

Experimental vaccine can counter dangerous effects of synthetic cannabinoids

December 16 2020



Credit: CC0 Public Domain

Made in clandestine laboratories and sold widely across the United States, the diverse class of drugs known as synthetic cannabinoids presents a growing public health threat.

In a new study, Scripps Research scientists have devised a way to

deactivate these [designer drugs](#) after they've been administered—offering a potential path for treating addiction and overdose.

The research appears today in the American Chemical Society's open access journal *JACS Au*, with findings from the laboratory of Kim Janda, Ph.D., the Ely R. Callaway, Jr. professor of chemistry at Scripps Research. Janda and his team developed a vaccine that was able to broadly counter the effects of synthetic cannabinoids in rodents, sequestering the [drug](#) molecules before they could interact with the central nervous system. Importantly, the approach worked in models that simulated smoking and vaping, which is how the drugs are most commonly used in real life.

"Synthetic cannabinoids are much more powerful and toxic than users often realize, and their rising prevalence has led to serious health issues among [young people](#) and adults," Janda says. "We found a way to negate the dangerous effects of these drugs, even when they're consumed in impure forms, as is often the case. Our hope is that this may one day help treat [cannabinoid](#) use disorders or accelerate recovery for people who overdosed."

Not to be confused with marijuana

Synthetic cannabinoids act on the same brain cell receptors as THC, the mind-altering ingredient in marijuana. However, they're man-made in a laboratory, with chemical structures that don't look anything like THC. Moreover, their actual effects can be unpredictable and, in some cases, fatal, Janda says.

The synthetic drugs are often sprayed on dried plant materials so they can be smoked, or sold as vaping liquids to be inhaled using e-cigarettes. Manufacturers tend to sell the products in colorful foil packages and

[plastic bottles](#) under a wide variety of brand names, including Spice, K2, Joker, Black Mamba and hundreds of others.

Synthetic cannabinoids are also sometimes mixed with other dangerous drugs such as fentanyl, which can make them more deadly. Overdoses are on the upswing, as evidenced by calls to poison control centers.

"The drugs often called synthetic marijuana are, in reality, very different from marijuana," the American Association of Poison Control Centers says. "They contain powerful chemicals and can cause severe, life-threatening health effects: severe agitation and anxiety, nausea, vomiting, seizures and hallucinations. The drugs are made specifically to be abused. Like many other illegal drugs, synthetic marijuana is not tested for safety, and users don't know exactly what chemicals they are putting into their bodies."

Expanding on a proven method

For the study, Janda says first author Mingliang Lin, a graduate student, wanted to explore whether a vaccine could work against synthetic cannabinoids, just as they have shown to do against some other drugs of abuse. Janda already has developed vaccine-based approaches to combat heroin, fentanyl and cocaine.

As an addiction treatment, Janda believes vaccines provide benefits over other therapeutics, as they don't require taking a daily pill and can reduce the risk of an overdose if the user relapses.

The newest vaccine differs from Janda's previous work in that it's composed of multiple drug-like antigens that stimulate "broadly neutralizing" antibodies within the body, which disable many types of cannabinoids. This is key, as [synthetic cannabinoids](#) encompass a wide range of man-made chemicals.

In [behavioral experiments](#) involving mice, the team found that even when exposed to a large amount of the drug, the vaccine offered broad protection against the psychoactive effects. The team also developed a version of the vaccine that could be inhaled, which could offer greater convenience.

"This work provides a solid foundation for future therapeutic development against synthetic cannabinoid abuse," Janda says. "The ultimate goal is to provide prolonged protection for those who may be struggling with substance abuse."

More information: Mingliang Lin et al, Broadly Neutralizing Synthetic Cannabinoid Vaccines, *JACS Au* (2020). [DOI: 10.1021/jacsau.0c00057](#)

Provided by The Scripps Research Institute

Citation: Experimental vaccine can counter dangerous effects of synthetic cannabinoids (2020, December 16) retrieved 24 April 2024 from <https://medicalxpress.com/news/2020-12-experimental-vaccine-counter-dangerous-effects.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--