3. A drug can stop a neurotransmitter from leaving a synapse.
4. A drug can act like a neurotransmitter.

#### What does dopamine control?

**Dopamine** is a neurotransmitter found in the brain that helps control body movements. Many drugs that affect the nervous system influence the amount of dopamine released by a neuron. The normal action of dopamine is shown in the figure on the next page.

### MAIN Idea

Some drugs alter the function of the nervous system.

#### What You'll Learn

- ways drugs can harm the body or cause death
- how a person can become addicted to a drug

### Mark the Text

**Identify Main Ideas** As you read this section, highlight the main point in each paragraph. State each main point in your own words.



### Think It Over

1. State the job of neurotransmitters.

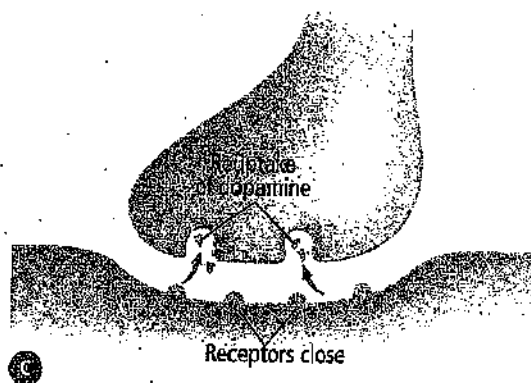
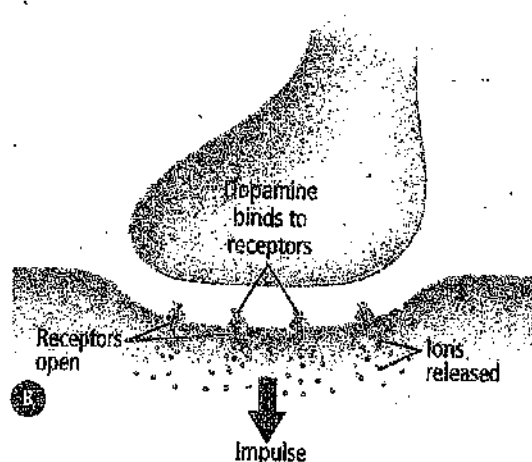
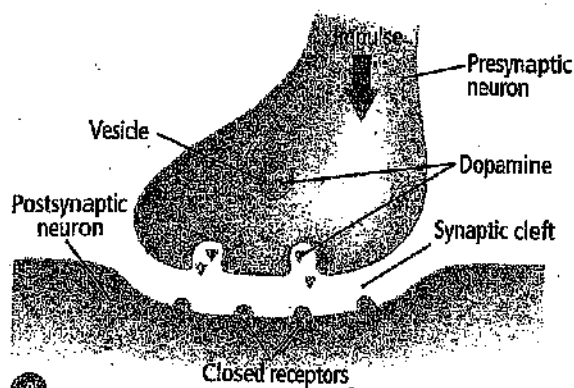
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## Picture This

2. **Label** Draw an arrow on the portion of the figure labeled A to show the direction that dopamine travels.

## Think It Over

3. **Generalize** What effect do many people get from drinking coffee when they get up in the morning?

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## Classes of Commonly Abused Drugs

Both legal and illegal drugs can be abused. Drug abuse is using a drug for any reason other than a valid medical purpose.

### What are stimulants?

**Stimulants** are drugs that increase alertness and physical activity. Common stimulants include nicotine and caffeine.

Nicotine in cigarette smoke increases the amount of dopamine released into a synapse. Nicotine also narrows blood vessels, raises blood pressure, and causes the heart to work harder. Cigarette smoking contributes to about 90 percent of all lung cancer cases.

Caffeine is found in coffee, tea, some soft drinks, and even some foods such as chocolate. It is a widely used and often abused stimulant. Caffeine binds to adenosine receptors on nerve cells in the brain. Adenosine slows down nerve cell activity and causes drowsiness. When caffeine binds to the adenosine receptors, it causes a feeling of heightened alertness. Caffeine also raises adrenaline levels briefly and gives a quick burst of energy that soon wears off.

## What are depressants?

Drugs that tend to slow down the central nervous system are **depressants**. These drugs can lower blood pressure, affect breathing, and slow the heart rate.

## How does alcohol use affect humans?

Alcohol is a depressant that is abused widely. It affects at least four different neurotransmitters. Alcohol use harms a person's judgment, coordination, and reaction time. Continued abuse of alcohol has long-lasting effects on the body. These effects include a reduction in brain mass, liver damage, ulcers, and high blood pressure. Alcohol use by the mother during pregnancy can harm the fetus. Fetal alcohol syndrome damages a baby's brain and nervous system.

## What effects do Inhalants have on the nervous system?

Inhalants are chemical fumes that affect the nervous system. Most inhalants slow down the nervous system. Inhalants might produce a feeling of intoxication and can cause nausea and vomiting. Inhalants can cause death. Long-term effects of inhalants include memory loss, hearing loss, vision problems, and permanent nerve and brain damage.

## What illegal drugs affect the nervous system?

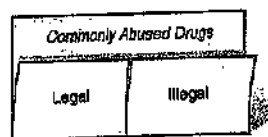
Amphetamines and cocaine keep dopamine from being reabsorbed. This leaves dopamine to build up in the synapse. Some amphetamines can also increase the amount of dopamine released from a neuron. As the levels of dopamine in the brain increase, a person can feel pleasure and a sense of well-being.

## What are the effects of amphetamines and cocaine?

Amphetamines and cocaine have both short-term and long-term effects on the body. Amphetamines can increase the heart rate, cause an irregular heartbeat, and increase blood pressure. Permanent damage to the small blood vessels in the brain can occur. Amphetamine use can also affect behavior. Abusers can experience periods of violent behavior, anxiety, confusion, paranoia, and insomnia. An amphetamine overdose can cause death. It can take a year or longer for the drug's effects to cease after a user stops taking the drug. Cocaine abuse can cause heart attacks, irregular heart rhythms, chest pain, respiratory failure, strokes, seizures, headaches, abdominal pain, and nausea. ☒

### FOLDABLES

**Take Notes** Make a concept map Foldable, as shown below. As you read, take notes and organize what you learn about commonly abused legal and illegal drugs.



### ✓ Reading Check

4. Name both a short-term and long-term physical effect of amphetamine use.

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### Reading Check

5. List three problems associated with marijuana use.

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### Think it Over

6. Summarize What are two reasons to avoid drug use?

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## What problems can marijuana cause?

Marijuana is the most-used illegal drug in the United States. Smoking marijuana releases the chemical tetrahydrocannabinol (THC) into the bloodstream. This chemical travels to the brain and binds to receptors in the neurons. The immediate effect is a strong feeling of pleasure.

In the short-term, marijuana use can cause problems with memory and learning, poor coordination, increased heart rate, anxiety, paranoia, and panic attacks. Long term marijuana use can lead to lung cancer. 

## Tolerance and Addiction

**Tolerance** of a drug occurs when a person needs more and more of the same drug to get the same effect. Tolerance can lead to addiction.

**Addiction** is the physical or psychological dependence on a drug. Physical dependence occurs when a drug affects the normal functions of the body's systems. Psychological dependence means that a person has a strong emotional desire for a drug. Marijuana and similar drugs cause psychological addiction. The desire to keep taking the drug is strong, making it difficult to quit.

## What neurotransmitter is involved in addiction?

A physical dependence occurs when the drug affects normal body functions. Researchers suggest that the neurotransmitter dopamine is involved in most types of addiction. An addicted person gets pleasure from the increased levels of dopamine. A tolerance to the drug builds up and the person takes more of the drug to achieve the same sense of pleasure. When the person tries to quit using the drug, dopamine levels decrease and make it difficult to resist taking the drug.

## How is addiction treated?

People who are psychologically or physically dependent on a drug experience serious withdrawal symptoms without it. Many people who are addicted to a drug have trouble quitting on their own. They might quit for short periods of time. However, they find it hard to resist using the drug again.

The best way to avoid addiction is not to use drugs. People who do use drugs should seek treatment for drug dependency. Counseling might be needed to break an addiction. Physicians, nurses, counselors, clergy, and social workers are trained to help people deal with addictions.