Hope for treatment of cocaine addiction

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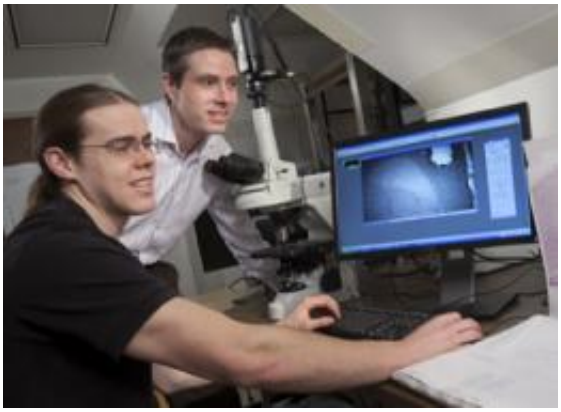

Devin Mueller (right), assistant professor of psychology, and doctoral student James Otis compare scans of rat brains used in their recent study on how the brain processes memories associated with cocaine addiction.

(PhysOrg.com) -- Two separate discoveries by researchers at the University of Wisconsin-Milwaukee (UWM) offer potential for development of a first-ever pharmacological treatment for cocaine addiction.

In one study, a common beta blocker, propranolol, currently used to treat people with hypertension and anxiety, has shown to be effective in preventing the brain from retrieving memories associated with cocaine use in animal-addiction models, according to Devin Mueller, UWM assistant professor of psychology and a co-author with James Otis of the research.

The work was presented today at the annual meeting of the Society for Neuroscience in San Diego.

This is the first time that a therapeutic treatment has been shown to block the retrieval of memories associated with drug addiction, a major reason many addicts experience relapse, says Mueller.

Along with the discovery of propranolol's cocaine-memory blocking effects, the researchers also have identified the primary players in the brain responsible for "extinction" learning – the ability to replace cocaine-associated memories with associations that have no drug "reward."

Understanding the neural mechanisms of extinction learning can also point to a possible pharmacological target for treating drug addiction, says Mueller.

Cocaine is one of the worst drug addictions to kick, with about 80 percent of those trying to quit experiencing a relapse within six months.

"Right now, there are no FDA-approved medications that are known to successfully treat cocaine abuse," says Mueller, "only those that are used to treat the symptoms of cocaine withdrawal, which are largely ineffective at preventing relapse."

The effects of propranolol were long-lasting and could be permanent, he says, even without subsequent doses and even in the presence of stimuli known to induce relapse.

Currently, "exposure therapy" is used to help recovering addicts suppress their drug-seeking behavior. In this therapy, the patient is repeatedly exposed to stimuli that provoke cravings but do not satisfy them. Done repeatedly over time, the patient experiences less craving when

presented with those stimuli.

The success of exposure therapy, however, is limited. Combining therapy with the use of propranolol, says Mueller, would boost the effectiveness of the treatment.

Propranolol was chosen for the memory study because it has been used before to ease some withdrawal symptoms experienced by recovering cocaine addicts. Those using the drug were able to continue standard therapy for longer periods than those without the drug.

But Mueller adds that propranolol has never been combined with exposure therapy.

In order to develop a drug treatment for overcoming relapse, the next step in the research is to determine where in the brain propranolol acts to mediate the retrieval of cocaine-associated memories.

The team already has found the part of the brain that mediates the process of extinction learning and also has identified certain neurotransmitter receptors – specifically, a variant of the NMDA receptor containing the NR2B subunit – that are necessary for extinction of cocaine-seeking.

“Our research supports the idea that drugs that enhance the function of NR2B-containing NMDA receptors could also augment exposure therapy and increase its effectiveness in preventing relapse,” says Mueller.

The researchers are now examining exactly how these receptors allow extinction learning and whether stimulating them will facilitate or even take the place of extinction training.

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