Cancer drug may prevent cocaine relapse behavior

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UC Irvine scientists Marcelo Wood (pictured), Melissa Malvaez and colleagues discovered that a drug in development to treat cancer could aid behavioral extinction therapy for cocaine addicts. Photo by Daniel A. Anderson / University Communications

(PhysOrg.com) -- A drug in development to treat cancer could help prevent relapse behavior in people trying to overcome an addiction to cocaine, according to a new study by UC Irvine neuroscientists.

n mice conditioned to cocaine, drug-seeking activity was inhibited faster and to a greater extent with sodium butyrate than without it.

People addicted to cocaine usually receive behavioral extinction therapy, in which they learn over time and without medication to disassociate a drug of abuse from the contexts and cues that are associated with it, but the process is lengthy and participants often drop out. Compounds tested

previously to aid this therapy have had limited success.

"Our results are exciting because sodium butyrate taps into fundamental molecular mechanisms, providing a novel approach to understanding and treating drug addiction," said Marcelo Wood, UCI neurobiology & behavior assistant professor and co-author of the study, published online Sept. 22 in the journal *Biological Psychiatry*.

For the study, Wood, lead author and graduate student Melissa Malvaez and colleagues placed mice in a container with three distinct chambers. The mice were given cocaine while in a particular chamber, and they quickly developed a preference for that location.

Then the cocaine was discontinued, and some of the mice were treated with sodium butyrate. Within 24 hours, those mice no longer sought out the cocaine chamber, but the untreated mice took more than a week to break from their chamber preference.

Later, the mice again were given cocaine prior to entering the chamber. The treated mice continued to show no preference, but the untreated mice quickly reverted to seeking out the cocaine chamber. "In a mouse, that's relapse-like behavior," Wood said.

Previously, Wood and colleagues had found that sodium butyrate, a histone deacetylase (HDAC) inhibitor, can enhance long-term memory.

HDAC inhibitors relax the protein structure that organizes and compacts genomic DNA, allowing for easier and perhaps maintained activation of genes involved in memory storage.

"Because sodium butyrate works at this level, its effects may be much more stable" than other compounds, Wood said.

In addition to Malvaez and Wood, undergraduate Darren Vo of UCI worked on the cocaine study, along with Carles Sanchis-Segura of Universitat Jaume I in Spain and K. Matthew Lattal of Oregon Health & Science University. Malvaez, Wood, Vo and Sanchis-Segura are affiliated with the UCI Center for the Neurobiology of Learning & Memory.

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Provided by UC Irvine