

# How drug skews values, Brain scans show that cocaine addicts seem less motivated to work harder for more money

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People who abuse cocaine may be damaging brain regions that motivate people to work harder for greater monetary rewards, and may extend to other nondrug rewards such as food, too, according to a new study. It could also make recovery from addiction more difficult.

"The problems in the brain's reward processing area and the control of behavior could explain why people have such a hard time stopping," said Rita Goldstein, a scientist at Brookhaven National Laboratory and lead investigator in the study.

She and her colleagues have identified disruptions in the brain's prefrontal cortex, the area that governs thinking, planning and behavior.

When addicts were asked to complete a number of computer-driven tests - a correct response would lead to rewards totaling \$50 - brain scans showed that the amount of money they could make had no impact on their response. But volunteers with no history of drug use performed better if they knew the reward was higher.

In other words, one of the most powerful rewards that drive human behavior - money - didn't seem to register a normal brain response, said Goldstein, who presented the latest findings during the Society for Neuroscience annual meeting in Atlanta this week.

"The drug overpowers the brain regions that respond to nondrug rewards like money," said Goldstein, who says that the ability to seek other rewards like food and sex may also be compromised by the changes to this region.

Goldstein and her colleagues also asked people in the study, 16 addicts and 13 healthy volunteers, how much they value money. Goldstein said more than half of the cocaine addicts said that \$10 was just as good as \$1,000, compared with two of the 13 healthy volunteers.

Test subjects had to tap a button on cue, or not tap a button when shown another cue. The normal volunteer's orbitofrontal gyrus - a part of the prefrontal cortex - became more active when the reward was greater and less active with a smaller sum.

This response - the higher the reward, the more brain activity - did not show up in the cocaine users. The responses showed no difference in activity, whether the reward was high or low.

The scientists also measured responses by placing electrodes across the scalp to check electrical activity inside the brain. The more active a person's prefrontal cortex, the more the subject understood the difference between low and high monetary rewards, she added.

Goldstein says that these changes "may be related to their ability to make decisions and control their behavior."

If someone is not motivated by a nondrug reward, it can't be used to control their behavior, she added.

"One is bound to make some disadvantageous decisions."

This includes continued drug use, she said.

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## **Abstract** (Document Summary)

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