

An advance in understanding drug 'habits' and their treatment

March 26 2014, by Verity Leatherdale

(Medical Xpress)—Cocaine promotes habitual behaviours and these can potentially be reversed with the use of an antioxidant, research at the University of Sydney has shown.

The findings have just been published in *Neuropsychopharmacology*.

For many people the term 'habit' has a negative connotation and uncontrolled [drug](#) use is the quintessential 'bad habit'.

"But in fact the assumption that drug use is habit-forming and, if so, why, has rarely been scientifically tested," said Dr Laura Corbit, from the University's School of Psychology and lead author on the paper with Professor Bernard Balleine from the Brain and Mind Research Institute at the University.

"There are two possible scenarios for compulsive drug use. One is that the drug is highly valued by the user and this drives active, deliberate pursuit of the drug. The second is that when a user finds themselves in a situation where they've used drugs before, they do so again regardless of the desire to use or abstain - their behaviour has become habitual," Dr Corbit said.

"We show that exposure to cocaine speeds up habit learning and, importantly, this effect is not limited to drug use. We also discovered that these drug-induced habits can be prevented by taking an antioxidant, N-acetylcysteine (NAC)," Dr Corbit said.

This tendency for drug-related and other behaviours to become habitual may present a significant challenge for drug-users as they are essentially having to change behaviour overall, not just their drug-taking.

The researchers modelled the effects of long-term cocaine exposure in rats and tested their reward-seeking behaviour using food.

"In cocaine-treated rats their behaviour rapidly became habitual but in the control animals, not receiving the cocaine, it remained flexible," Dr Corbit said.

"Strikingly we saw that, in the rats' brains, there were changes in regions needed to make flexible decisions rather than in the habit-forming part of the brain. So impaired decision making may allow for earlier control by habits."

Rats given NAC at the same time as the cocaine were indistinguishable from controls - rats that were not receiving either drug. The effects of cocaine were prevented, with goal-directed, as distinct from habitual, behaviour observed in the NAC-treated [rats](#).

"The effects of cocaine are not limited just to behaviours related to taking the drug. Our findings suggests that what lies at the heart of addiction is not only decisions about drug seeking but a more general cognitive rigidity - or inability to control our behaviour," Dr Corbit said.

"That is why these preliminary findings with NAC are encouraging. Its ability to reduce [cocaine](#) craving and relapse risk are established. Future research will confirm its potential to improve goal-directed decision-making which promises better treatment outcomes for interventions such as [cognitive behavioural therapy](#)," Dr Corbit said.

More information: "Effects of Repeated Cocaine Exposure on Habit

Learning and Reversal by N-Acetylcysteine." Corbit LH, Chieng BC, Balleine BW. *Neuropsychopharmacology*. 2014 Feb 17. [DOI: 10.1038/npp.2014.37](https://doi.org/10.1038/npp.2014.37). [Epub ahead of print]

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