

Research provides clues to alcohol addiction vulnerability

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(Medical Xpress)—A Wake Forest Baptist Medical Center team studying alcohol addiction has new research that might shed light on why some drinkers are more susceptible to addiction than others.

Jeff Weiner, Ph.D., professor of physiology and pharmacology at Wake Forest Baptist, and colleagues used an [animal model](#) to look at the early stages of the addiction process and focused on how individual animals responded to [alcohol](#). Their findings may lead not only to a better understanding of addiction, but to the development of better drugs to treat the disease as well, Weiner said.

"We know that some people are much more vulnerable to alcoholism than others, just like some people have a vulnerability to cancer or [heart disease](#)," Weiner said. "We don't have a good understanding of what causes this vulnerability, and that's a big question. But if we can figure it out, we may be able to better identify people at risk, as well as gain important clues to help develop better drugs to treat the disease."

The findings are published in the March 13 issue of the *Journal of Neuroscience*. Weiner, who directs the Translational Studies on Early-[Life Stress](#) and Vulnerability to Alcohol Addiction project at Wake Forest Baptist, said the study protocol was developed by the first author of the paper, Karina Abrahao, a graduate student visiting from the collaborative lab of Sougza-Formigoni, Ph.D, of the Department of Psychobiology at the Federal University of Sao Paulo, Brazil.

Weiner said the study model focused on how individual animals responded to alcohol. Typically, when a drug like alcohol is given to a mouse every day, the way the animals respond increases - they become more stimulated and run around more. "In high doses, alcohol is a depressant, but in low doses, it can have a mellowing effect that results in greater activity," he said. "Those low dose effects tend to increase over time and this increase in activity in response to repeated [alcohol exposure](#) is called locomotor sensitization."

Prior studies with other drugs, such as cocaine and amphetamine, have suggested that animals that show the greatest increases in locomotor sensitization are also the animals most likely to seek out or consume these drugs. However, the relationship between locomotor sensitization and vulnerability to high levels of alcohol drinking is not as well established, Weiner said.

Usually when researchers are studying a drug, they give it to one test group while the other group gets a control solution, and then they look for behavioral differences between the two, Weiner said. But in this study, the researchers focused on individual differences in how each animal responded to the alcohol. A control group received a saline injection while another was injected with the same amount of alcohol every day for three weeks. Weiner said they used mice bred to be genetically variable like humans to make the research more relevant.

"We found large variations in the development of locomotor sensitization to alcohol in these mice, with some showing robust sensitization and others showing no more of a change in locomotor activity than control mice given daily saline injections," Weiner said. "Surprisingly, when all of the alcohol-exposed mice were given an opportunity to voluntarily drink alcohol, those that had developed sensitization drank more than those that did not. In fact, the alcohol-treated mice that failed to develop sensitization drank no more alcohol

than the saline-treated control group."

The authors also conducted a series of neurobiological studies and discovered that mice that showed robust locomotor sensitization had deficits in a form of brain neuroplasticity - how experiences reorganize neural pathways in the brain - that has been linked with cocaine addiction in other animal models.

"We found that this loss of the ability of brain cells to change the way that they communicate with each other only occurred in the animals that showed the behavioral response to alcohol," he said. "What this suggests for the first time in the [alcohol addiction](#) field is that this particular deficit may represent an important brain correlate of vulnerability to alcoholism. It's a testable hypothesis. That's why I think it's an important finding."

Provided by Wake Forest University Baptist Medical Center

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