

**DID YOU KNOW?** Some drugs “fool” the brain due to their similarity in size and shape to natural neurotransmitters.

## Drugs and Your Brain

Drugs are chemicals. They work by tapping into the brain’s communication system and interfering with the way nerve cells normally send, receive, and process information. Some drugs resemble natural neurotransmitters, a similarity in structure that “fools” receptors in the brain and allows the drugs to lock onto and activate the nerve cells.

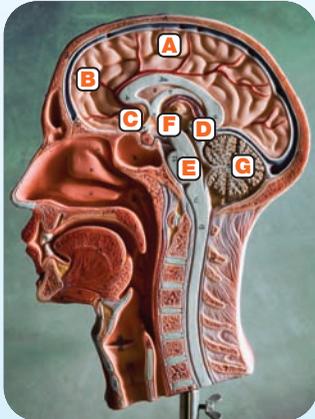
Here’s how it works with two commonly abused drugs: marijuana and prescription painkillers. In marijuana, the principal chemical affecting the brain is called THC (or tetrahydrocannabinol) and it attaches to specific receptors called cannabinoid receptors. THC affects the hippocampus, causing problems with short-term memory and attention; the hypothalamus, increasing hunger; the prefrontal cortex, affecting decision making; and the cerebellum and basal

ganglia, affecting balance and coordination.

Prescription painkillers, such as OxyContin® and Vicodin®, are derived from opium in poppy plants and are called opioids. In the brain and body, opioids attach to special proteins called opioid receptors. When used as directed by a physician, opioids are designed to ease pain. But when opioids are abused, there can be serious health risks, including addiction and overdose. In the cerebral cortex, opioids distort thinking, perception, and judgment; in the cerebellum, they distort coordination; in the limbic system, they can alter the brain’s wiring for pleasurable experiences; and in the brain stem, they slow breathing and heart rate, which can lead to death.

**Pick Your Brain:** After reading the information above, answer the following questions:

- Opioids can adversely affect a person’s breathing. What part of the brain governs respiration and breathing?
  - (A) Brain stem
  - (B) Limbic system
  - (C) Hippocampus
  - (D) Cerebellum
- Tetrahydrocannabinol (THC), the active ingredient in marijuana, acts on the brain by:
  - (A) surrounding the brain
  - (B) creating electrical charges
  - (C) binding to specific receptors
  - (D) reducing blood flow
- THC can affect the hypothalamus by making someone feel:
  - (A) angry
  - (B) hungry
  - (C) alone
  - (D) none of the above
- The cerebral cortex is also known as the:
  - (A) thinking center
  - (B) memory and learning center
  - (C) body regulation center
  - (D) reward center
- What part of the brain determines emotional reactions, especially involving excitement or fear?
  - (A) Brain stem
  - (B) Hypothalamus
  - (C) Prefrontal cortex
  - (D) Amygdala



fear. The amygdala is part of the **limbic system**, a set of interconnected structures, including the hippocampus and the hypothalamus, that works in concert to process emotional information.

- D HIPPOCAMPUS:** The brain’s center for memory and certain types of learning.
- E BRAIN STEM:** Controls automatic functions like breathing, sensitivity to pain, level of alertness; relays messages to the cerebrum and cerebellum and back down to the spinal cord.
- F HYPOTHALAMUS:** Controls body temperature, hunger, and thirst; affects appetite and sleep.
- G CEREBELLUM:** Provides coordination, balance, and precise timing for movements.

- A CEREBRAL CORTEX:** This “thinking center” rules comprehension, self-control, and concentration.
- B PREFRONTAL CORTEX:** Responsible for logic, helps you make decisions and understand long-term consequences.
- C AMYGDALA:** Determines emotional reactions, especially involving excitement or