

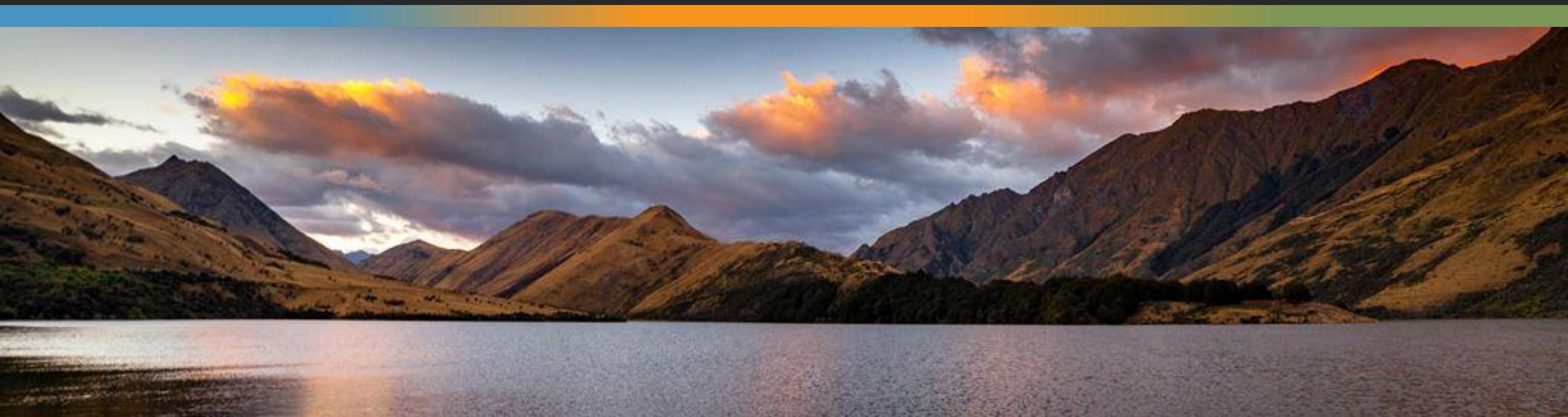


Monitoring the North American Drug Supply and Responding in Real-Time



Reducing Harm From Drugs in Aotearoa – Wellington, New Zealand – Monday December 1, 2025

Alex J. Krotulski, PhD – Center for Forensic Science Research and Education, Pennsylvania, USA



FUNDING DISCLOSURE

- CFSRE's NPS Discovery program is funded in part by the National Institute of Justice (NIJ), Office of Justice Programs (OJP), U.S. Department of Justice (DOJ).
 - Award Number: 15PNIJ-24-GK-00981-COAP
 - The opinions, findings, conclusions and/or recommendations expressed in this presentation are those of the author(s) and do not necessarily represent the official position or policies of the U.S. Department of Justice.
- CFSRE's NPS Discovery program also receives funding, either directly or indirectly, from a variety of agencies and entities, including Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH).

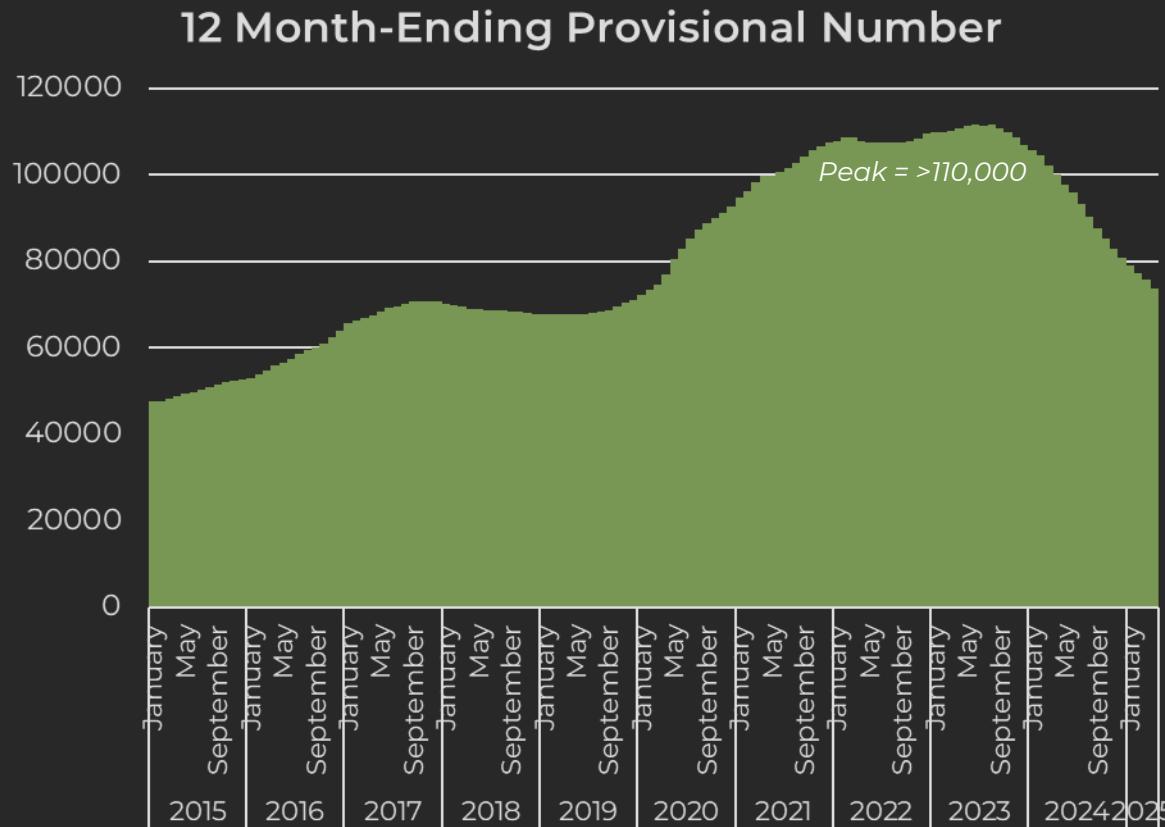




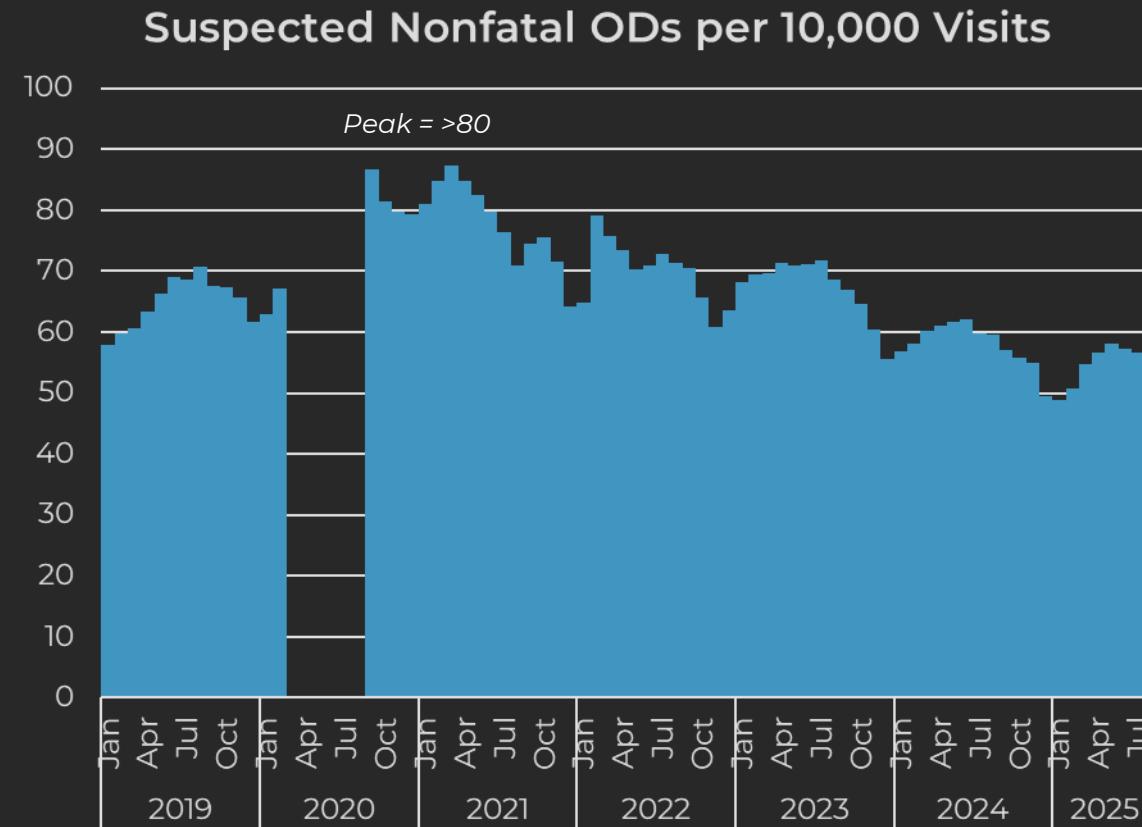
PROBLEM STATEMENT

U.S. DRUG-RELATED DEATHS & HOSPITALIZATIONS

FATAL DRUG OVERDOSES



NON-FATAL DRUG OVERDOSES



DISTINCT U.S. DRUG MARKETS

STREET DRUG SUPPLY



SMOKE SHOPS



ONLINE MARKETPLACES

A screenshot of an online marketplace for chemicals. The header includes a logo for "LFPharm", a search bar, and links for "REGISTER / SIGN IN" and "SHOPPING CART(1) \$270.00". The main page features a green banner with "TRPTAMINE CHEMISTRY" and a background image of laboratory glassware. Below the banner are two sections of product cards. The left section is titled "TRYPTAMINE CHEMISTRY" and includes a network diagram, a "TRYPTAMINE" category link, and a "TRYPTAMINE" product card for "Etodezitamide, HCL" with a price of \$13.00. The right section is titled "TRYPTAMINE" and includes product cards for "SPIROBROPHINE, CITRATE" and "SPIROBROPHINE, HCL", both with a price of \$13.00. Each product card has a "VIEW MORE" button.

DISTINCT U.S. DRUG MARKET PRODUCTS

STREET DRUG SUPPLY



SMOKE SHOPS



ONLINE MARKETPLACES



ILLICIT

QUASI-LEGAL

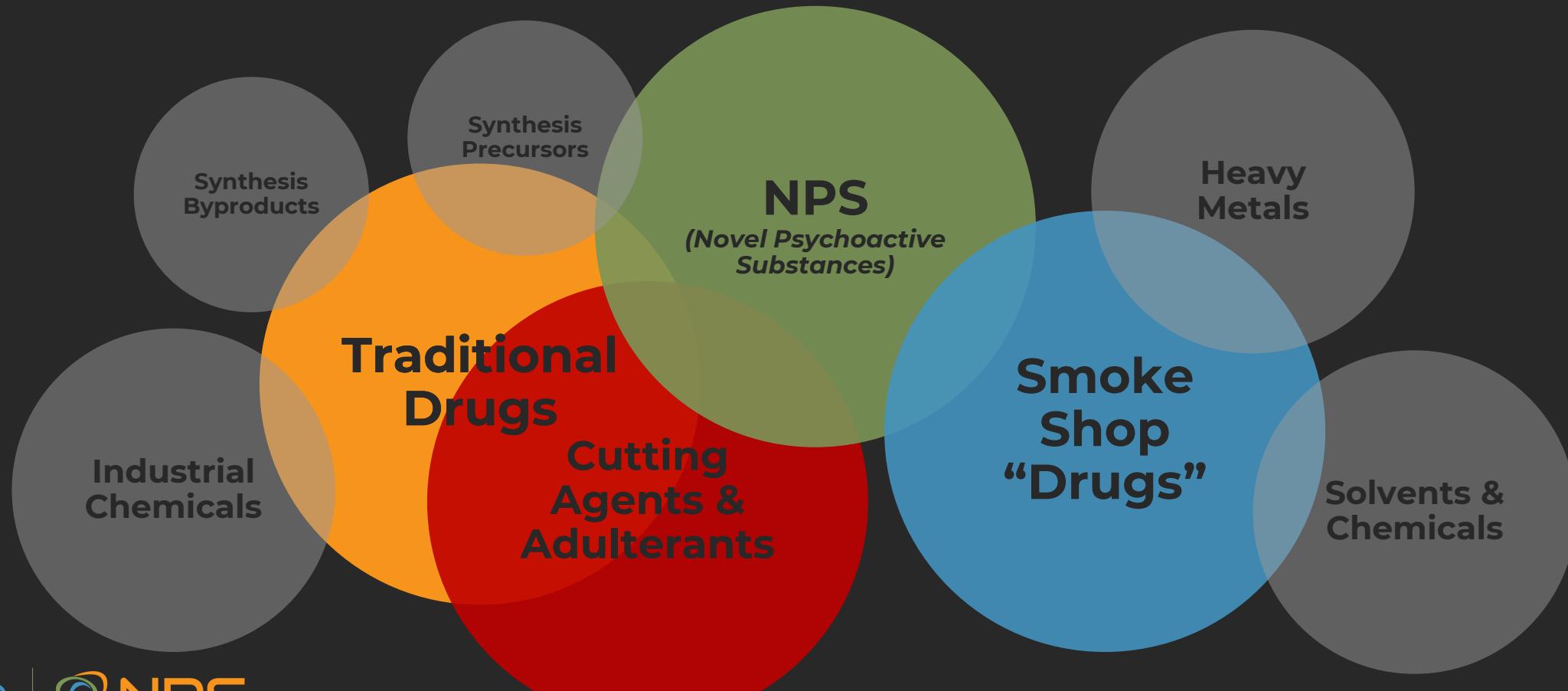
LEGAL ("LEGAL")

OVERLAPPING DRUG SUPPLIES & SOURCES

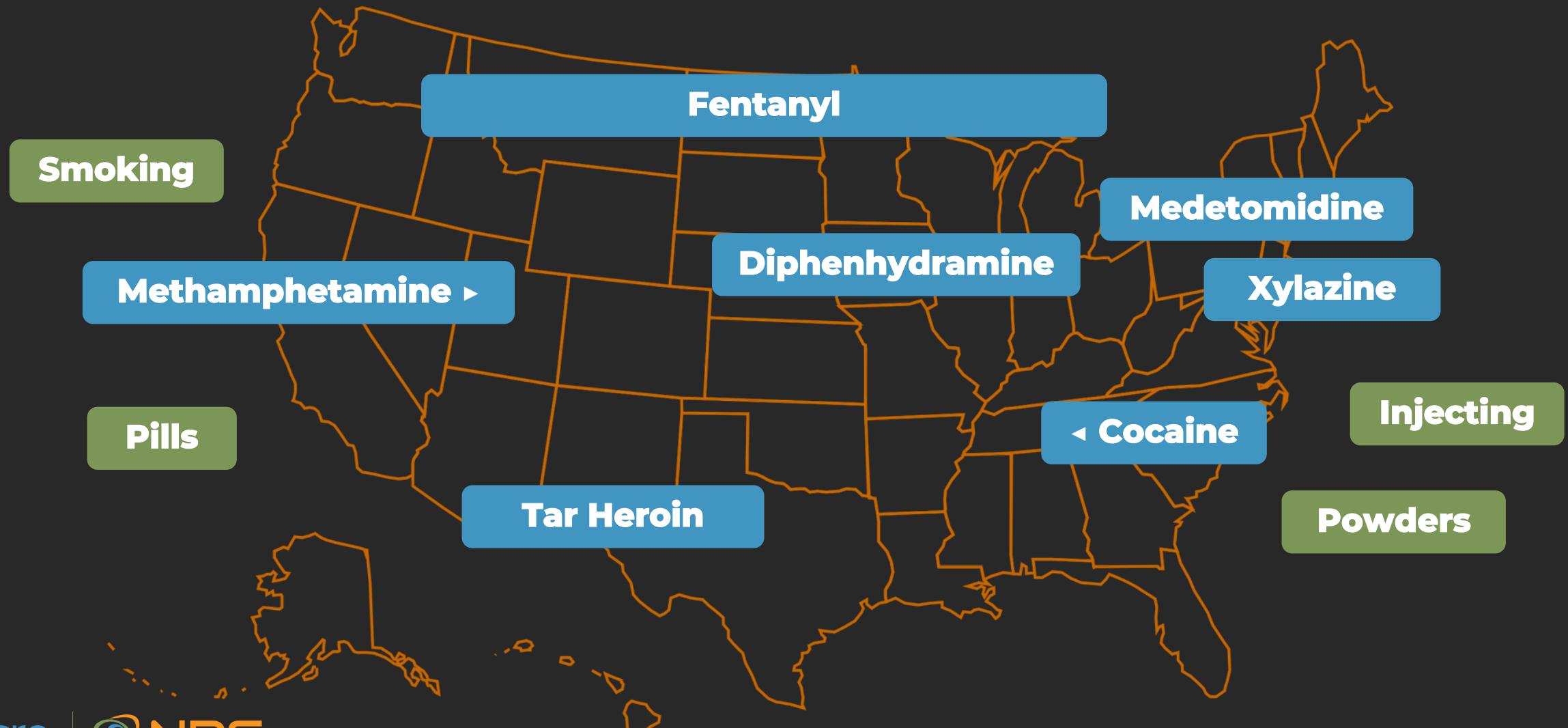
STREET DRUG SUPPLY

SMOKE SHOPS

ONLINE MARKETPLACES



GEOGRAPHICAL DIVERSITY IN THE U.S.



GEOGRAPHICAL DIVERSITY IN THE U.S.

Benzodiazepines

Cathinones

Nitazenes

SCRAs

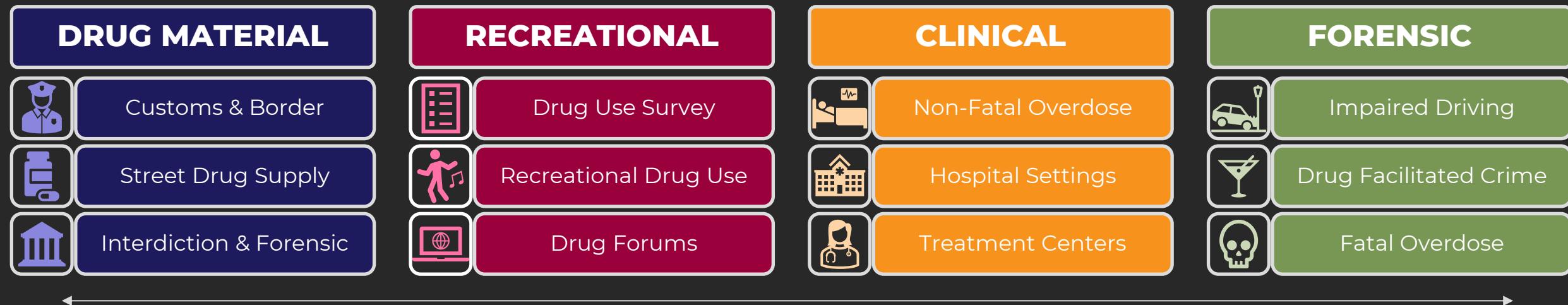




SOLUTION & APPROACH

CFSRE'S NPS DISCOVERY PROGRAM

- Launched in 2018, **NPS Discovery** is an **open-access drug early warning system** operating in the United States and housed at the Center for Forensic Science Research & Education (CFSRE)
 - Primary focus on **analytically confirmed** detections of NPS and other substances (when possible)
- Maintain extensive **collaborations and partnerships** with vast variety of public health and safety organizations (federal, state, and local) within North America and around the world



OPEN-ACCESS DRUG EARLY WARNING SYSTEM



Surveillance & Monitoring

- Fatal Overdoses
- Non-Fatal Overdoses
- Recreational Drug Use
- Impaired Driving
- Local Drug Seizures
- Customs Interdiction



Outbreak Testing

- Emergent Harms & Overdose
- Rapid Turnaround
- Drug Materials
- Biological Specimens
- Public Health Interpretation



Drug Checking

- Public Health
- Harm Reduction
- Point-of-Use
- Market Analysis
- All Types of Drug Materials
- Use Information
- Survey Responses



Test Purchases

- Smoke Shops, Gas Stations, & Corner Stores
- Recreational Supplies
- Gray Market Websites
- The Dark Web



Dissemination

- New Drug Monographs
- Trend Reports
- Public Alerts
- Year In Review
- Drug Checking Reports
- Clinical Reports
- Scope Recs.
- NPS Naming Guides



Resources

- Open-Access Web Repository
- *Forensically Relevant Drugs Database*
- Drug Checking Database
- Analytical Spectral Library
- Expert Review & Interpretation

OPEN-ACCESS DRUG EARLY WARNING SYSTEM

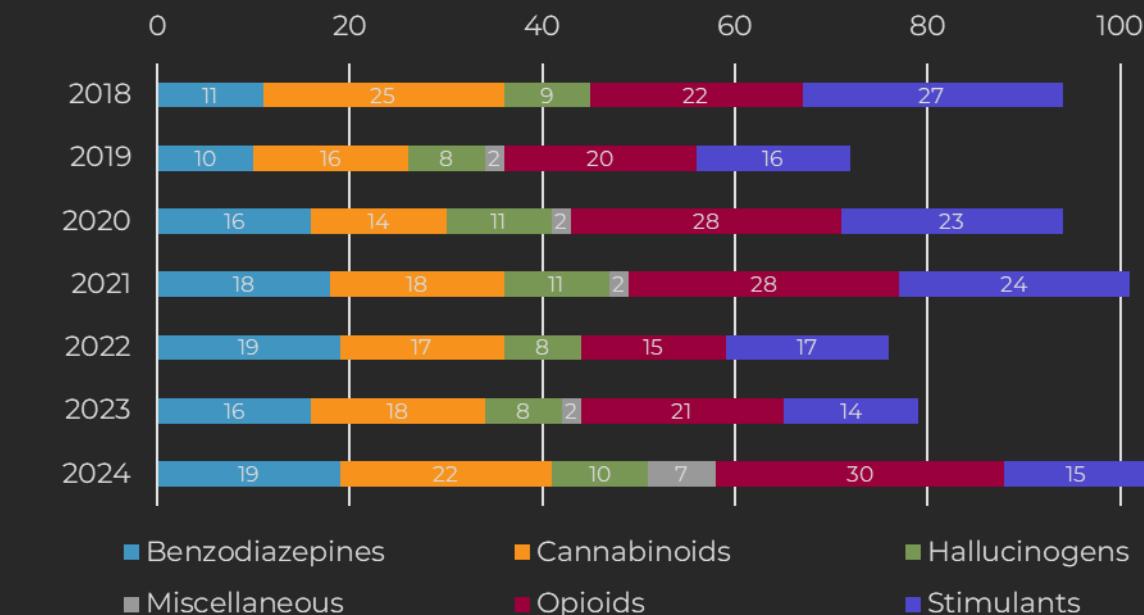
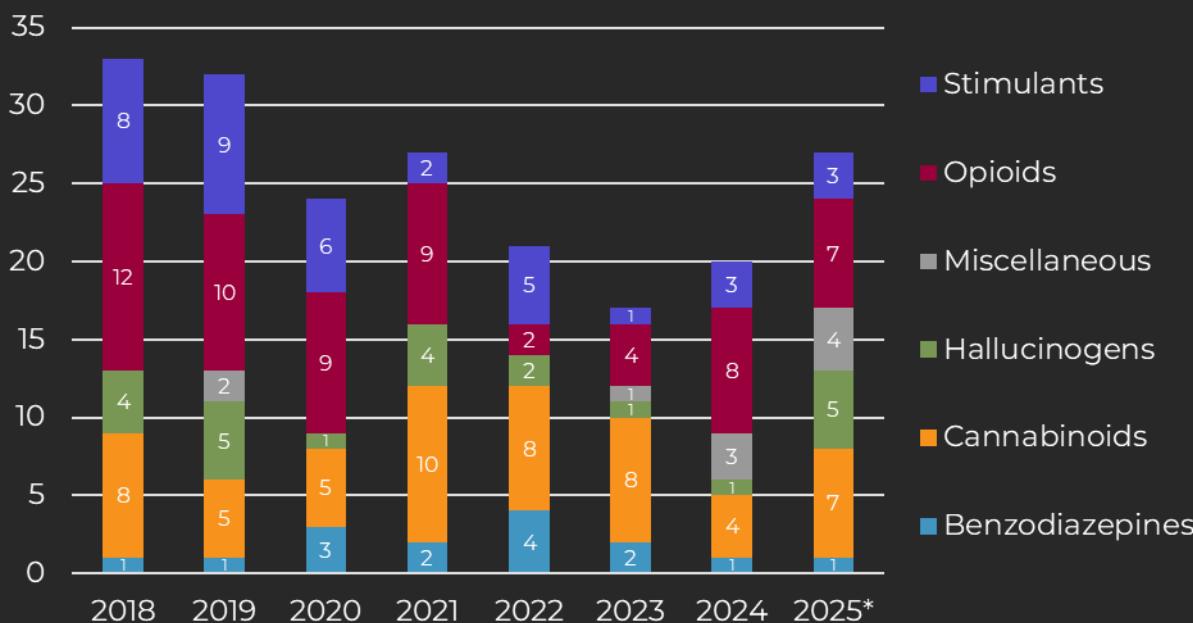




RESULTS & IMPACT

NPS DISCOVERIES

- Our program has reported **201+** newly discovered NPS in the U.S. (**27+** in 2025)
 - **NPS opioids** remain the largest subclass, followed by **cannabinoids** and **stimulants**
- In total, our program has **identified 296+** NPS in the U.S. (**103** in 2024)
 - **NPS opioids, stimulants, and cannabinoids** represent the largest subclasses



NEW NPS DETECTED & REPORTED IN 2025

	N-Desethyl Protonitazene		7-Hydroxy Mitragynine		Spirochlorphine		Mitragynine Pseudoindoxyl
	Dicloqualone		2C-B-FLY		THCP		Dihydro-7-Hydroxy Mitragynine
	4F-MBZP		N-Pyrrolidino Metodesnitazene		Tetramethylfentanyl		Etonitazene
	HHCH		CUMYL-INACA		3C-P		AMB-4en-PINACA
	AB-MDMSBA		Dipropyltryptamine (DPT)		Deoxymethoxetamine		MMB-PICA
	Alpha-PiHpP		N-Pyrrolidino Ethylene Isotonitazene		Deschloroketamine		5,6-Dichloro Brorphine
	4F-Alpha-PHP		Ethylbromazolam		Despentyl-UR-144	  	Forthcoming: DPP-26, Methidone, Avizafone, Methyl-K, PiPTentadol, LSM-75, Pynazolam, 2Me-PiHP, +++

NPS and related emerging drugs continue to appear at steady or increasing rates in the United States

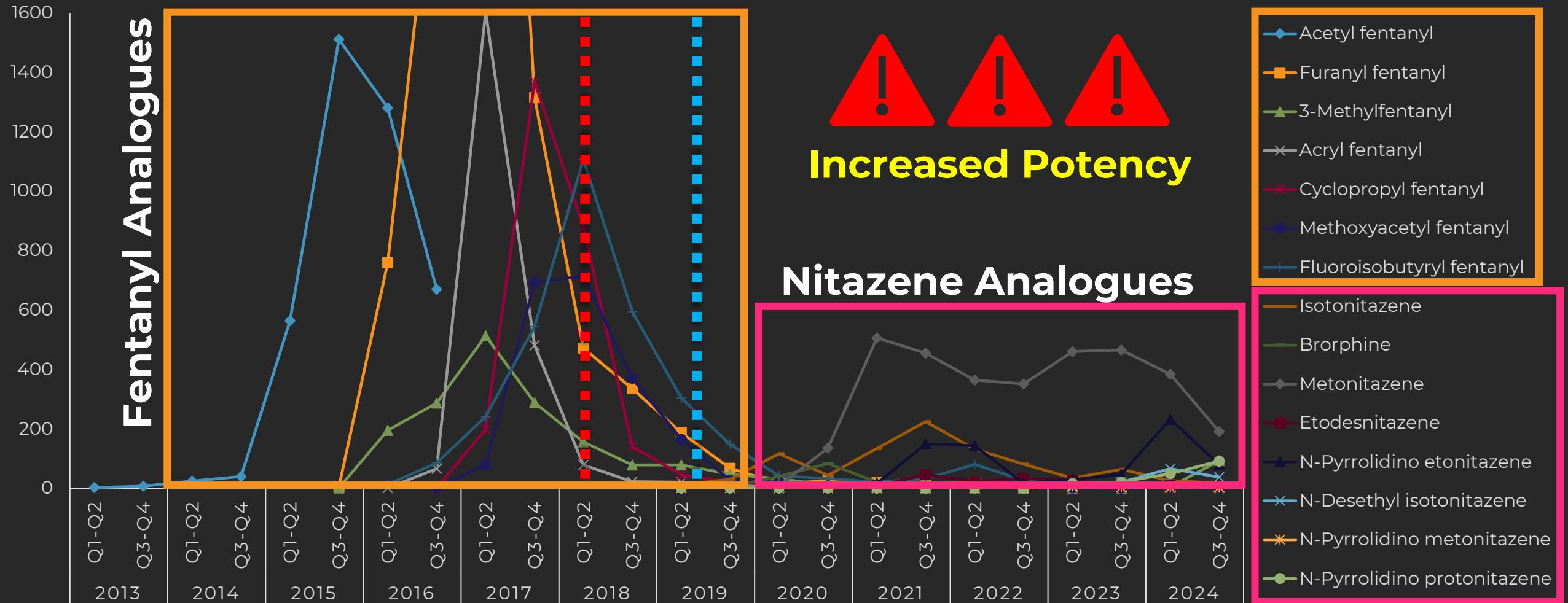
NPS OPIOIDS

FRS Scheduling in U.S.

February 6, 2018

FRS Scheduling in China

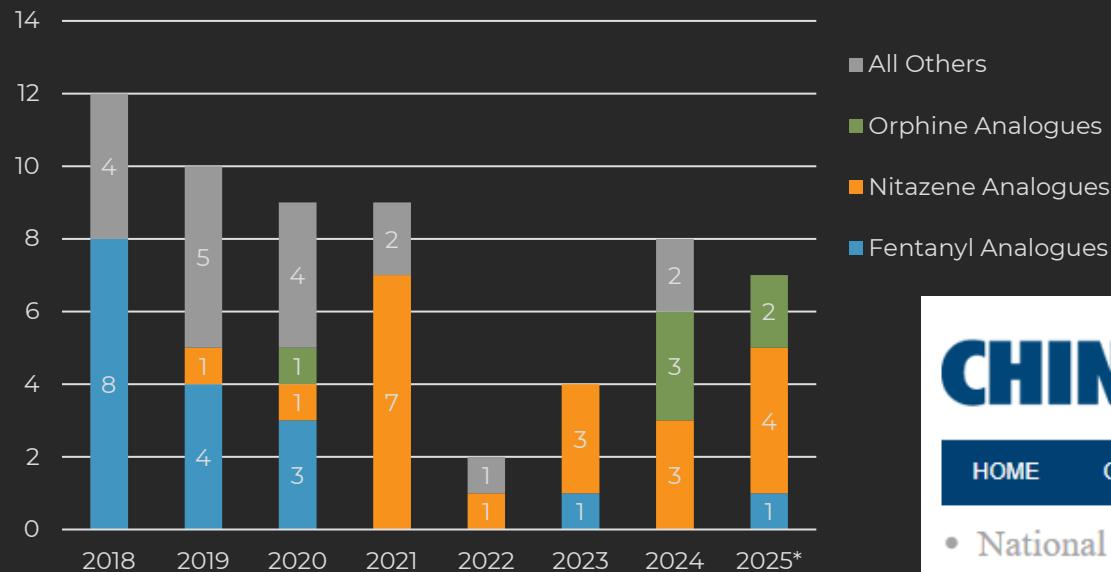
May 1, 2019



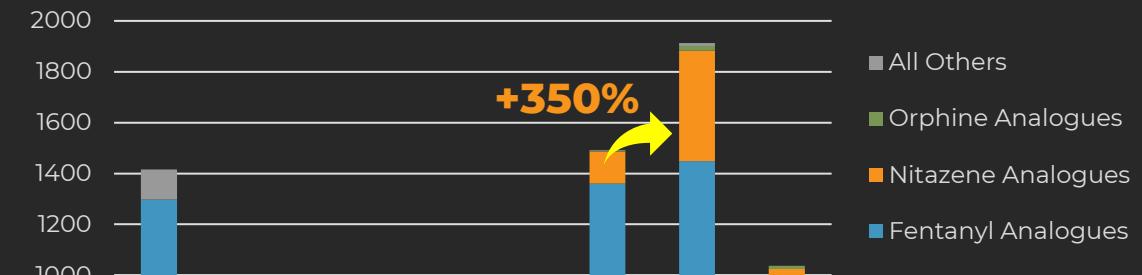
NPS OPIOIDS

- North America has experienced **continual shifts** amongst its **novel synthetic opioid (NSO)** market, often influenced by national and international efforts to **ban or illegalize** specific NSOs.

NEW NSOs DETECTED



CUMULATIVE NSO DETECTIONS



CHINADAILY 中国日报网 .com.cn

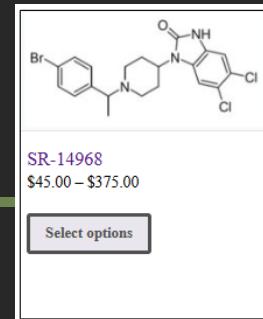
Global Edition
Nov 19, 2025

HOME OPINION VIDEO WORLD CHINA TECHNOLOGY BUSINESS CULTURE TRAVEL

- National Affairs

China clamps down on nitazene-related substances

5,6-DICHLORO BRORPHINE (SR-14968)



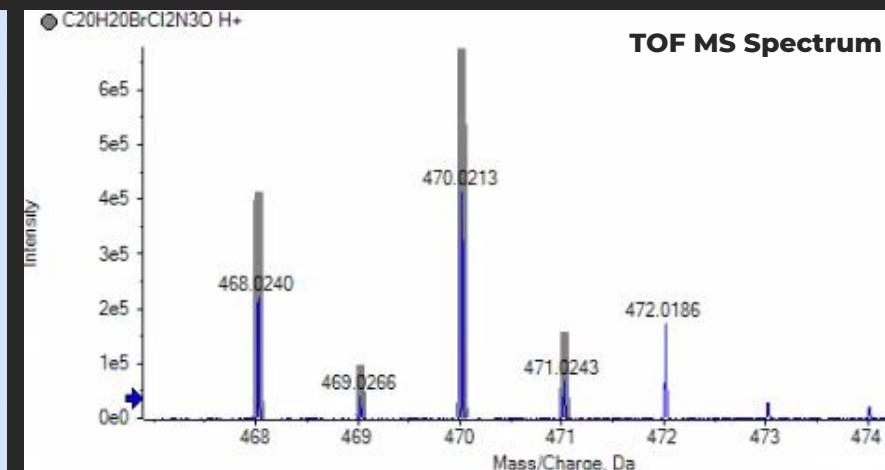
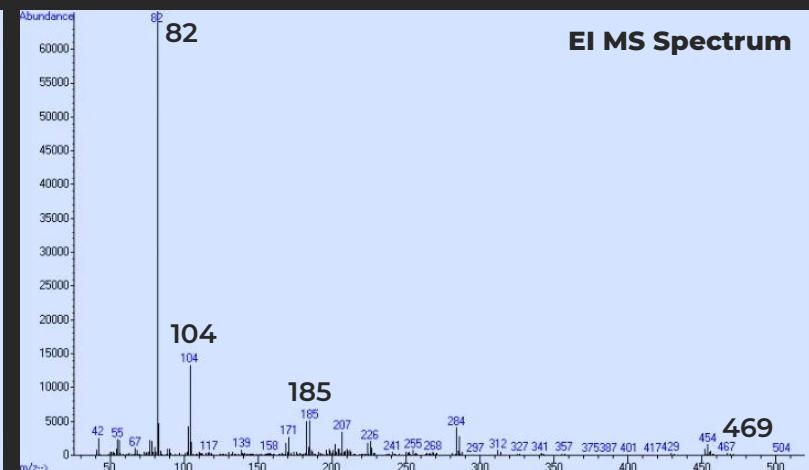
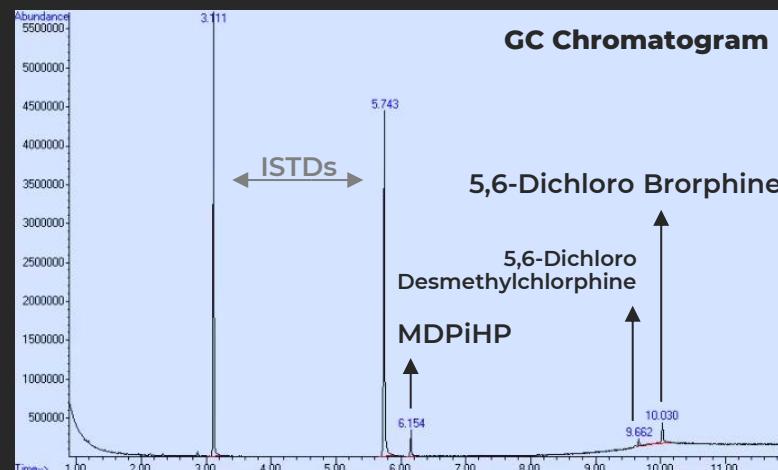
- Began appearing on gray market sites after nitazene analogue ban (China)

- Two samples tested positive:**

- November 5th – Received through drug checking (“unknown white powder”)
- November 17th – Received test purchase



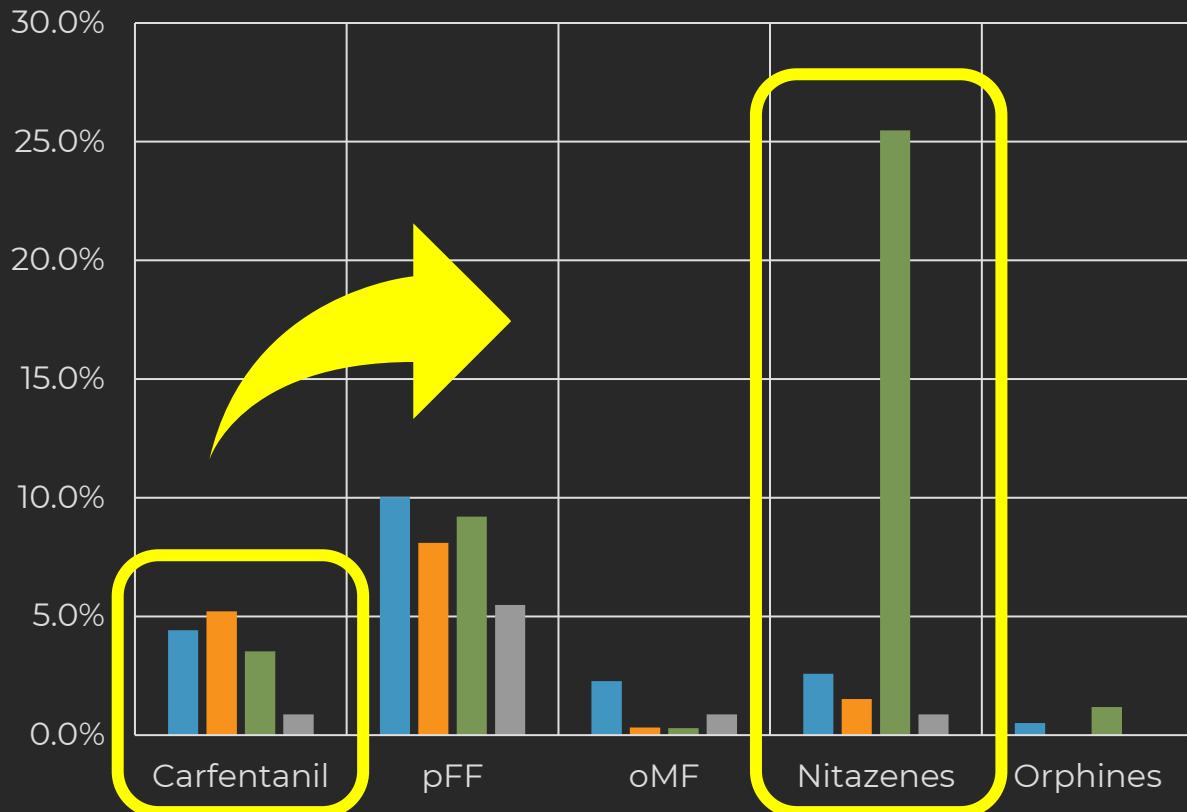
- Analytical Data (Drug Checking):**



NITAZENES & CARFENTANIL

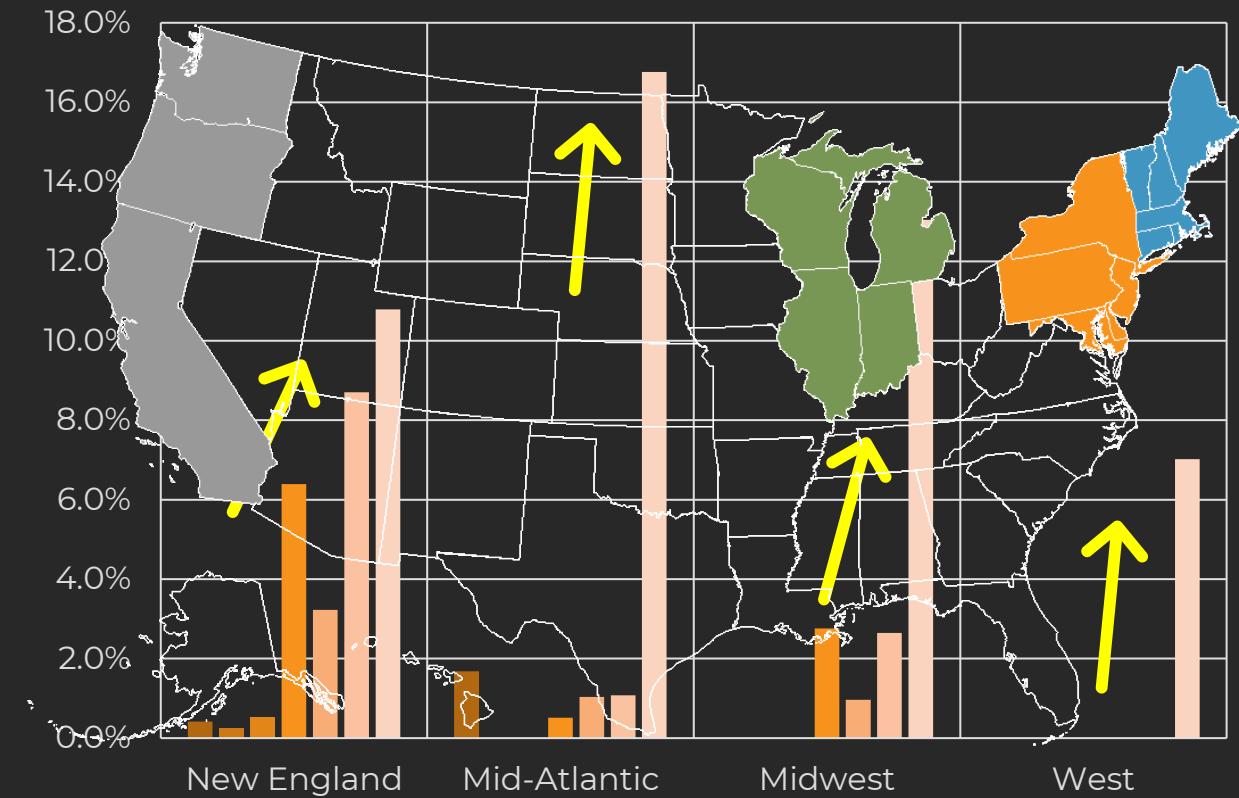
NPS Opioids

■ New England ■ Mid-Atlantic ■ Midwest ■ West



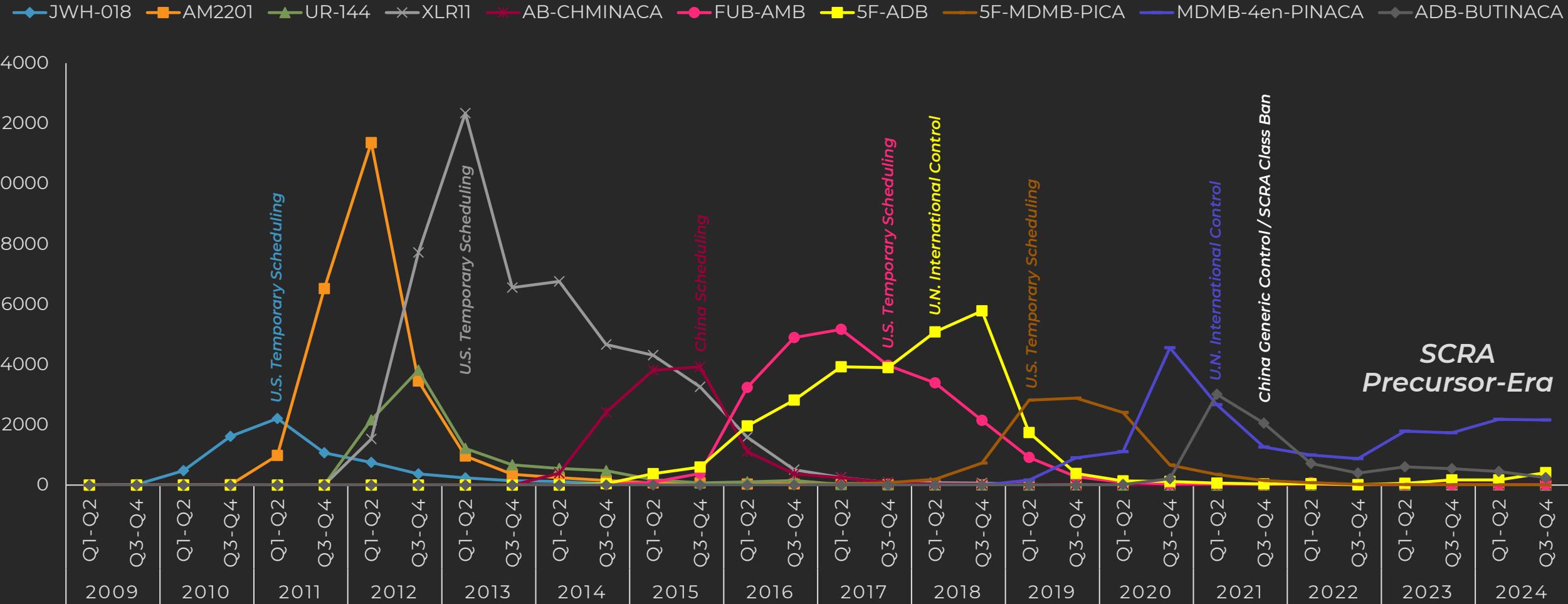
Carfentanil

■ 2024 Q1 ■ 2024 Q2 ■ 2024 Q3 ■ 2024 Q4 ■ 2025 Q1 ■ 2025 Q2 ■ 2025 Q3*



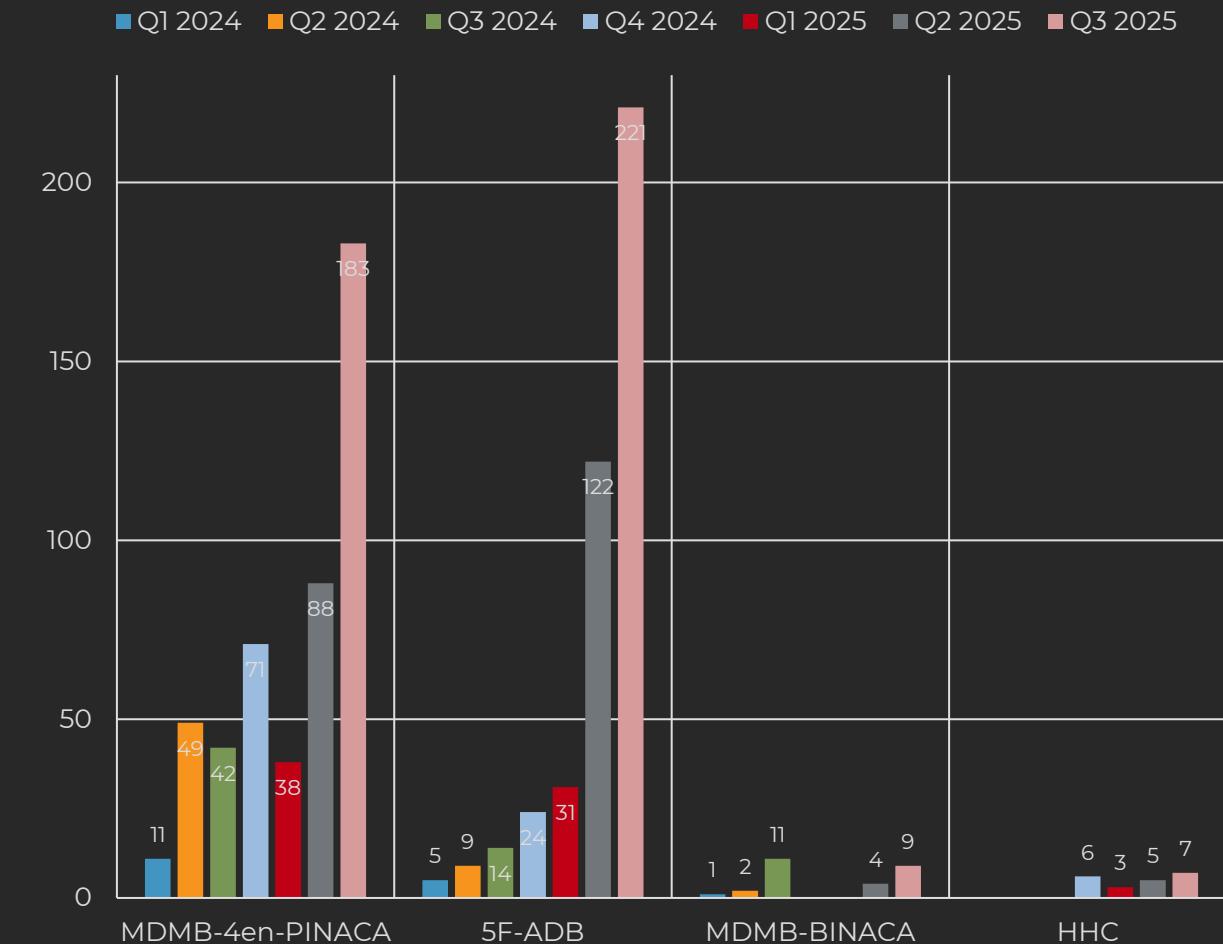
The North American opioid crisis continues – fueled by fentanyl but exacerbated by potent novel synthetic opioids

SYNTHETIC CANNABINOID



JAIL & PRISON DEATHS INVOLVING SYN. CANN.

- **Increased number of deaths involving synthetic cannabinoids**
 - Fueled by use of precursors and (seemingly) domestic production
- **Cases analyzed in:**
 - 2023 = 7
 - 2024 = 30
 - 2025 (to date) = 40+
- **Able to provide answers for challenging or underdetermined death investigation cases**



The synthetic cannabinoid market is rebounding – contributing to increased jail and prison deaths

MISCELLANEOUS

▪ Plant-Based Substances

- Kratom alkaloids
- Semi-synthetic cannabinoids
- Kava alkaloids

▪ Opioid Adulterants

- Medetomidine
- Etomidate
- Local Anesthetics



▪ Edibles & Synthetics

- Psilocin & 4-AcO-DMT
- Muscimol
- Blue Lotus

Muscimol.HCL

Item Code: LF-57

Write a review

USD \$150.00 \$299.99 You Save: 50%

Muscimol (also known as agarin or pantherine) is one of the principal psychoactive constituents of Amanita muscaria and related species of mushroom. Muscimol is a potent and selective orthosteric agonist for the GABA_A receptor and displays sedative-hypnotic, depressant and hallucinogenic psychoactivity. This colorless or white solid is classified as an isoxazole. .

Muscimol went under clinical trial phase I for epilepsy, but the trial was discontinued... .

This product is intended for laboratory research purposes only and are not to be used for any other purposes. .

WEIGHT	1g	2g	5g	10g
PRICE	\$150.00 (per gram)	\$120.00 (per gram)	\$80.00 (per gram)	\$70.00 (per gram)



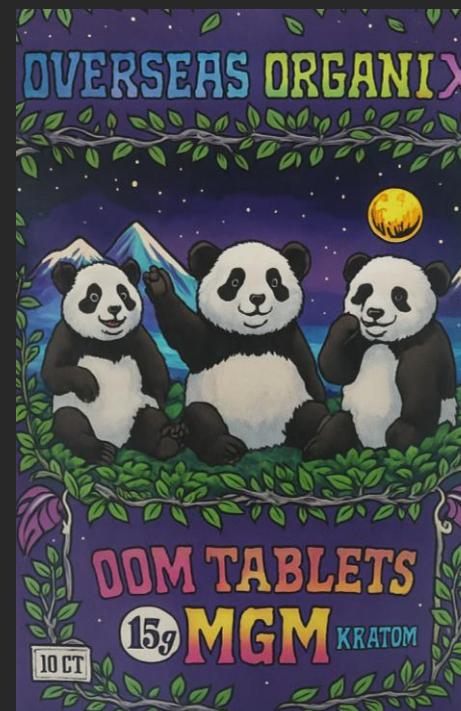
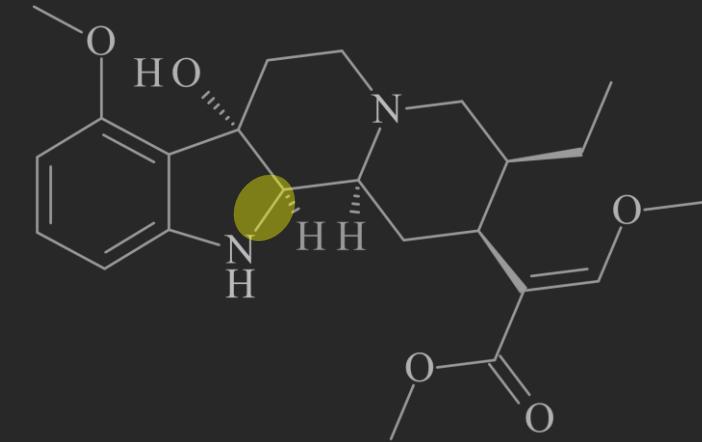
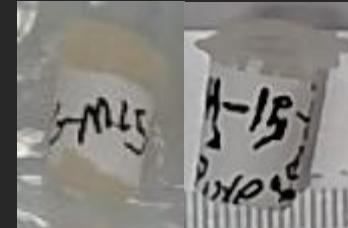
▪ Other Synthetic Drugs

- Dihydro-7-Hydroxy Mitragynine
- Tianeptine
- Phenibut
- Nootropics



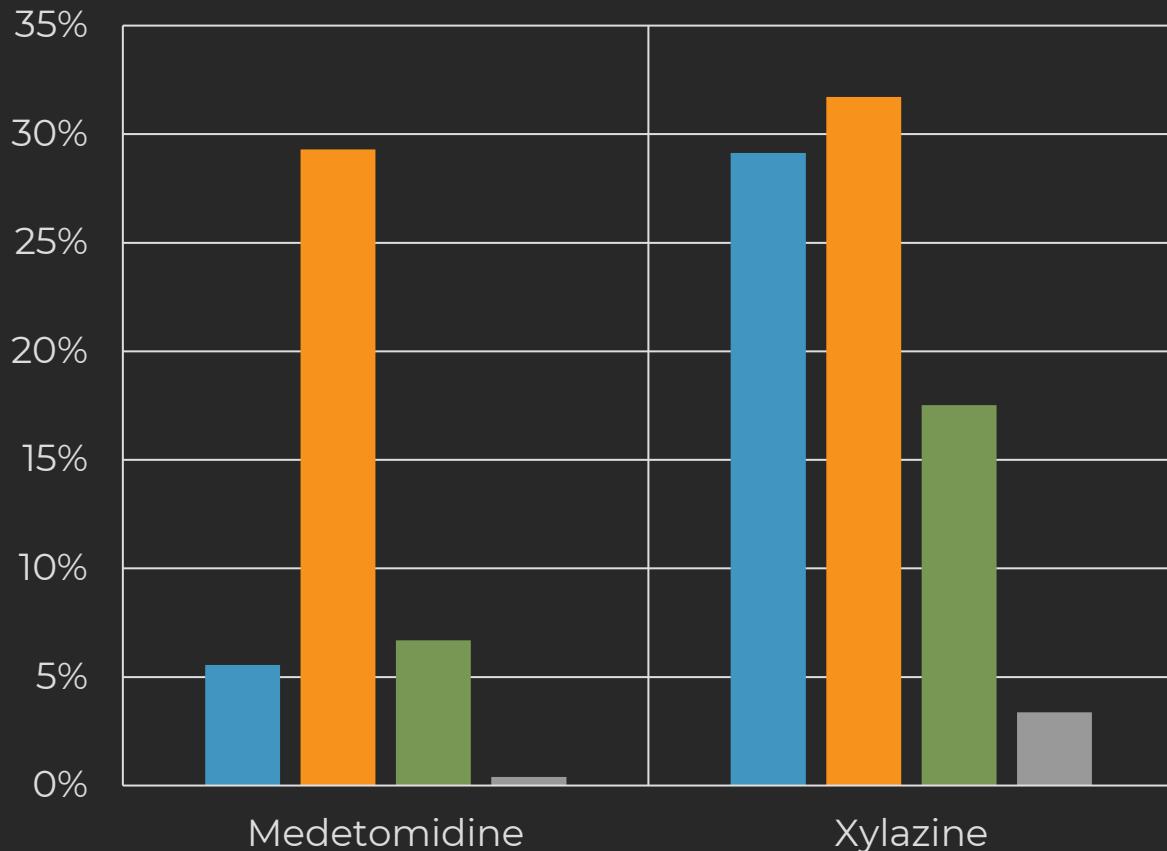
DIHYDRO-7OH MITRAGYNINE (MGM-15)

- Began hearing about “MGM-15” in August 2025
- **Two samples (drug checking):**
 - September 2nd – Plastic container labeled "MGM-15 RitPure"
 - September 2nd – Plastic container labeled "MG-M15"
- **Analytical Challenges:**
 - GC-MS: Conversion to mitragynine
 - LC-QTOF-MS: DH-7OH vs. 7OH M+2
- **First Fatal Intoxication:**
 - September 3rd, 2025 → New Jersey
 - History: Purchasing research chemicals
 - Results: DH-7OH (2,900 ng/mL), kratom, benzos

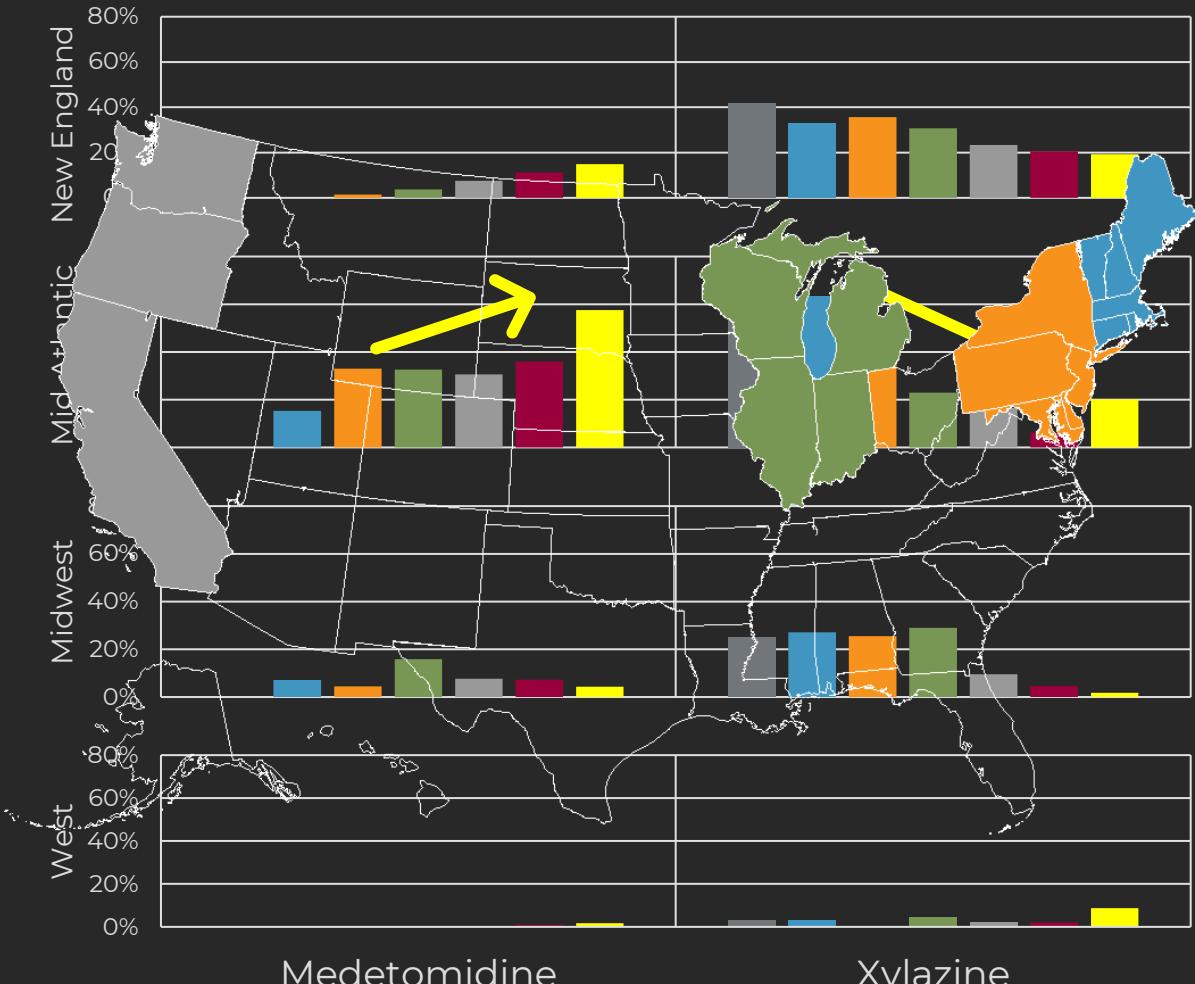


MEDETOMIDINE – TRENDS

■ New England ■ Mid-Atlantic ■ Midwest ■ West



■ 2024 Q1 ■ 2024 Q2 ■ 2024 Q3 ■ 2024 Q4 ■ 2025 Q1 ■ 2025 Q2 ■ 2025 Q3*



MEDETOMIDINE – UNDERSTANDING ITS IMPACT

U.S. Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 74 / No. 15
May 1, 2025

Overdoses Involving Medetomidine Mixed with Opioids — Chicago, Illinois, May 2024

Amy Nham, PharmD^{1,2,*}; John N. Le, PharmD^{1,3,*}; Shawn A. Thomas, PhD^{1,4}; Kimberly Grossick, MD^{1,2}; Emily N. Usery, PhD⁵; Jean Y. Ko, PhD⁵; Jennifer M. Sestina, PhD^{1,2}; Michael J. Johnson, PhD^{1,2}; Michael J. McManus, PhD^{1,2}; Michael A. Konecky, MPH⁶; Daferne Nolando Magana, MBA, MPH⁷; Lavia Verhulst-McNamee⁸; Michael Wohl, MD⁹; Taylor Wood¹⁰; And Adams, MPH¹¹; Alan Konecky, PhD¹²; Jordan Trecki, PhD¹⁰; Roni Ellman¹¹; Roy Gestra, PhD¹³; Pavan Arunkumar, MD¹²; Mojdeh Mir, MS, MPH¹²; Leslie M. Wier, PhD¹³; Emma Betancourt, MPH¹⁴; Kathleen Montry¹⁴; Jhoanna Galmatino, MSN¹⁵; Angie Pujas, MS, MBA¹⁶; Rachael Fitzgerald, MD¹⁷; Mian Hua, MD, PhD¹⁸

Abstract

Medetomidine, a nonopiod sedative not approved for use in humans, has periodically been detected in illegally manufactured opioids across North America since 2022. On May 11, 2024, the Chicago Department of Public Health (CDPH) and the Illinois Department of Public Health (IDPH) were alerted by the Overdose Detection Mapping Application Program¹ that 50 emergency medical services (EMS) responses for suspected opioid-involved overdoses occurred that day, a number more than two standard deviations above the 2023 daily average (27.4) in Chicago. Events were mostly clustered on Chicago's West Side. Area hospitals and the Illinois Poison Center (IPC) also notified CDPH of several patients observed with bradycardia and suspected opioid-involved overdose symptoms not fully reversed by naloxone during the weekend of May 11.

*The program, developed by the Office of National Drug Control Policy; links first responders and records management systems to a mapping tool to track overdoses and stimulate real-time response and strategic analysis across jurisdictions. [ODMAP](#)

INSIDE

266 Notes from the Field: Suspected Medetomidine Withdrawal Syndrome Among Fentanyl-Exposed Patients — Philadelphia, Pennsylvania, September 2024–January 2025

269 Notes from the Field: Severe Medetomidine Withdrawal Syndrome in Patients Using Illegally Manufactured Opioids — Pittsburgh, Pennsylvania, October 2024–March 2025

Continuing Education examination available at https://www.cdc.gov/mmwr/mmwr_continuingEducation.html

**U.S. DEPARTMENT OF
HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE
CONTROL AND PREVENTION**

CLINICAL TOXICOLOGY
<https://doi.org/10.1089/15563650.2025.2500601>

Taylor & Francis
Taylor & Francis Group

Check for updates

SHORT COMMUNICATION

Clinical characteristics of patients exposed to medetomidine in the illicit opioid drug supply in Philadelphia – a case series

Lauren Murphy^{a,b}  Alex Krutolski^{c,d}  Brendan Hart^e, Matthew Wong^f  Rebeccah Overton^g and Rita McKeever^{a,b} 

^aDepartment of Emergency Medicine, Division of Medical Toxicology, Lewis Katz School of Medicine, Temple University Hospital, Philadelphia, PA, USA; ^bThe Poison Control Center at Children's Hospital of Philadelphia, Philadelphia, PA, USA; ^cCenter for Forensic Science Research and Education (CFSE) at the Robert P. Gavitt Foundation, Philadelphia, PA, USA; ^dCollege of Life Sciences, Jefferson University, Philadelphia, PA, USA; ^eDepartment of Emergency Medicine, Division of Addiction Medicine, Lewis Katz School of Medicine, Temple University Hospital, Philadelphia, PA, USA; ^fDepartment of Emergency Medicine, Lewis Katz School of Medicine, Temple University Hospital, Philadelphia, PA, USA; ^gLevin School of Medicine, Temple University Hospital, Philadelphia, PA, USA

ABSTRACT

Introduction: Medetomidine is an emerging adulterant in the illicit opioid drug supply with minimal data regarding clinical effects or blood concentrations after uncontrolled exposures in humans.

Methods: A retrospective case series was performed of patients presenting to the emergency department after illicit opioid overdose with confirmed exposure to medetomidine. Patient outcomes and clinical data were collected from the hospital's electronic medical records.

Results: Eleven patients were included in the series. Whole blood medetomidine concentrations ranged from 1.2 µg/L to 16 µg/L. Patients had sinus bradycardia for a median of 34h, and hypotension was not common. Six cases were admitted to the hospital, one to the intensive care unit, and all survived. All cases tested positive for fentanyl and xylazine, and other adulterants were common.

Discussion: Sinus bradycardia was the most salient finding of patients with confirmed medetomidine exposure from the illicit opioid supply. Bradycardia resolved within the expected first half-lives determined by drug half-lives, and no patient required atropine, electrical pacing, or vasopressors for hypotension.

Conclusion: In this retrospective case series, patients who tested positive for medetomidine had sinus bradycardia and required prolonged monitoring.

ARTICLE HISTORY
Received 4 March 2025
Revised 14 April 2025
Accepted 2 April 2025

KEYWORDS
Opioid overdose; drug toxicity; levomedetomidine; medetomidine; substance-related disorders

Introduction

Medetomidine was first detected as an adulterant in blood samples taken from suspected illicit opioid overdose patients in Missouri, Colorado, and Pennsylvania in August 2022 and rapidly proliferated in 2024 [1,2]. Medetomidine is the racemic mixture of the more familiar sedative demedetomidine and its enantiomer, levomedetomidine. It is an α_2 -adrenergic receptor agonist used in veterinary medicine for sedation and anesthesia but is not approved for human use [3]. An alert issued by the Philadelphia Department of Public Health in May 2024 indicated medetomidine had been detected in the illicit opioid supply stating a concern that patients may be at risk for bradycardia, hypotension, and prolonged sedation [4].

The purpose of this paper is to describe the clinical characteristics of patients who tested positive for medetomidine after presenting to the emergency department after illicit opioid overdose.

As part of ongoing public health surveillance, de-identified, waste blood samples from patients presenting with atypical features after presumed opioid overdose within a single university health system are sent to a local forensic laboratory for testing on a continuous basis. Discarded blood samples are analyzed at the Center for Forensic Science Research and Education (Horsham, PA). Samples are first analyzed using non-targeted acquisition by liquid-chromatography quadrupole time-of-flight mass spectrometry against an in-house library database of more than 1,200 targets. Samples testing positive for substances of interest (e.g., fentanyl, xylazine, and novel agents) are secondarily analyzed by liquid chromatography tandem quadrupole mass spectrometry to determine concentration of drug.

From April 29, 2024, to May 12, 2024, patients presenting to the emergency department with opioid overdose and bradycardia of 50 beats/min or less for at least one measurement,

CONTACT Lauren Murphy  lm8@virginia.edu  Department of Emergency Medicine, Division of Medical Toxicology, Lewis Katz School of Medicine, Temple University Hospital, Philadelphia, PA, USA.
© 2025 Informa UK Limited, trading as Taylor & Francis Group

Withdrawal Cases Soar in Hospitals, While Skin Damage Wanes

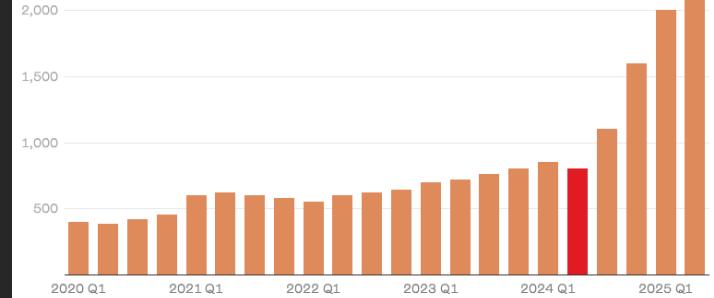
Over the last year, as medetomidine quickly replaced xylazine, also known as "trang," in Philly's street drug supply, emergency rooms saw a stark shift. Cases where drug-addicted patients came in with soft-tissue damage — an injury widely linked to xylazine — dropped by more than half. But the number of patients being admitted for severe withdrawal more than tripled in the same period.

ER Visits for Drug-Related Withdrawal

ER Visits for Drug-Related Skin Damage

Medetomidine first detected in city drug supply

The Philadelphia Inquirer



Note: Quarterly totals are rounded estimates based on data obtained through a Right-to-Know request.

Chart: Max Marin/Staff • Source: Philadelphia Department of Public Health

Philadelphia's rapidly changing and increasingly toxic drug supply often acts as a bellwether for other U.S. cities. The city was among the first to see overdose deaths spike after fentanyl, a potent synthetic opioid, emerged last decade, and has spent the last five years trying to respond to xylazine.

New subclasses of NPS are emerging - causing harm and mortality amongst knowing and naïve users



DEATH CASE INVOLVING NPS

DEATH CASE

CASE SYNOPSIS

- **20 y.o. male – college student**
 - History of purchasing drugs online
 - Purchased a variety of substance
 - Sell or distribute amongst friend and community
- **Intended to purchase “quaaludes”**
 - Schedules a time to try with his girlfriend
 - Snorted substance twice
 - Girlfriend decided not to use
 - [Gave some to a friend]
- **Next morning – found unresponsive in bed**



AUTOPSY FINDINGS

- No evidence of injury
- **Severe cerebral (brain) edema**
- **Severe pulmonary (lung) edema**
- Drugs and paraphernalia found at scene
 - History of drug use

CASE #3

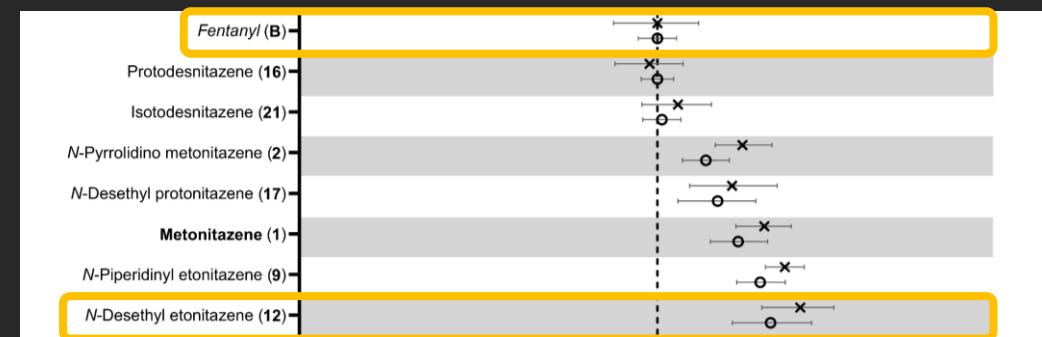
TOXICOLOGY RESULTS

- **Peripheral Blood:**
 - Methamphetamine (<10 ng/mL)
 - Ketamine (50 ng/mL) & Norketamine (43 ng/mL)
 - ***N*-Desethyl Etonitazene (est. ~10 ng/mL)**
 - 2F-2oxo-PCE
- **Urine:**
 - Methamphetamine
 - Ketamine + metabolite
 - ***N*-Desethyl Etonitazene**
 - 2F-2oxo-PCE



DEATH CERTIFICATION

- **Manner of Death:**
 - Accident
- **Cause of Death:**
 - *N*-Desethyl etonitazene and 2F-2oxo-PCE intoxication



doi.org/10.1007/s00204-024-03774-7



CONCLUDING REMARKS

CONCLUDING REMARKS

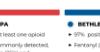
- The U.S. drug market remains **dynamic, geographically diverse**, and **variable over time**
 - **Converging trilogy:** Street drugs, smoke shop drugs, and online drugs
- **NPS** continue to emerge at a **steady rate**; however, major market influences are now common
 - **Opioids:** Fentanyl ► Nitazenes ► Orphine Analogues
 - **Cannabinoids:** MDMB-4en-PINACA, 5F-ADB
 - **Miscellaneous:** Mitragynine alkaloids, medetomidine
- Today, **single-drug intoxications** are rare for NPS in the U.S., especially as **co-occurrence** with other drugs and NPS increase
- **Collaboration, collaboration, collaboration**
 - **Forensic, public health, public safety, medicine, law, & others!**



NPS DISCOVERY REPORTS

WWW.NPSDISCOVERY.ORG

NPS Discovery — New Drug Monograph	
 	JUDICIAL DEPARTMENT 
ADB-5'-Br-PINACA	NPS SUBCLASS Synthetic Cannabinoid
	REPORT DATE May 1, 2023
	SAMPLE RECEIVED March 3, 2023
	SAMPLE TYPE Drug Material
<hr/>	
Preferred Name	ADB-5'-PINACA
Synonyms	ADB-5'-PINACA, ADB-5'-Br-PINACA, 5'-Bromo-N-(carboxymethyl-2,2-dimethylpropyl)-N-pentyl-undecyl-5-carboxamide
Formal Name	5'-Bromo-N-(carboxymethyl-2,2-dimethylpropyl)-N-pentyl-undecyl-5-carboxamide
INChI Key	OU0VJTCMLBILUHFFACOYA N
CAS Number	Not Available
Chemical Formula	C ₂₃ H ₃₉ NO ₃
Molecular Weight	423.55
Molecular Ion [M ⁺]	422
Exact Mass [M+H] ⁺	423.5590

Toxic Fentanil Study Group — Quarterly NPS Report		CLINICAL
PHARAOH	<p>DISCUSSION: The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in New York City and surrounding areas shows excess availability.</p>	
CHIEFSPUR	<p>DISCUSSION: Fentanyl use is still being seen across the country. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Los Angeles, CA shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in New York, NY shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Pittsburgh, PA shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Philadelphia, PA shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Chicago, IL shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Boston, MA shows excess availability.</p>	
DIRECTOR	<p>DISCUSSION: A situation between the fentanyl mapping comprehensive drug testing of retail outlets in New York, NY and the fentanyl mapping comprehensive drug testing of retail outlets in Philadelphia, PA shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Boston, MA shows excess availability.</p>	
MAPS & MODELS	<p>DISCUSSION: Fentanyl availability across the country is still being seen. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in New York, NY shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Philadelphia, PA shows excess availability. Our findings point to a need for continued monitoring and reporting of fentanyl availability across the country.</p>	
TOXICOLOGY TESTING	<p>DISCUSSION: Fentanyl was performed, followed by benzodiazepine, amphetamine, barbiturate, and cocaine. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in New York, NY shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Philadelphia, PA shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Boston, MA shows excess availability.</p>	
PITTSBURGH, PA	<ul style="list-style-type: none"> • 70% positive for at least one opioid • Fentanyl (20%) as most commonly detected, followed by Heroin (10%) and tramadol (2%) • Opioid and stimulant use observed (40%) • NPS (e-Fentanyl) (2%) • Cetirizine 	
RETHMELSON, PA	<ul style="list-style-type: none"> • 95% positive for at least one opioid • Fentanyl (20%) as most commonly detected, followed by Heroin (10%) and tramadol (2%) • Opioid and stimulant use observed (40%) • NPS (e-Fentanyl) (2%) • Cetirizine 	
NEW YORK, NY	<ul style="list-style-type: none"> • 85% positive for at least one opioid • Fentanyl (20%) as most commonly detected, followed by Heroin (10%) and tramadol (2%) • Opioid and stimulant use observed (40%) • Opioid and stimulant use observed (40%) • NPS (e-Fentanyl) (2%) • Heroin • NPS (e-Fentanyl) (2%) • Benzodiazepine • Stimulants • Heroin • NPS (e-Fentanyl) (2%) • Benzodiazepine • Stimulants 	
NEWARK, NJ	<ul style="list-style-type: none"> • 85% positive for at least one opioid • Fentanyl (20%) as most commonly detected, followed by Heroin (10%) and tramadol (2%) • Opioid and stimulant use observed (40%) • Opioid and stimulant use observed (40%) • NPS (e-Fentanyl) (2%) • Cetirizine 	
LOS ANGELES, CA	<ul style="list-style-type: none"> • 85% positive for at least one opioid • Fentanyl (20%) as most commonly detected, followed by Heroin (10%) and tramadol (2%) • Opioid and stimulant use observed (40%) • Opioid and stimulant use observed (40%) • NPS (e-Fentanyl) (2%) • Benzodiazepine 	
BETHLEHEM, PA	<ul style="list-style-type: none"> • 95% positive for at least one opioid • Fentanyl (20%) as most commonly detected, followed by Heroin (10%) and tramadol (2%) • Opioid and stimulant use observed (40%) • NPS (e-Fentanyl) (2%) • Cetirizine 	
ALBANY, NY	<ul style="list-style-type: none"> • 95% positive for at least one opioid • Fentanyl (20%) as most commonly detected, followed by Heroin (10%) and tramadol (2%) • Opioid and stimulant use observed (40%) • NPS (e-Fentanyl) (2%) • Benzodiazepine • Stimulants • Heroin • NPS (e-Fentanyl) (2%) • Benzodiazepine • Stimulants 	
TOXIC	<p>DISCUSSION: Fentanyl was performed, followed by benzodiazepine, amphetamine, barbiturate, and cocaine. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in New York, NY shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Philadelphia, PA shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Boston, MA shows excess availability.</p>	
GRAND RAPIDS, MI	<ul style="list-style-type: none"> • 95% positive for at least one opioid • Fentanyl (20%) as most commonly detected, followed by tramadol (10%) and Heroin (10%) • Opioid and stimulant use observed (40%) • NPS (e-Fentanyl) (2%) • Cetirizine 	
ACMT	<p>DISCUSSION: Fentanyl was performed, followed by benzodiazepine, amphetamine, barbiturate, and cocaine. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in New York, NY shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Philadelphia, PA shows excess availability. The latest phase one fentanyl mapping comprehensive drug testing of retail outlets in Boston, MA shows excess availability.</p>	

The graphic is a composite of several charts and text sections. At the top left is the 'cfsre' logo. To its right is the 'NPS DISCOVERY' logo. Below these is a large, bold, semi-transparent text 'YEAR IN REVIEW 2022'. To the left of the text is a vertical list of bullet points. Below the text are three horizontal bar charts. The first chart shows 'Number of new NPS' from 2016 to 2022. The second chart shows 'Number of total NPS' from 2016 to 2022. The third chart shows 'Number of total NPS detections' from 2016 to 2022. To the right of the charts is a circular pie chart titled 'Number of total NPS detections by class' with percentages for Opioids (36%), Stimulants (30%), Hallucinogens (20%), Cannabinoids (10%), and Benzodiazepines (4%). Below the charts is a section titled 'In 2022, NPS Discovery discovered more than 5,200 total NPS detections within examined sample populations (Figure 4, a portion of more than 10,000 total NPS detections since our program launched in 2016 (Figure 5)).' At the bottom right is a small 'SCHOLAR' logo.

Program. This report presents descriptive and analytic findings about the emergence and landscape of most psychotropic substances (NPS) in the United States. The data presented here are from the NPS Discovery program, which is a subset of the NPS Monitoring program.

Since 2016, NPS Discovery has reported **137** newly discovered NPS in the United States (Figure 3). **NPS opioids** remain the largest substance (Figure 2). In 2022, NPS Discovery reported the discovery of **21** NPS for the first time.

Figure 3. Number of newly discovered NPS in the United States, 2016–2022.

Figure 2. Number of total NPS in the United States, 2016–2022.

Figure 4. Number of total NPS detections by class.

Since 2016, NPS Discovery has identified **210** NPS in forensic samples (Figure 5). **NPS opioids, stimulants, and cannabinoids** represent the largest substance classes. In 2022, **76** total NPS were detected (Figure 4).

Figure 5. Number of total NPS detections by class.

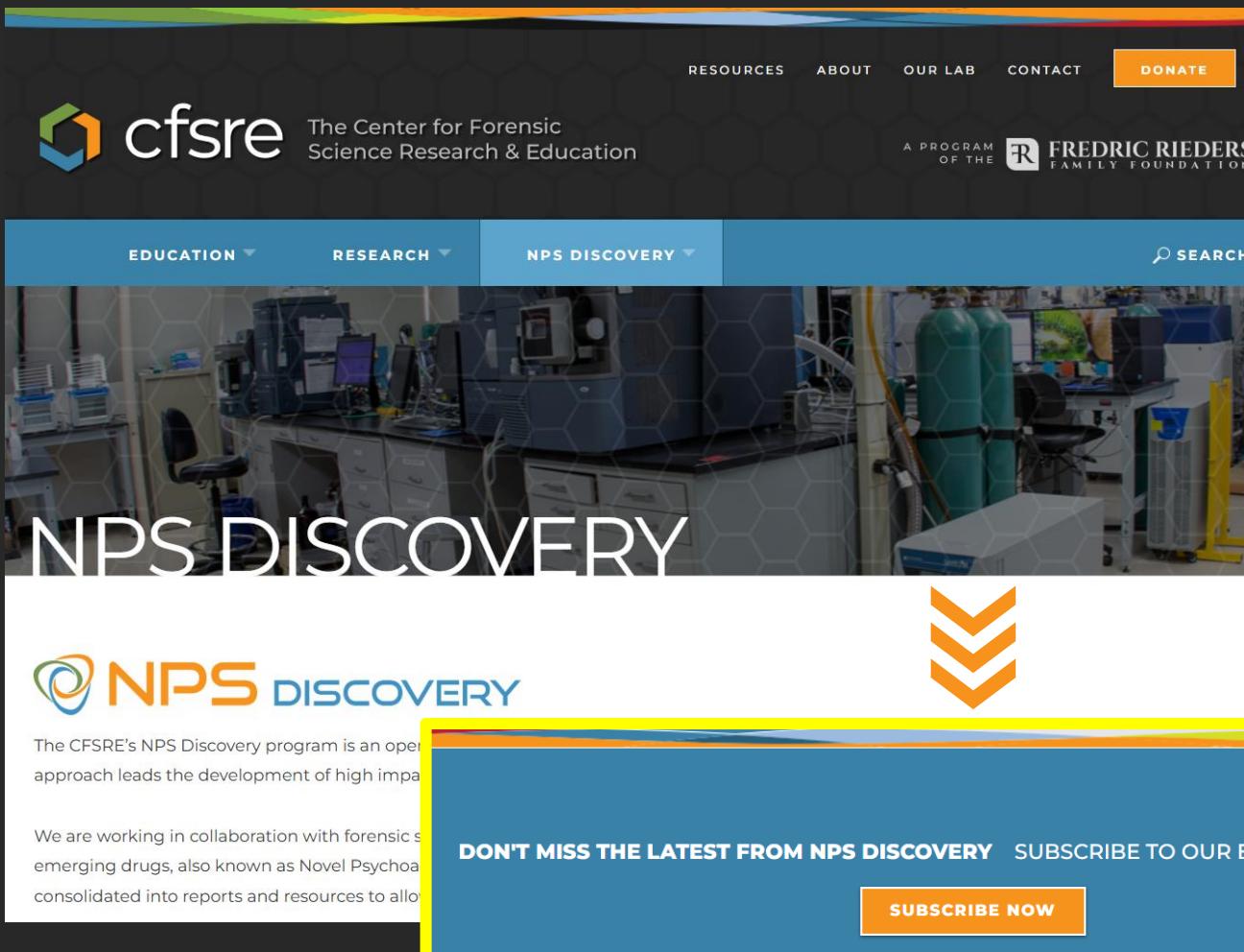
In 2022, NPS Discovery discovered more than **5,200** total NPS detections within examined sample populations (Figure 4, a portion of more than **10,000** total NPS detections since our program launched in 2016 (Figure 5)).

Figure 6. Number of total NPS detections by class.

Figure 7. Number of total NPS detections by class.

Figure 8. Number of total NPS detections by class.

RECEIVE REAL-TIME UPDATES VIA EMAIL



The screenshot shows the CFSRE website with a hexagonal background pattern. At the top, there is a navigation bar with links for RESOURCES, ABOUT, OUR LAB, CONTACT, and a DONATE button. Below the navigation is the CFSRE logo and the text "The Center for Forensic Science Research & Education". To the right, it says "A PROGRAM OF THE FREDRIC RIEDERS FAMILY FOUNDATION". The main content area features a blue header with "EDUCATION", "RESEARCH", and "NPS DISCOVERY" dropdown menus, and a "SEARCH" bar. Below the header is a photograph of a laboratory with various pieces of equipment. Overlaid on the image is the text "NPS DISCOVERY" in large white letters. In the center of the image is a large orange downward-pointing chevron icon. At the bottom, there is a yellow-outlined box containing the text "DON'T MISS THE LATEST FROM NPS DISCOVERY" and "SUBSCRIBE TO OUR E-NEWSLETTER TODAY", with a "SUBSCRIBE NOW" button. A small portion of the text "The CFSRE's NPS Discovery program is an open approach leads the development of high impact" is visible to the left of the yellow box.

What Newsletter would you like to sign up for?

- CFSRE Weekly Newsletter
- NPS Discovery Newsletter



ACKNOWLEDGEMENTS

- **CFSRE Toxicologists & Chemists**

- Barry Logan, Sara Walton, Josh DeBord, Brianna Stang, Max Denn, & many others!

- **NMS Labs**

- Donna Papsun & others

- **Funding Agencies**

- National Institute of Justice (NIJ)
 - CDC, NIH, FDA, etc.

- **Collaborators & Partners**





THANK YOU! QUESTIONS?

Alex J. Krotulski, Ph.D.

Director – Toxicology & Chemistry – CFSRE

Program Manager – NPS Discovery

alex.krotulski@cfsre.org

