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:
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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.

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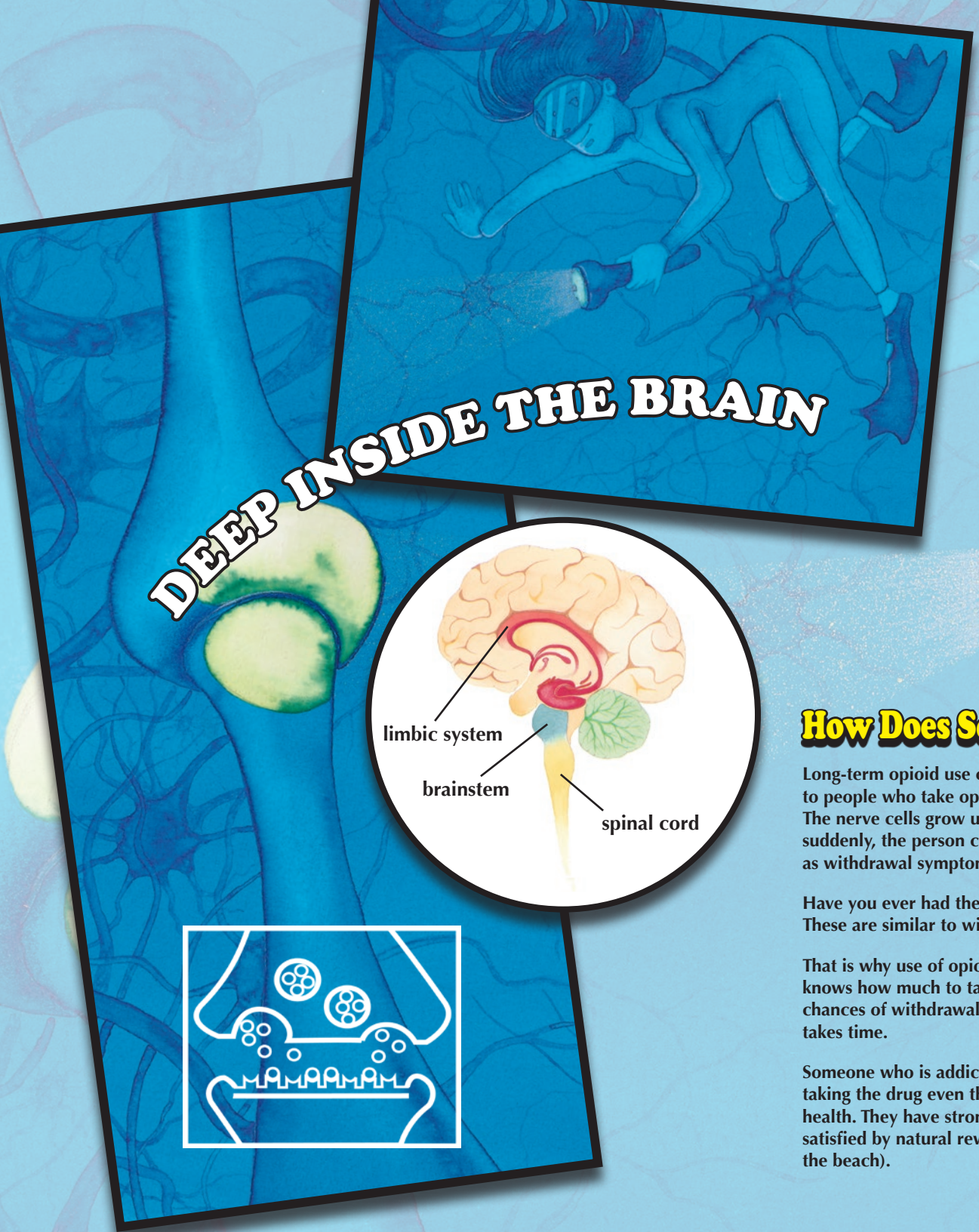

How Do Opioids Work?

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).