Addiction Clue article

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Addiction clue

Gene essential for normal brain development, and linked to autism spectrum disorders, plays critical role in addiction-related behaviors

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By Scott O’Brien, McLean Hospital Communications

Agene essential for normal brain development, and also linked to autism spectrum disorders, plays a critical role in addiction-related behaviors, according to Harvard Medical School (HMS) investigators at [McLean Hospital.](http://mclean.harvard.edu/)

“In our lab, we investigate the brain mechanisms behind drug addiction, a common and devastating disease with limited treatment options,” said[Christopher Cowan](http://connects.catalyst.harvard.edu/Profiles/display/Person/51158), HMS associate professor of psychiatry and director of the Integrated Neurobiology Laboratory at McLean.

The findings were published in the latest issue of the neuroscience journal[Neuron.](http://www.cell.com/neuron/home)

“Chronic exposure to drugs of abuse causes changes in the brain that could underlie the transition from casual drug use to addiction. By discovering the brain molecules that control the development of drug addiction, we hope to identify new treatment approaches,” Cowan said.

The Cowan lab team, led by Laura Smith, HMS research fellow in psychiatry at McLean, used animal models to show that the fragile X mental retardation protein, or FMRP, plays a critical role in the development of addiction-related behaviors.

FMRP is also the protein that is missing in Fragile X Syndrome, the leading, single-gene cause of autism and intellectual disability.

Consistent with FMRP’s important role in brain function, the team found that cocaine utilizes it to facilitate brain changes involved in addiction-related behaviors.

Cowan, whose work tends to focus on identifying novel genes related to conditions such as autism and drug addiction, explained that FMRP controls the remodeling and strength of connections in the brain during normal development.

His team’s current findings reveal that FMRP plays a critical role in the changes in brain connections that occur following repeated cocaine exposure.

“We know that experiences are able to modify the brain in important ways. Some of these brain changes help us, by allowing us to learn and remember. Other changes are harmful, such as those that occur in individuals struggling with drug abuse,” said Cowan and Smith.

“While FMRP allows individuals to learn and remember things in their environment properly, it also controls how the brain responds to cocaine and ends up strengthening drug behaviors. By better understanding FMRP’s role in this process, we may someday be able to suggest effective therapeutic options to prevent or reverse these changes,” he said.