

New study suggests ovarian hormone may make drug withdrawal symptoms worse for women

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New research published in the journal *Neuroscience Letters* suggests women may have more difficulty than men in withdrawing from and staying off methamphetamine. The study by Dickinson College neuroscientists looked at the interaction of estradiol—a naturally occurring form of estrogen and the major female sex hormone—and methamphetamine in female mice. Researchers found estradiol could contribute to anxiety-like behavior in the mice as they withdrew from the drug. These observations indicate the hormone may contribute to drug relapse in women by worsening anxiety-related symptoms during withdrawal.

"We tend to think of [methamphetamine](#) use disorder as a traditionally male problem, but women experience it differently, and this [hormone](#) may be a factor in that experience," said research co-author Anthony Rauhut, associate professor of psychology at Dickinson. The finding supports previous studies, which have found women are more likely than men to initiate methamphetamine use earlier, escalate to regular use in a shorter period of time and show signs of greater dependency. Previous research also has found women are more prone to use methamphetamine while also experiencing psychiatric disorders, like anxiety.

"The level of ovarian hormones circulating in a woman's bloodstream fluctuates throughout her menstrual cycle," said study co-author Meredith Curran-Rauhut, neuroscience instructor at Dickinson. "This

research suggests that fluctuating estradiol levels may impact severity of withdrawal symptoms in women."

In order to control hormone levels, researchers performed an ovariectomy on mice involved in the study. One group received an implanted estradiol capsule. When injected with methamphetamine, these mice exhibited more anxiety-like behavior as they withdrew from the [drug](#) than the [mice](#) who did not receive the hormone implant.

"Mouse anxiety behavior is well-understood from decades of observation," explained Rauhut. "Certain measurable behaviors, like how far a mouse travels during its time in the test field or how much time it spends resting along the sides of the chamber can tell us how anxious the animal is."

The husband-and-wife research team thinks their study could lead to further work on women and drug addiction, including studying whether exercise plays a role in reducing the negative effects of drug withdrawal. "The medical field needs to differentiate better between [women](#) and men, especially in addiction treatment," Curran-Rauhut said.

More information: A.S. Rauhut et al, 17 β -Estradiol exacerbates methamphetamine-induced anxiety-like behavior in female mice, *Neuroscience Letters* (2018). [DOI: 10.1016/j.neulet.2018.05.025](https://doi.org/10.1016/j.neulet.2018.05.025)

Provided by Dickinson College

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