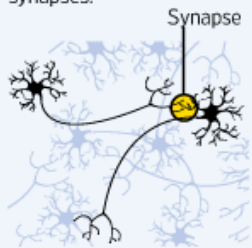


# How Marijuana Affects the Brain

THC, a key ingredient in marijuana, attaches to cannabinoid receptors throughout the body. Several areas of the brain have high densities of these receptors, which helps explain the different effects of the drug.

## How the receptors work

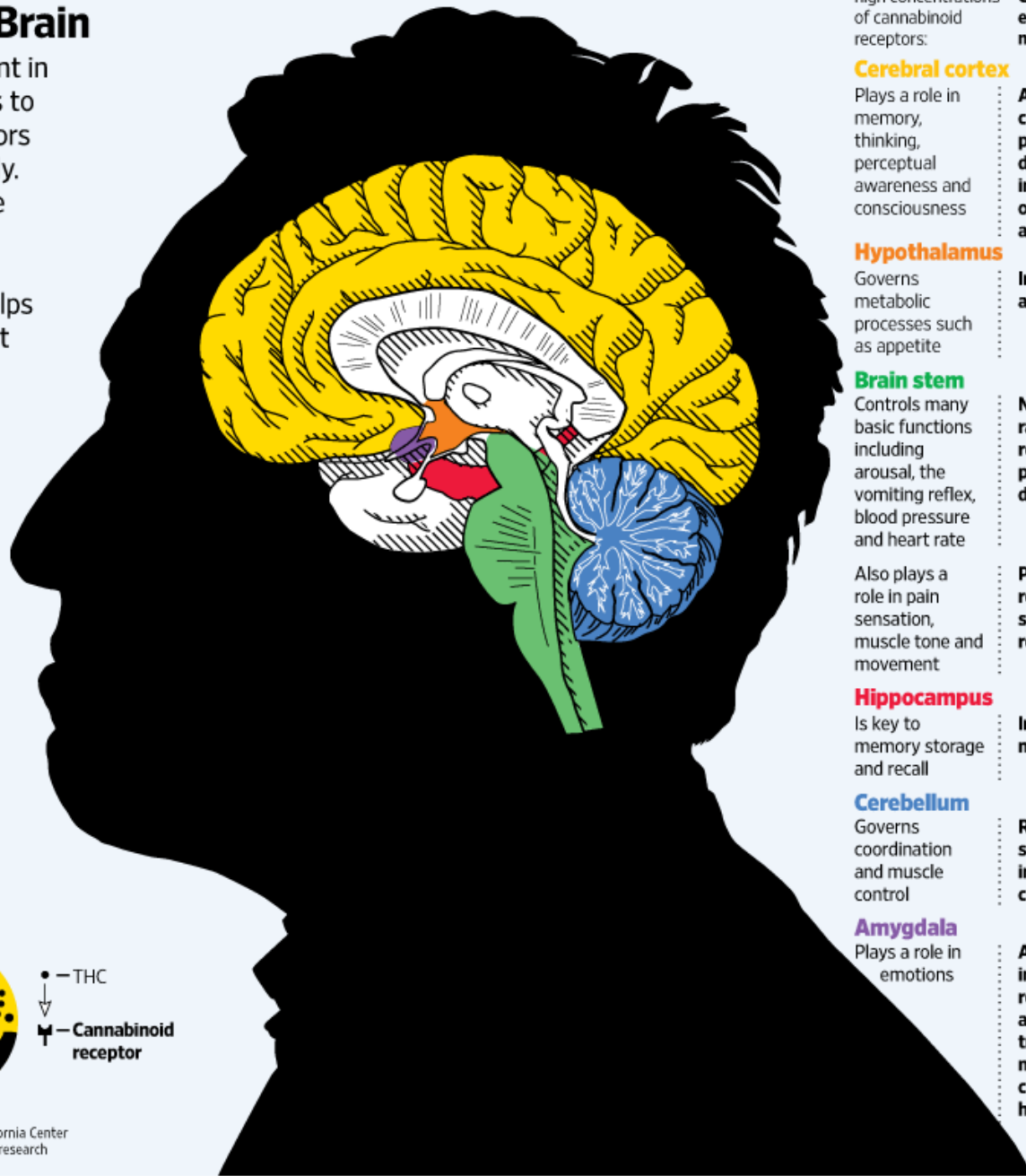
Nerve cells communicate by passing chemical messages across contact points called synapses.



The most active ingredient in marijuana, THC, attaches to cannabinoid receptors and modifies nerve action.



Sources: Igor Grant, University of California Center for Medicinal Cannabis Research; WSJ research



Some areas with high concentrations of cannabinoid receptors:

**Corresponding effects of marijuana:**

### Cerebral cortex

Plays a role in memory, thinking, perceptual awareness and consciousness

**Altered consciousness; perceptual distortions; memory impairment; occasional delusions and hallucinations**

### Hypothalamus

Governs metabolic processes such as appetite

**Increased appetite**

### Brain stem

Controls many basic functions including arousal, the vomiting reflex, blood pressure and heart rate

**Nausea relief; rapid heart rate; reduced blood pressure; drowsiness**

Also plays a role in pain sensation, muscle tone and movement

**Pain reduction; reduced spasticity; reduced tremor**

### Hippocampus

Is key to memory storage and recall

**Impairment in memory**

### Cerebellum

Governs coordination and muscle control

**Reduced spasticity; impaired coordination**

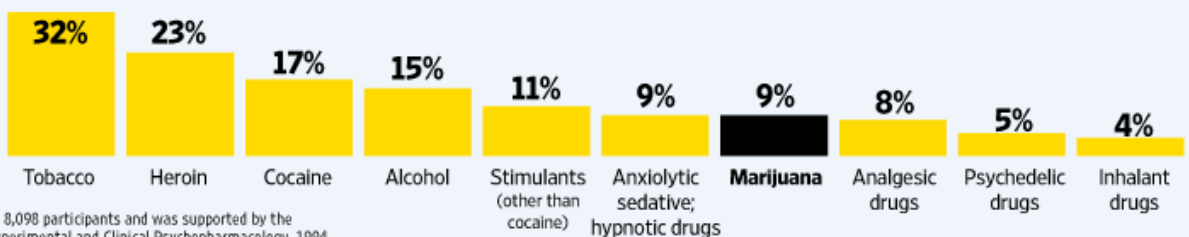
### Amygdala

Plays a role in emotions

**Anxiety and panic in some cases; reduced anxiety and blocking of traumatic memories in other cases; reduced hostility**

Maryanne Murray/WSJ

Estimated percentage of people in a national survey who used a substance at least once and became dependent



Source: The National Comorbidity Survey, which included 8,098 participants and was supported by the National Institute on Drug Abuse; results published in Experimental and Clinical Psychopharmacology, 1994