

SYNTHETIC CANNABINOID DETECTIONS SURGE AMONG FATAL OVERDOSES OF INMATES IN JAILS & CORRECTIONAL FACILITIES

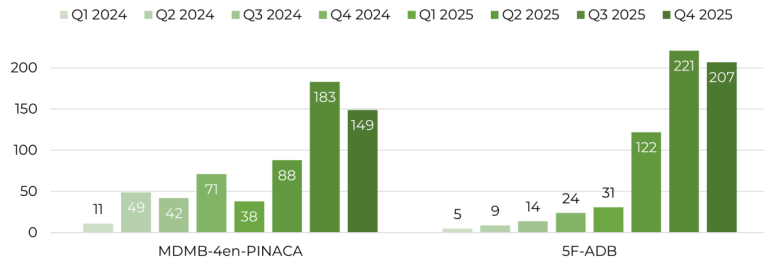
PURPOSE: The objective of this *Public Alert* is to notify public health and safety agencies, medical examiners and coroners, forensic and clinical laboratory personnel, clinicians, and other related communities about the rising presence of synthetic cannabinoids in correctional facilities, as well as adverse events and deaths among this population.

BACKGROUND: Synthetic cannabinoids (colloquially referred to as “K2” or “spice”) are chemically manufactured drugs designed to activate endogenous cannabinoid receptors. Unlike plant derived cannabinoids, these drugs are often full agonists at the CB1 receptor, with potency levels significantly higher than that of delta-9 tetrahydrocannabinol (THC). Synthetic cannabinoids remain poorly characterized pharmacologically and increasing research suggests they may exhibit off-target effects, leading to a broader range of side effects and risks. **Adverse effects** may include agitation, psychosis, seizures, delirium, paranoia, anxiety, tachycardia, hypertension, hyperthermia, arrhythmia, acute kidney injury, stroke, sudden collapse, and respiratory failure, and progression to death in severe intoxication cases.

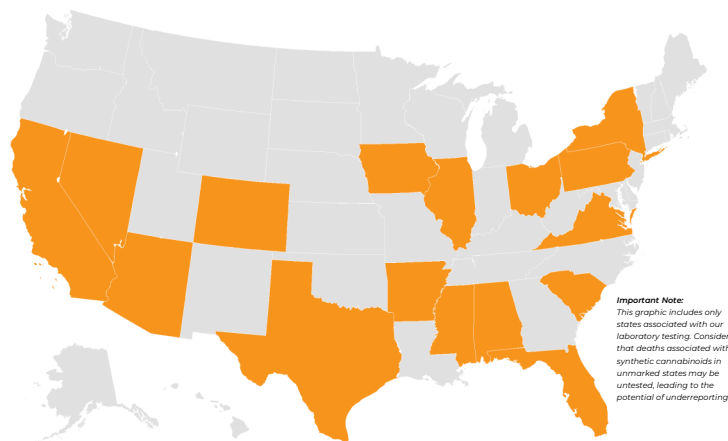
SUMMARY: Synthetic cannabinoids are increasingly being detected in jail and prison settings, often attributed to the ease of smuggling into correctional facilities and their pharmacological activity at low doses. Use of synthetic cannabinoids in these settings is not a new phenomenon—prior publications have documented concerns about these substances in **Florida, Illinois, and Georgia**. Historically, the synthetic cannabinoid landscape has been complex and volatile, similar to other subclasses of novel psychoactive substances (NPS). Potent synthetic cannabinoids pose significant health risks to incarcerated populations, as well as complex challenges and safety concerns for facility staff. Recent data show these drugs increasingly implicated in deaths; however, statistics regarding synthetic cannabinoid fatalities in jails and prisons remain underreported.

MDMB-4en-PINACA and **5F-ADB** (5F-MDMB-PINACA) remain the two most popular synthetic cannabinoids in **2026** despite their prior stints of prevalence and control as Schedule I drugs in the U.S. MDMB-4en-PINACA and 5F-ADB can be synthesized from the common precursor MDMB-INACA, which appeared after China’s generic control of this drug class in 2019. MDMB-4en-PINACA and 5F-ADB are **highly potent** ($EC_{50} = 2.47$ and 0.59 nM, respectively) compared to delta-9 THC ($EC_{50} = 269$ nM), another factor likely responsible for their persistence among the current recreational drug market. The chemical composition of synthetic cannabinoid formulations is extremely variable, leading to unpredictable consumption paired with varying use patterns. Paraphernalia often consist of paper materials, including letters, greeting cards, magazines, and books, which can be smoked, vaped, chewed, brewed, or consumed in differing manners inside correctional facilities. In 45 death cases tested by the **Center for Forensic Science Research and Education (CFSRE)** collected between August 2023 and March 2025, the primary metabolite and degradation product of 5F-ADB was detected in 80% of cases, followed by 31% of cases containing the metabolite of MDMB-4en-PINACA, and 17% positive for both substances. The majority of case histories described “individuals found down in cell”.

SYNTHETIC CANNABINOID POSITIVITY 2024-2025



STATES WITH FATAL OVERDOSES IN JAILS OR PRISONS



SELECTION OF CASE HISTORIES & TOXICOLOGY RESULTS

STATE	RESULTS (NG/ML)	CASE HISTORY
AL	<ul style="list-style-type: none"> ▶ MDMB-4en-PINACA (0.2) ▶ Acetaminophen ▶ Fluphenazine ▶ Fentanyl (<1) 	<ul style="list-style-type: none"> ▶ History of drug use. Found unresponsive in shower unit. Narcan administered. ▶ MOD: Accident ▶ COD: Probable fentanyl and MDMB-4en-PINACA toxicity
FL	<ul style="list-style-type: none"> ▶ 5F-ADB ▶ 5F-ADB 3,3-Dimethylbutanoic Acid ▶ Caffeine 	<ul style="list-style-type: none"> ▶ Jail death. Hypertensive and atherosclerotic cardiovascular disease. Severe pulmonary edema ▶ MOD: Accident ▶ COD: Acute synthetic cannabinoid (5F-MDMB-PINACA) toxicity
CA	<ul style="list-style-type: none"> ▶ 5F-ADB (0.17) ▶ 5F-ADB 3,3-Dimethylbutanoic Acid 	<ul style="list-style-type: none"> ▶ Jail death. ▶ MOD: Accident ▶ COD: 5F-ADB toxicity
OH	<ul style="list-style-type: none"> ▶ 5F-ADB ▶ 5F-ADB 3,3-Dimethylbutanoic Acid 	<ul style="list-style-type: none"> ▶ Found unresponsive in cell. History of smoking drugs smuggled into prison on paper. ▶ MOD: Accident
IA	<ul style="list-style-type: none"> ▶ MDMB-4en-PINACA (0.7) ▶ MDMB-4en-PINACA 3,3-Dimethylbutanoic Acid 	<ul style="list-style-type: none"> ▶ State penitentiary. History of seizure disorder, depression, ADHD and anxiety. Found unresponsive on floor of cell. ▶ MOD: Accident
IL	<ul style="list-style-type: none"> ▶ MDMB-4en-PINACA (0.75) ▶ Naloxone ▶ Lamotrigine (5,600) ▶ Aripiprazole (50) ▶ Citalopram (730) 	<ul style="list-style-type: none"> ▶ Discovered unresponsive after taking shallow breaths, possible drug paraphernalia. ▶ MOD: Accident ▶ COD: MDMB-4en-PINACA toxicity
TX	<ul style="list-style-type: none"> ▶ 5F-ADB 3,3-Dimethylbutanoic Acid 	<ul style="list-style-type: none"> ▶ Found unresponsive in cell. ▶ MOD: Accident

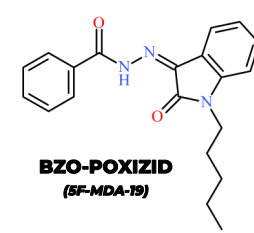
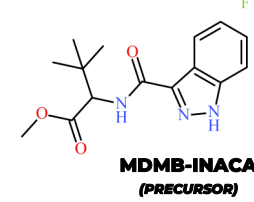
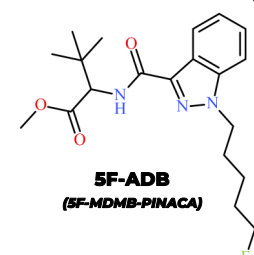
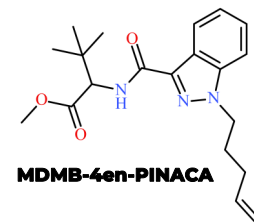
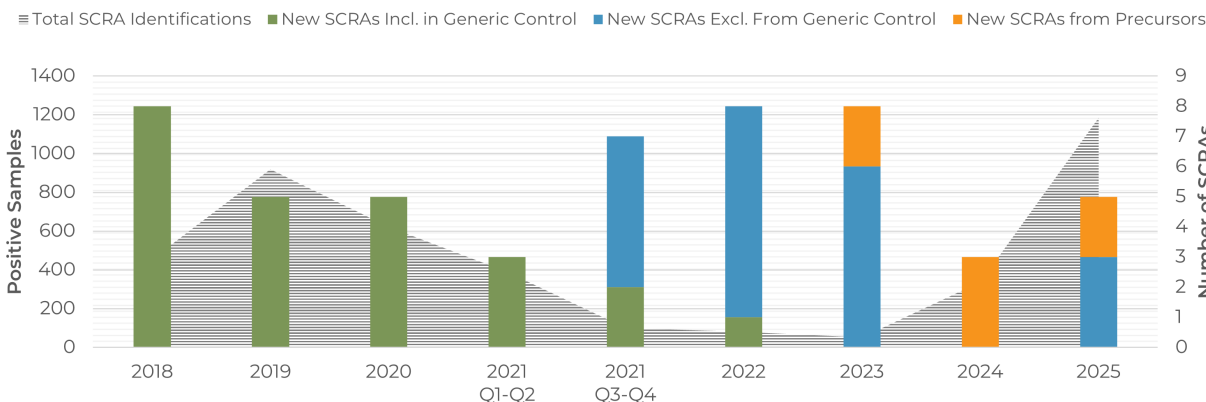


SYNTHETIC CANNABINOID DETECTIONS SURGE AMONG FATAL OVERDOSES OF INMATES IN JAILS & CORRECTIONAL FACILITIES

CHINESE GENERIC CONTROLS & IMPACTS: Synthetic cannabinoids, also referred to as synthetic cannabinoid receptor agonists (SCRAs), first emerged in the late 2000s and by the mid-2010s had become the largest subclass of NPS, contributing to adverse events and deaths. Changes in synthetic cannabinoid markets have largely been driven by national or international control and scheduling efforts. The global synthetic cannabinoid market changed significantly in the early 2020s following **China's class-wide scheduling action** enacted in July 2021. Similar to the approach by U.S. DEA for scheduling fentanyl analogues, the Chinese government outlined several "core structures" with prescribed modifications (i.e., head, tail, core, and linker components). This led to increased diversity of chemical structures, innovations in manufacturing and distribution, and increased variability in product potency with, early on, generally less potent (inactive) drugs appearing. As a result, today's synthetic cannabinoid landscape is distinct yet complex, and health concerns for synthetic cannabinoids remain high.

Following the enactment of China's generic control of synthetic cannabinoids, our laboratory observed a near immediate shift in the drug market: 1) with respect to the new synthetic cannabinoids emerging for the first time, and 2) in the positivity of overall synthetic cannabinoid detections among our forensic testing. New synthetic cannabinoids in late-2021 and 2022, outside the scope of the generic control (e.g., **BZO-POXIZID**, **ADB-FUBIATA**), often were characterized with low activity, seemingly resulting in less use and fewer links to adverse events and intoxications. By 2022 and 2023, the synthetic cannabinoid landscape changed as precursors (also outside the scope of the generic control) began appearing and were processed into final drugs with greater activity. A notable example is the conversion of **precursor** **MDMB-INACA** to the final drug product **MDMB-4en-PINACA**. This trend continued into 2024 and 2025, and is largely responsible for the renewed increase in the identification of synthetic cannabinoids among our forensic testing submissions (e.g., drug materials, fatal overdoses).

CHANGES IN SYNTHETIC CANNABINOID TRENDS PRE & POST CHINESE GENERIC CONTROLS



TESTING & RECOMMENDATIONS: Synthetic cannabinoids present many analytical challenges as these drugs with significant degrees of structural variability require specialized analysis (e.g., targeted testing methods, specialized extractions, low detection limits). This has historically led to inconsistent testing among laboratories and underestimations of involvement in medicolegal death investigations. Further, some analytes (e.g., 5F-ADB) present stability concerns, necessitating testing for alternative biomarkers. It is recommended that both blood and urine are collected and tested in cases suspecting synthetic cannabinoid involvement. Enhanced analytical sensitivity is necessary in the laboratory as potent synthetic cannabinoids are found at low yet significant concentrations (e.g., <1.0 ng/mL). Forensic toxicology testing for synthetic cannabinoids should be pursued in fatal overdoses, especially among high-risk populations where there is no apparent anatomical cause of death or no relevant toxicology results.

Through our NPS Discovery program and with ongoing support from the National Institute of Justice (NIJ), the CFSRE invites partnerships with medical examiners, coroners, and correctional agencies. Our laboratory offers specialized testing to identify synthetic cannabinoids and other emerging drugs involved in suspected intoxications or fatalities within carceral settings. For more information on how to submit drug materials or biological specimens for forensic analysis, visit our [webpage](#) or contact our team via npsdiscovery@cfsre.org.

REFERENCES:

- Hvozdoch et al. (2020) [Case Report: Synthetic Cannabinoid Deaths in State of Florida Prisoners](#)
- Gitto et al. (2025) [MDMB-4en-PINACA-Related Deaths in Cook County Jail: Awareness and Preventive Measures](#)
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- Mohr et al. (2021) [Reports of Adverse Events Associated with Use of Novel Psychoactive Substances, 2017–2020: A Review](#)
- Logan et al. (2017) [Reports of Adverse Events Associated with Use of Novel Psychoactive Substances, 2013–2016: A Review](#)



Note: Paper from a jail containing synthetic cannabinoid MDMB-4en-PINACA and its precursor MDMB-INACA.

