

Researchers see way cocaine hijacks memory

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Washington State University researchers have found a mechanism in the brain that facilitates the pathologically powerful role of memory in drug addiction. Their discovery opens a new area of research for targeted therapy that would alter or disable the mechanism and make drug addiction less compulsive.

Turning off the mechanism is "diminishing the [emotional impact](#) or the emotional content of the memory, so it decreases the motivation to

relapse," said Barbara Sorg, a professor of neuroscience at Washington State University, Vancouver. Her findings appear in the latest *Journal of Neuroscience*.

Memories associated with drug use are a leading suspect in driving the impulses behind [drug addiction](#). The brain reinforces memories, in part by giving them emotional weight. The result is a personal blueprint of rewards and cues guiding fundamental decisions.

Drug use creates memories so powerful they hijack the system, turning physiology into pathology.

"If you saw 'Spinal Tap,' it's like memory turned up to 11," said Sorg.

Sorg and Megan Slaker, a doctoral candidate in neuroscience, gave male rats cocaine in a specific setting, a drug cage, conditioning them to associate the experience with that place. With each new experience, the rats would draw memories of previous experiences there, reconsolidate them with new information and in effect reinforce the memory.

With one group of rats, the researchers removed structures called perineuronal nets that surround a group of neurons in the [medial prefrontal cortex](#), a high-order area of the brain important for attention, cognition and inhibitory behavior, as well as learning and memory. The nets are believed to regulate the ability to strengthen or weaken as memories are recalled and reconsolidated.

Indeed, the rats with their nets removed were less interested in being in the drug cage.

"When we manipulated them and removed these nets from the prefrontal cortex, we saw that our animals had poorer memories," said Slaker.

"That was a very novel finding since no one else has ever looked at these

structures within the [prefrontal cortex](#) in relation to a drug memory."

Sorg notes that the procedure probably did not erase the drug [memory](#) but blunted its emotional power. The finding opens the possibility of developing a way to target, for example, a protein of the perineuronal nets, to counteract cocaine's influence over memories.

Provided by Washington State University

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