



## Surprising Facts

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

Your brain produces its own versions of opiates, called endogenous opioids. These chemicals act just like opiates, binding to opiate receptors. 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 this natural chemical in your brain.

## The Search Continues

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

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



For more information, visit: [www.teens.drugabuse.gov](http://www.teens.drugabuse.gov)

To learn more about opiates and other drugs of abuse, or to order materials on these topics, free of charge, in English or Spanish, visit the NIDA Web site at [www.drugabuse.gov](http://www.drugabuse.gov) or contact the DrugPubs Research Dissemination Center at 877-NIDA-NIH (877-643-2644; TTY/TDD: 240-645-0228).

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# The Brain's Response to Opiates

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 opiates.

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 opiate. 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."

Opiates are made from opium, which comes from the poppy plant. They can

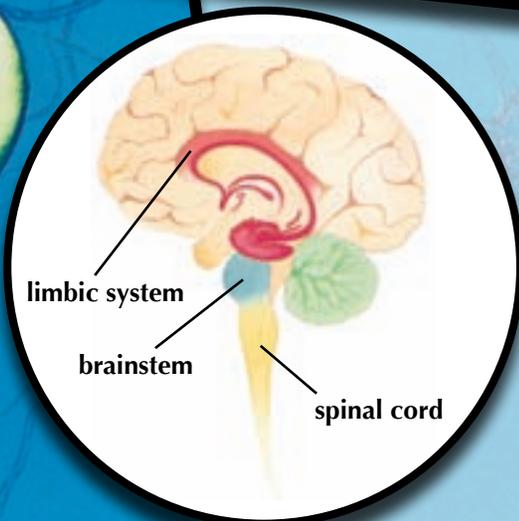
have important medical benefits—they're powerful painkillers, they are sometimes prescribed to control severe diarrhea, and they can also be found in cough medicine. Maybe you've heard of drugs called Vicodin, morphine, or codeine. These are examples of opiates. When used properly for medical purposes, they can be very helpful. Opiates used without a doctor's prescription or in ways other than how they are prescribed, can be dangerous and addictive.

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



## National Institute on Drug Abuse

## DEEP INSIDE THE BRAIN



## How Do Opiates Work?

Opiates resemble natural chemicals that have binding sites in the brain and the body called opiate receptors. Scientists have identified three types of opiate receptors: mu, delta, and kappa (named after letters in the Greek alphabet). Each of these receptors is involved in different functions. For example, mu receptors are responsible for the pleasurable effects of opiates, and their pain-relieving properties.

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

- the **limbic system**, which controls emotions. Acting here, opiates can produce feelings of pleasure, relaxation, and contentment.
- the **brainstem**, which controls things your body does automatically, like breathing. Opiates can act on the brainstem to slow breathing, stop coughing, and lessen feelings of pain.
- the **spinal cord**, which transmits sensations from the body. Opiates also act here to decrease feelings of pain, even following serious injuries.

Whether it is a medication like Vicodin or a street drug like heroin, the effects of opiates (and many other drugs) depend on how much you take and how you take it. If opiates are swallowed as pills, they take longer to reach the brain. If they are injected, they act faster and can produce a quick, intense feeling of pleasure followed by a sense of well-being and a calm drowsiness.

## How Does Someone Become Addicted to Opiates?

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

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

That is why, when used as medicine, opiates should be carefully monitored by a doctor—so that a person knows how much to take and when and 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 opiates has other symptoms as well—they cannot control how much drug they take, 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 don't feel satisfied by natural rewards (chocolate, a walk on the beach).