

Novelty lures rats from cocaine-paired settings, hinting at new treatments for recovering addicts

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The brain's innate interest in the new and different may help trump the power of addictive drugs, according to research published by the American Psychological Association. In controlled experiments, novelty drew cocaine-treated rats away from the place they got cocaine.

Novelty could help break the vicious cycle of treatment and relapse, especially for the many addicts with novelty-craving, risk-taking personalities, the authors said. Drug-linked settings hold particular sway over recovering addicts, which may account in part for high rates of relapse.

In the multi-stage study, Carmela Reichel, PhD, and Rick Bevins, PhD, of the University of Nebraska-Lincoln, trained rats to prefer one side of a large Plexiglas apparatus by injecting them with one of three different doses of cocaine before placing them in that side. For the next eight days, the researchers alternated placing rats in one side or the other, injecting cocaine before placing them on one side, or injecting saline solution before placing them on the other.

This simple procedure left the rats, when drug free and given a choice, significantly more likely to visit the side where they had felt the rewarding effects of cocaine, according to the report in the February issue of [Behavioral Neuroscience](#).

In the next stage, for another eight days, the researchers tried to break the tie between drug and place by introducing novelty. Now, when rats were placed into the saline-paired compartment, half found something new there -- a white sock, a little piece of PVC pipe, a plastic scouring pad or balled-up newspaper. The remaining rats were given the same bare compartment as before.

Next, the rats were injected with saline solution instead of cocaine and placed -- on alternate days - in either the side paired with cocaine or with novelty. That would be like recovering addicts going back to the place they took drugs, a major cause of relapse. Alternating placements helped researchers counteract rats' natural tendency to spend more time in unfamiliar places, and equalize the time they spent in each context.

Finally, to test whether novelty could still compete with drug-linked cues, drug-free rats were placed between compartments to see where they would go. Rats that had been trained on 7.5 and 20, but not 30, cocaine milligrams per kilogram (mg/kg) of weight and then given novel objects spent equal time on both sides. That is, they went back and forth between the places they had experienced both cocaine and novelty. Rats that did not receive the novel objects spent more time where they had experienced the effects of cocaine.

Drugged rats that had been trained on 7.5 mg/kg of cocaine and then given novel objects also gave both sides equal attention. However, rats that had been trained on 20 or 30 mg/kg of cocaine and then given novel objects still preferred the cocaine-paired over the novelty side.

Given the results of the drug-free tests, the findings suggested that employing something new and intriguing could work with drug-free, recovering addicts who are mild but not heavy users, the authors wrote.

In a second experiment, the researchers repeated the procedure with just

one dose of cocaine, 10 mg/kg of weight, to test the effect's staying power one, 14 or 28 days after establishing the preference for the cocaine-paired side. Two weeks later, novelty still changed compartment choice for drug-free rats. Four weeks later, however, none of the rats showed a particular preference for either compartment.

"We identified a window of opportunity for conditioned rewards to compete for control over choice behavior," at least among [rats](#), the authors wrote.

By understanding how long and how well novelty can compete with the allure of addicting drugs, researchers may start to consider using it in the real world. The human equivalent of new "toys" - such as scuba diving, mountain climbing, whitewater rafting and snow skiing -- could work as a behavioral reward. As the researchers pointed out, novelty does not involve medical treatment or side effects, and could be cheaper as well.

"Treatment programs implementing novel rewards targeted to those individuals that have high novelty/sensation seeking tendencies may offer addicts the opportunity (e.g., with vouchers) to participate in one of the activities mentioned previously in hopes of maintaining abstinence," wrote Reichel and Bevins.

More information: "Competition Between Novelty and Cocaine Conditioned Reward Is Sensitive to Drug Dose and Retention Interval;" Carmela M. Reichel, PhD, and Rick A. Bevins, PhD, University of Nebraska-Lincoln; Behavioral Neuroscience, Vol. 124, No. 1.

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