Nicotinic receptors may be important targets for treatment of multiple addictions

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For years, scientists have known that some people are biologically more susceptible to drug addiction than others, but they have only been able to speculate why.

In the August 15, 2007 issue of the *Journal of Neuroscience*, researchers at the University of Chicago report on a study that may help answer this question.

They discovered that rats most likely to self-administer addictive drugs had a particular receptor in the brain that is more responsive than the same receptor in rats least likely to self-administer addictive drugs.

This receptor, known as the nicotinic acetylcholine receptor (nAChR), increases excitability within in the brain's reward centers. In the animals that were more likely to take addictive drugs, the effects of these receptors were much stronger, leading to more profound excitation of the cells and pathways associated with reward.

Stress, and the associated increases in stress hormones, will promote drug-taking behavior regardless of whether an animal is more or less susceptible, say the researchers. They showed that stress also increases the responses of nAChRs within the brain's reward areas.

"We tested the exploratory behavior of rats in an unfamiliar cage. Rats that explore a new environment for a prolonged period of time were more interested in addictive drugs," says Daniel McGehee, PhD, associate professor and lead researcher on this study. " Those rats also had stronger nAChR responses, meaning their brains responded differently to the drugs. We measured receptor activity in the brain's reward centers that are known to be activated by addictive drugs."

"This study provides valuable insight into the mechanism of addiction," says McGehee. "It raises the possibility that nicotinic receptors may be important targets for the treatment of multiple addictions, not just nicotine. Unfortunately, blocking these receptors may also interfere with healthy behaviors that depend upon the same brain circuitry. Precisely where these findings will lead drug treatment strategies is unclear, but this work provides insight into the role of nicotinic receptors in the vulnerability to multiple classes of addictive drugs."

Source: University of Chicago Medical Center