

Use of Mephedrone—a popular party drug—can lead to permanent brain damage, research shows

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Craig Motbey preparing tissue from a rat's brain.

(Medical Xpress)—The party drug mephedrone can cause lasting damage to the brain, according to new research led by the University of Sydney.

"Mephedrone is highly addictive in the worst possible way. Users tend to binge on massive doses of the drug over short time spans," said Craig Motbey, a PhD candidate in the University's School of Psychology and lead author of the research published in [PLOS ONE](#), the [Public Library of Science](#) journal, today.

"Combined with the fact mephedrone is skyrocketing in popularity worldwide, with Australia following that trend, our finding that high

doses can cause ongoing [cognitive impairment](#) spells a significant risk for users."

Also known as 'meow meow' and 'MCAT', mephedrone's immediate effect on the brain is similar to a combination of ecstasy and methamphetamine.

"You get the [euphoria](#) and touchy-feeliness of [ecstasy](#) together with the intense addictiveness of [methamphetamine](#) or cocaine," said Motbey.

The current results, based upon experiments with [laboratory rats](#), provide evidence of mephedrone's ability to damage memory.

Rats were given an injection of mephedrone once a day for 10 days. The brains from one group of rats were examined an hour after their final dose. Another group of rats had several more weeks of drug-free living and were then given behavioural tests to find signs of long-term cognitive impairment, before their brains were also analysed.

"With this second group that lived drug free for an extended period we found a substantial [memory impairment](#) in animals that had been given the higher dose of the drug. This is concerning because it confirms earlier hints of [memory problems](#) in human mephedrone users. The fact the impairment was still there many weeks after the end of the drug treatment suggests that this damage may be permanent," said Motbey.

"So at this stage we know there is a significant, persistent impact with this drug which is relevant to humans, but we don't know why.

"There were no lasting changes to be seen when we studied the brain's chemistry, but all that means is that the cause of the memory problem may be rather subtle. Hopefully continuing research on mephedrone at this University and elsewhere will help solve that mystery."

While memory impairment was only observed with rats in the higher-dosed group, this does not mean that mephedrone is safe at lower doses.

"We really don't know enough about this drug to say whether there is any such thing as a safe dose. It's quite possible that any damage from mephedrone is cumulative, and that even relatively mild doses could eventually build up to cause serious harm," said Motbey.

The research also provided a better idea of how mephedrone functions in the brain.

"The data from the brains of the first group of rats, who were examined only an hour after taking mephedrone, suggests it causes an immediate surge in serotonin, associated with feelings of euphoria, while slowing down the metabolism of dopamine, associated with addiction and stimulation. Serotonin and dopamine are both neurotransmitters - chemicals that help transmit signals in the [brain](#).

"So the serotonin disappears very quickly while the dopamine remains in the system longer. The result is a user who is highly motivated, thanks to the addiction-related properties of dopamine, to recreate the intense but short-lived serotonin rush."

This may help to explain the behaviour of users who frequently re-dose throughout a mephedrone session, often continuing until supplies of the drug are exhausted.

Provided by University of Sydney

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