



**HEADS UP  
REAL NEWS  
ABOUT DRUGS  
AND YOUR BODY**

## Dangerous Cravings and the Brain

Researchers have found that people suffering from obesity, alcohol addiction, and drug addiction tend to have lower-than-average numbers of D2 (dopamine) receptors in their brains. In 2001, researchers at Brookhaven National Laboratory in New York conducted an experiment using rats to find out if increasing the number of D2 receptors in rats' brains would decrease the amount of alcohol consumed by rats that had been trained to prefer alcohol over water. The experiment was conducted with two groups: normal rats and rats that had been trained to prefer alcohol.

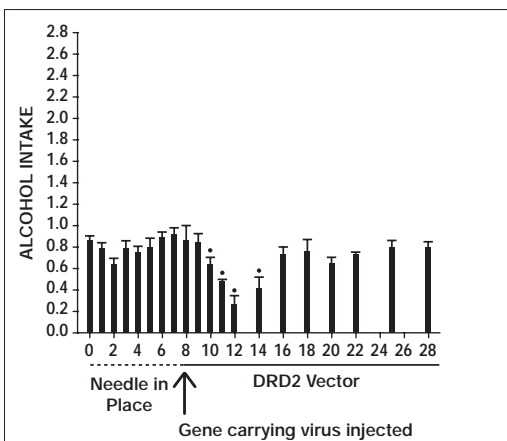
### Rats, D2 Receptors, and Alcohol Intake

**Hypothesis:** An increase in the number of D2 receptors in the brains of rats trained to prefer alcohol will make alcohol less appealing and cause them to drink less of it.

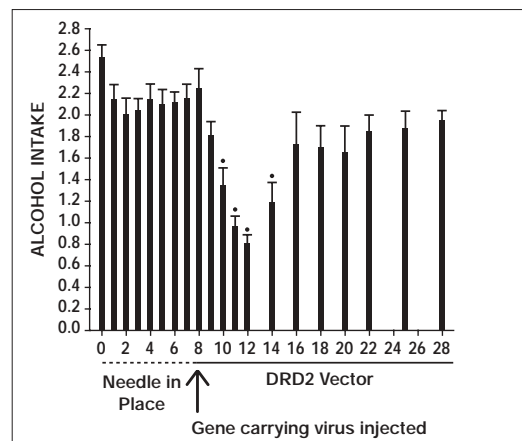
**Brief Description of Experiment:** The researchers, led by Panayotis K. Thanos, injected a virus carrying the D2 receptor gene into the nucleus accumbens (the pleasure center of the brain) of rats. This caused their brains to produce more D2 receptors. Brain imaging techniques were used to measure the increase. Of the 15 rats that received injections, six had been trained to prefer alcohol over water. (On average, 60 percent of

the liquid they chose to drink was alcohol.) Nine rats preferred water. The experiment began when the needle that would carry the gene was implanted in the rats' brains as a control. After eight days with the needle in place, the virus-carrying gene was injected. Each day, scientists measured the rats' alcohol intake. The rats could choose from two bottles: one filled with water and the other with alcohol.

### The Results of the Experiment



Alcohol intake over time for rats that preferred water and were injected with the D2 receptor gene on Day 8.



Alcohol intake over time for rats that preferred alcohol and were injected with the D2 receptor gene on Day 8.

### D2 Receptor Levels

In both alcohol-addicted and non-alcohol-addicted rats, D2 receptor levels rose—in most cases there was an approximate 50 percent increase about four days after injection of the virus-carrying gene. The D2 receptor level fell to about 8 percent above normal levels by the tenth day after the injection.

Now that you have read about the experiment, answer these questions. Write your answers on the back of this page.

1. Did the researchers prove their hypothesis?
2. How did the results differ in the alcohol-addicted and non-alcohol-addicted rats? Are the results permanent?
3. Why do you think researchers waited eight days before injecting the D2 receptor gene?