

- EMS called for agitated/violent 17 year old male. Tazed by police 5 times. EMS gives him 10 mg midazolam IM. Still agitated. In ED given haloperidol, ketamine, lorazepam, diphenhydramine and phenobarbital. Still agitated. Finally intubated and sedated with propofol and fentanyl.
- What did he take?

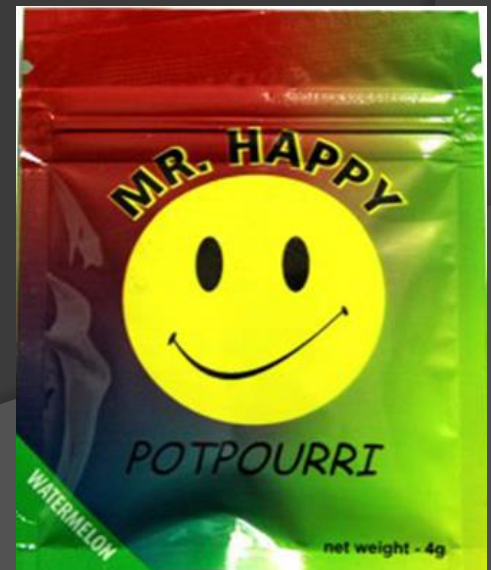


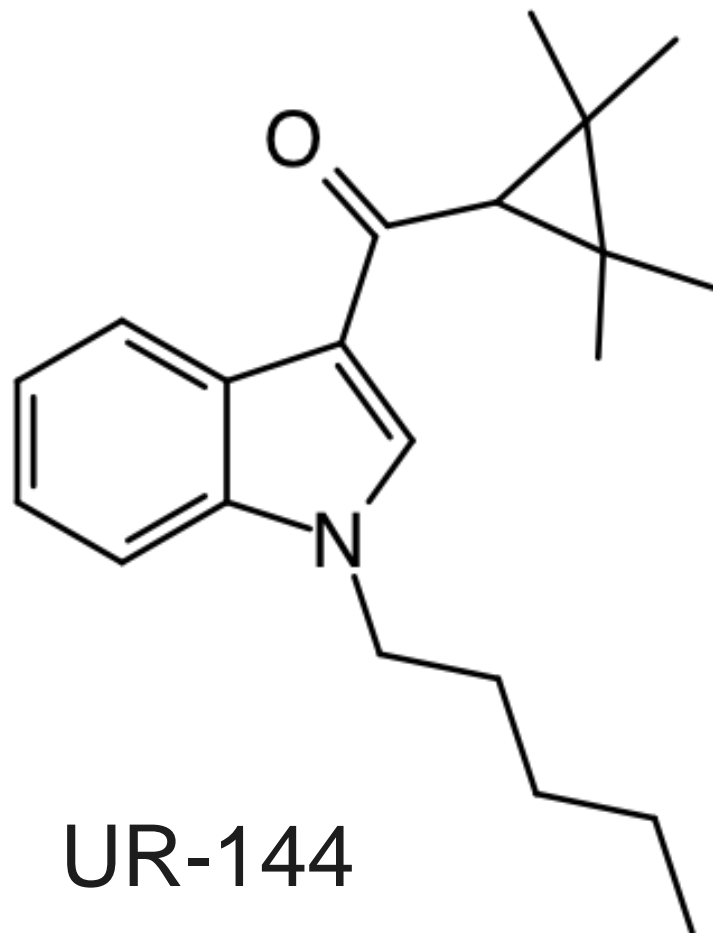
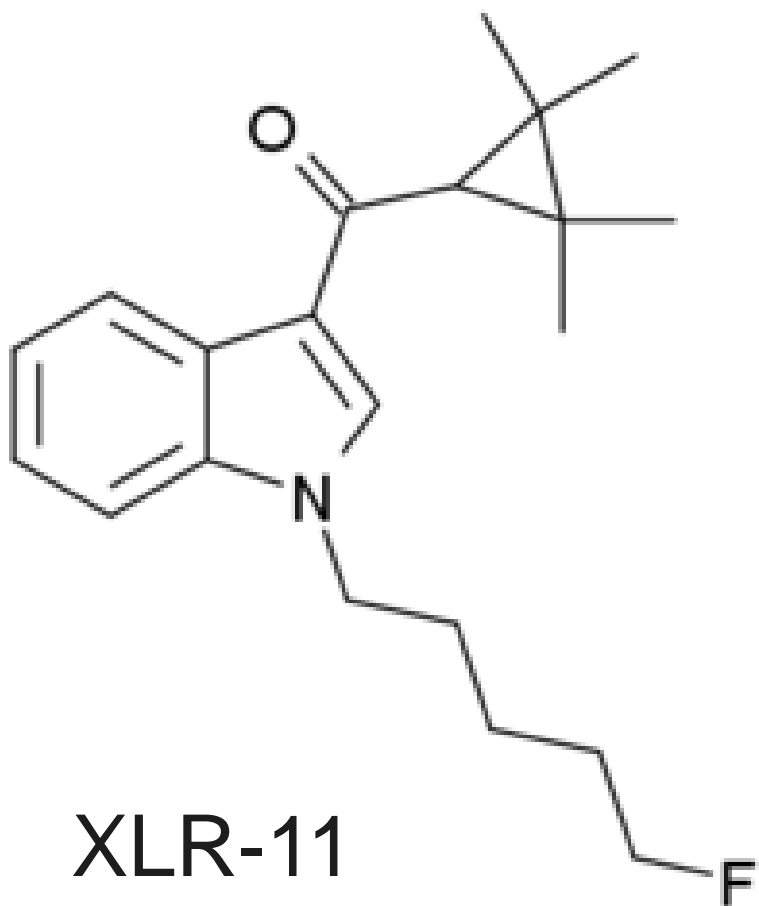
# NRG-3



Not For Human  
Consumption

- 26-year-old male presents to ED with 1 day of N/V and abdominal & lower back pain. Initial evaluation demonstrated a serum creatinine of 5.38 mg/dL, a blood urea nitrogen of 30 mg/dL and an urinalysis with 1+ protein and trace blood. He admitted to approximately one year of daily use of “Mr Happy”
- What did he take?







# The Devil We Don't Know:

## TOXICITY OF NOVEL PSYCHOACTIVE SUBSTANCES

Stephen Thornton

Medical Director

University of Kansas Health Systems Poison Control Center



# Disclosure

- ⦿ No conflicts of interest to declare.



# Objectives

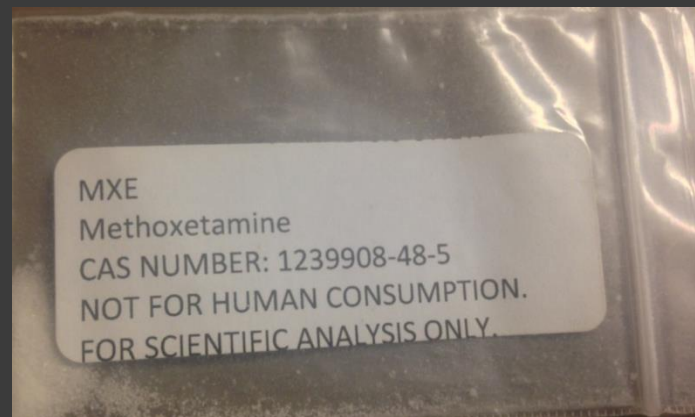
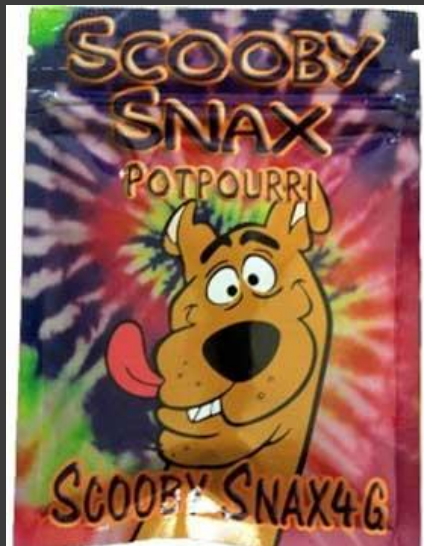
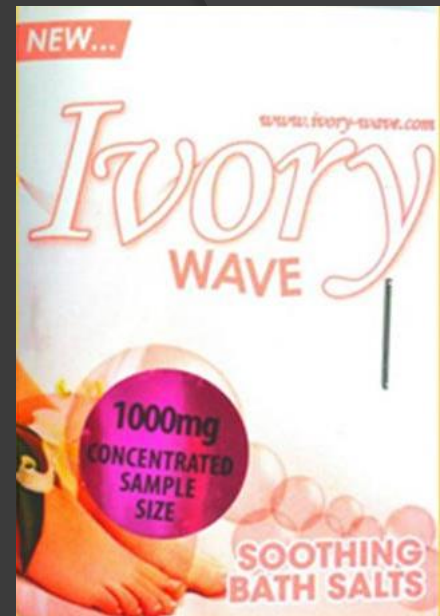
- 1. List 3 characteristics common to novel psychoactive substances**
- 2. List 4 types of novel psychoactive substances and their associated toxicity.**
- 3. Describe 3 severe complications that can be seen with novel psychoactive substance use.**

# The Devil We Knew






# New Devils?



# Novel Psychoactive Substances

- ⦿ a.k.a. Designer drugs
- ⦿ a.k.a. Synthetic drugs
- ⦿ a.k.a. Legal highs



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# Brief History of Novel Psychoactive Substances

- ◎ **1874 – Diacetylmorphine**
- ◎ **1887 -- Methamphetamine**
- ◎ **2004 -- Synthetic cannabinoids.**
- ◎ **2006 -- Synthetic cathinones**
- ◎ **2012 -- 2-C drugs**
- ◎ **2015 -- Fentanyl analogs**
- ◎ **2018 -- ???**



# Common Characteristics & Challenges

1. Origins
  - Research chemicals
  - Foreign Pharmaceuticals
2. Start overseas
3. Manufactured in China or Eastern Europe.
5. Internet Distributed
  - Grey Market
  - DarkNET
6. Evolve rapidly.
7. Difficult to detect.
8. “Not For Human Consumption”
9. Difficult to regulate.

# ORIGINS: RESEARCH CHEMICALS



Synthesized JWH-018 in 1993



# ORIGINS: FOREIGN PHARMACEUTICALS

Clinical Therapeutics/Volume 31, Number 12, 2009

## Effects of Treatment With Etizolam 0.5 mg BID on Cognitive Performance: A 3-Week, Multicenter, Randomized, Double-Blind, Placebo-Controlled, Two-Treatment, Three-Period, Noninferiority Crossover Study in Patients With Anxiety Disorder

Maria Pia De Candia, MD<sup>1</sup>; Guido Di Sciascio, MD<sup>1</sup>; Federico Durbano, MD<sup>2</sup>; Claudio Mencacci, MD<sup>2</sup>; Marta Rubiera, MD<sup>3</sup>; Eugenio Aguglia, MD<sup>3</sup>; Alessandra Garavini, MD<sup>4</sup>; Giuseppe Bersani, MD<sup>4</sup>; Antonella Di Sotto, MD<sup>5</sup>; Gianfranco Placidi, MD<sup>5</sup>; and Bruno M. Cesana, MD<sup>6</sup>

<sup>1</sup>Psychiatric Neuroscience Group, Department of Neurological and Psychiatric Sciences, University of Bari, Bari, Italy; <sup>2</sup>Neuropsychiatric Department/Psychiatric Unit, Fatebenefratelli and Oftalmico Hospital, Milan, Italy; <sup>3</sup>Department of Clinical, Morphological and Technological Science, UCO of Clinical Psychiatry, University of Trieste, Trieste, Italy; <sup>4</sup>Psychiatric Clinic III, Department of Psychiatric Sciences and Psychological Medicine, University of Rome "La Sapienza," Rome, Italy; <sup>5</sup>Department of Neurological and Psychiatric Sciences, Psychiatry Unit, University of Florence, Florence, Italy; and <sup>6</sup>Section of Medical Statistics and Biometry, Department of Biomedical Sciences and Biotechnologies, University of Brescia, Brescia, Italy

### ABSTRACT

**Background:** Etizolam is an anxiolytic drug with a pharmacologic profile similar to that of the classic benzodiazepines. Neurochemical research suggests that etizolam may have selectivity for the subpopulation of  $\gamma$ -aminobutyric acid type A receptors associated with

function was assessed using scores from the Wechsler Adult Intelligence Scale (WAIS) Digit Span test (total forward and backward scores and the time required to perform the test). Anxiety was measured using the Hamilton Anxiety Rating Scale (HAM-A) and the State-Trait Anxiety Inventory (STAI) for screening and

# The Grey Market

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**Aminoindanes**

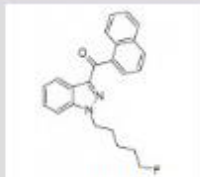
**Indazole-carboxamides  
and other fine chemicals**

**Forensic Reference Samples**

**Laboratory Reagents**

**Research & Development**

### DEALS FOR APRIL!

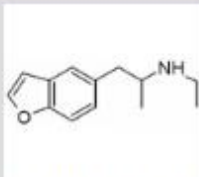


**2g THJ-2201**

UK legal AM-2201  
analogue!

Regular Price: ~~£10.00~~  
Special Price: £15.00

[Add to Cart](#)

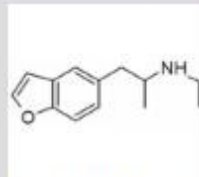


**10 x120mg 5-EAPB  
Pellets**

Only £3.50 per pellet on  
10 pellets!

Regular Price: ~~£50.00~~  
Special Price: £35.00

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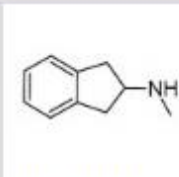


**10g 5-EAPB Powder**

Research it whilst it's  
still legal!

Regular Price: ~~£175.00~~  
Special Price: £140.00

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**1g N-methyl-2AI**

Latest chemical in the  
Aminoindane cyclised  
amphetamines series

Regular Price: ~~£20.00~~  
Special Price: £11.50

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# The Grey Market

- ◎ 12 “Research Chemical” Internet Vendors monitored weekly for 24 weeks:
  - >600 novel psychoactive substances (NPS) listed
    - > 13+ different classes
  - ~70 new NPS listed during the study period.
  - >8 DEA Sched I substances/website

# The Grey Market

- ⦿ 14 “Research Chemicals” Purchased
  - Total of 34 samples
- ⦿ From 8 websites
- ⦿ 80% delivered
- ⦿ 80% confirmed to be advertised substance.
- ⦿ Multiple DEA Schedule I substances

# The DarkNet

## The “Darknet”: The new street for street drugs

J. V. Pergolizzi Jr, MD<sup>1</sup> | J. A. LeQuang BA<sup>1</sup> | R. Taylor Jr, PhD<sup>1</sup> | R. B. Raffa PhD<sup>2,3</sup>  |  
NEMA Research Group

<sup>1</sup>NEMA Research Inc., Naples, FL, USA

<sup>2</sup>University of Arizona College of Pharmacy,  
Tucson, AZ, USA

<sup>3</sup>Temple University School of Pharmacy,  
Philadelphia, PA, USA

### Correspondence

R. B. Raffa, University of Arizona College of  
Pharmacy, Tucson, AZ, USA.

Email: robert.raffa@gmail.com

### Summary

**What is known and objective:** The “Darknet” (“dark web”) has emerged as a means by which illegal drug buys and deliveries can be arranged with apparent anonymity and impunity. Healthcare providers should be aware of this growing source of illicit drugs.

**Comment:** The “Darknet” refers to networks isolated from the Internet that cannot be accessed via conventional search engines. They require special software that is protected by special encryption. The initial legitimate use of a “Darknet” to conceal personal information against misuse or political reprisal is being exploited to conceal the identity of buyers and sellers in illegal drug transactions. Instructions on how to obtain

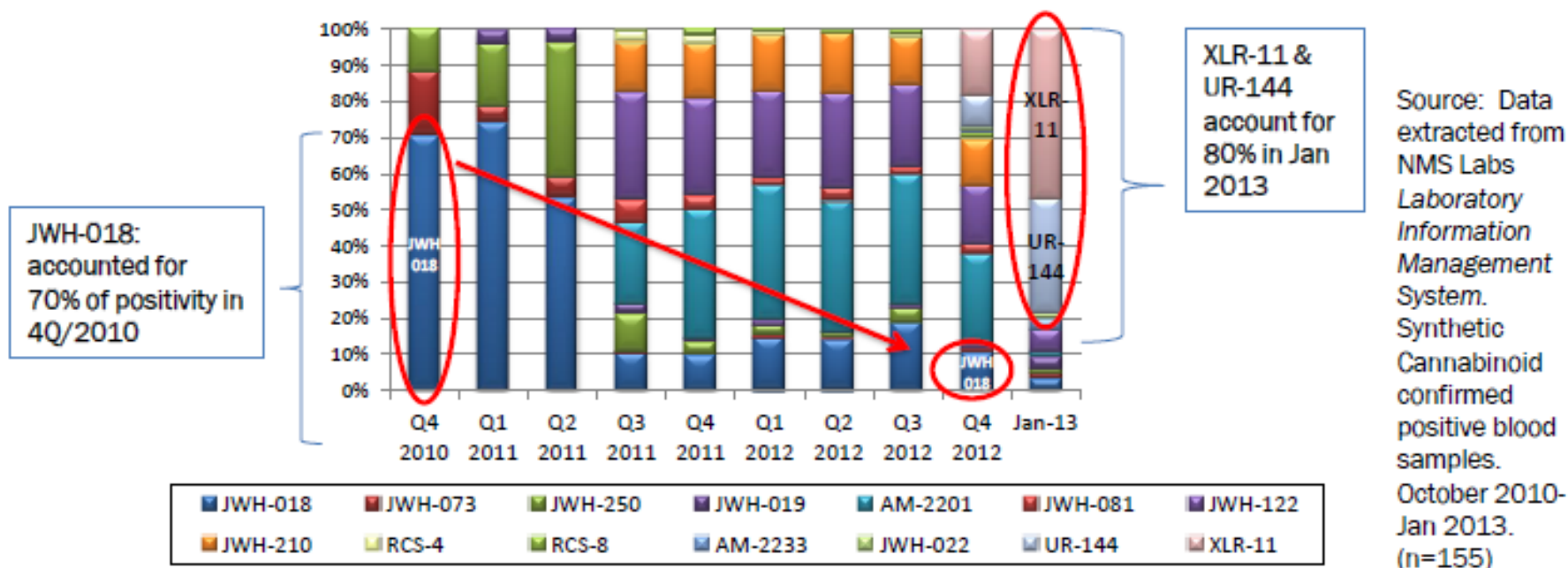


# The DarkNet

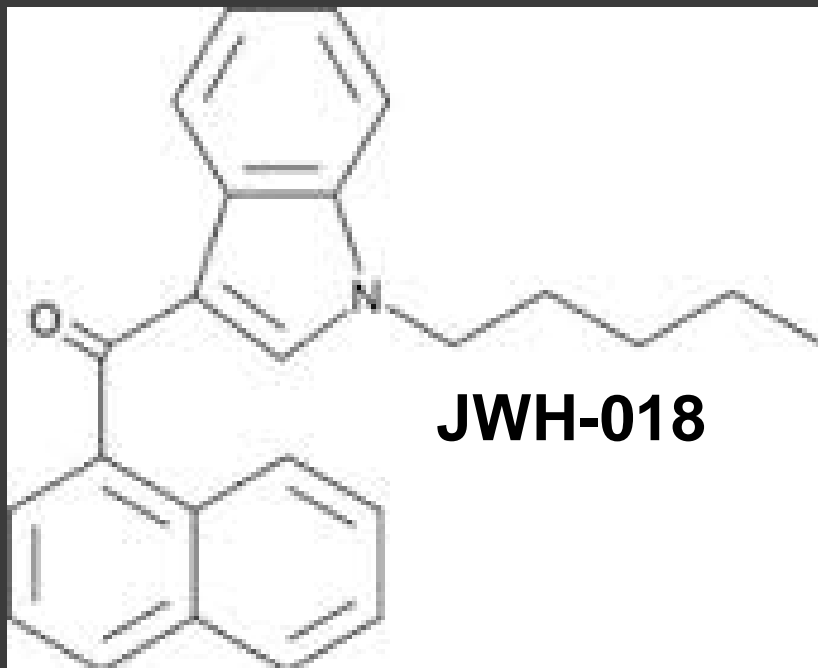


# Rapid Evolution

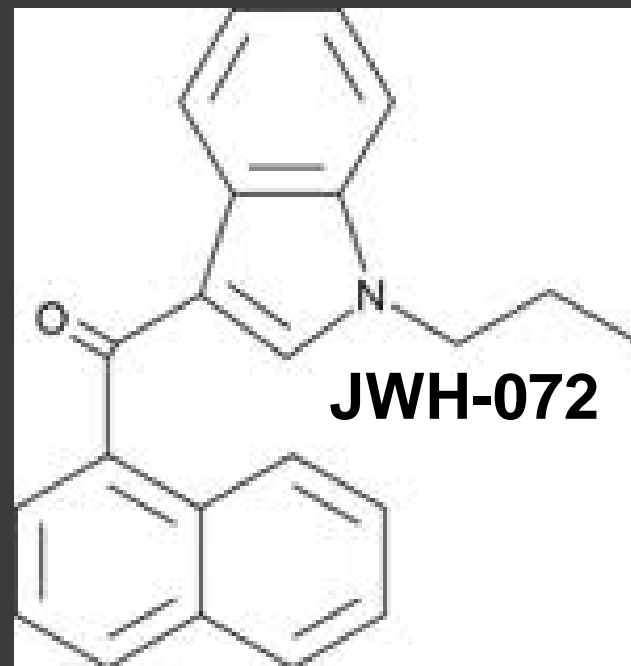
Confirmed Positive Analytes in Synthetic Cannabinoids Blood Samples



# Regulation Begets Rapid Evolution



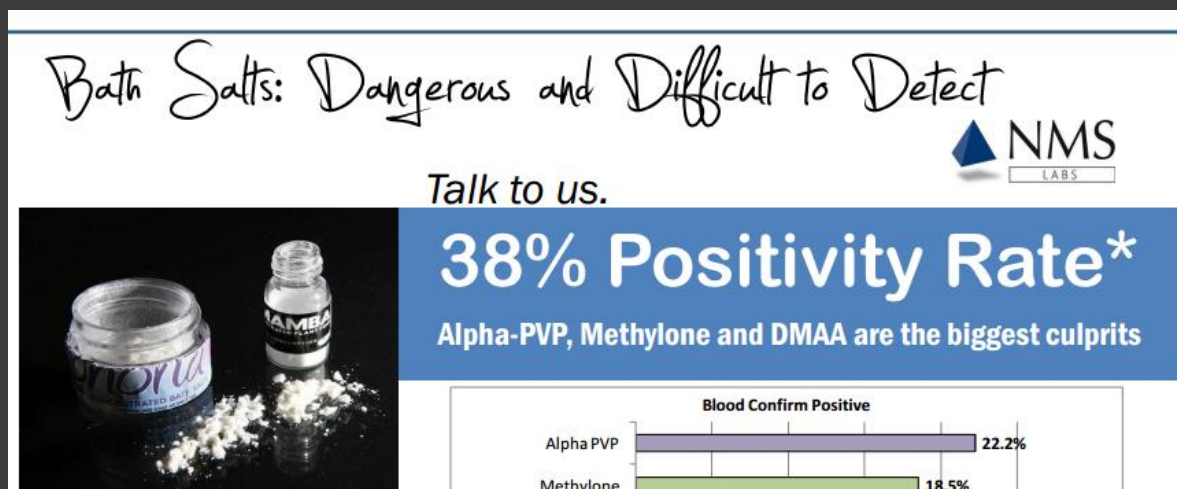
**Illegal**



**Legal**

# Difficult to Detect

- NOT detected on your standard UDS.
- Large labs have dedicated screens.
- Still often don't know what to test for!
- Need specialized testing methods



# “Not For Human Consumption” Loophole

- Skirts the Federal Analog Act
- Avoids regulation by DEA or FDA.





4-AcO-MET  
Metacetin  
CAS NUMBER 246-87-2  
NOT FOR HUMAN CONSUMPTION  
FOR SCIENTIFIC ANALYSIS ONLY.

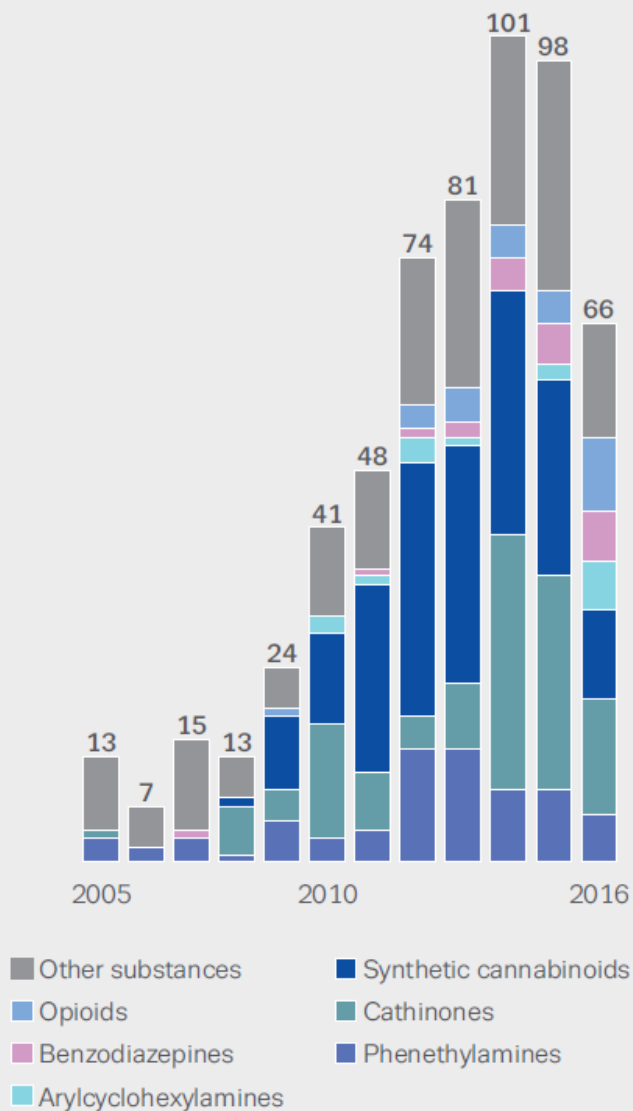
MXE  
Methoxetamine  
CAS NUMBER: 1239908-48-5  
NOT FOR HUMAN CONSUMPTION.  
FOR SCIENTIFIC ANALYSIS ONLY.

NP-LAD  
1P-LSD  
1-Propionyl-lysergic acid diethylamide  
NOT FOR HUMAN CONSUMPTION  
FOR SCIENTIFIC ANALYSIS ONLY

4-FA  
4-Fluoroamphetamine  
CAS number 459-02-9  
NOT FOR HUMAN CONSUMPTION.  
FOR SCIENTIFIC ANALYSIS ONLY.

# The Scope of the Problem:

Number and categories of new psychoactive substances notified to the EU Early Warning System for the first time, 2005–16

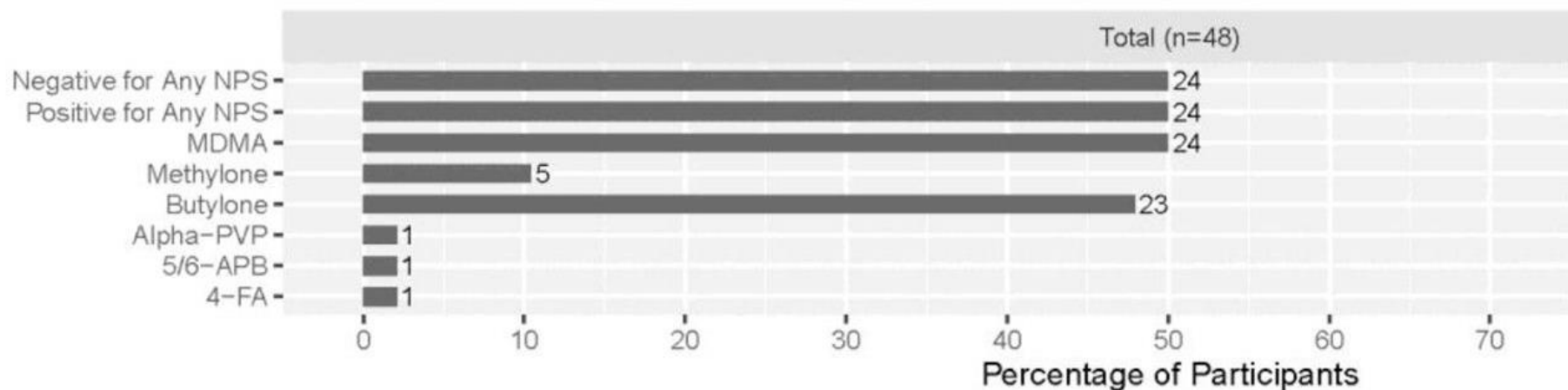


**Table 1.** NPS classes and individual NPS with at least 1% prevalence (weighted  $N = 682$ ).

	Weighted % (95% CI)
Any NPS	35.1 (29.8, 40.3)
Synthetic cannabinoids	16.3 (11.3, 21.4)
Psychedelic phenethylamines	14.7 (9.5, 19.9)
NBOMe series	9.0 (5.5, 12.5)
25b-NBOMe	3.4 (1.7, 5.1)
25i-NBOMe	3.2 (1.0, 5.4)
NBOMe (unknown)	5.4 (2.6, 8.2)
2C series	10.3 (5.4, 15.3)
2C-I	5.1 (1.9, 8.4)
3C series	2.6 (1.0, 4.3)
Dox series	3.5 (1.7, 5.2)
Phenethylamines (non-psychedelic)	7.8 (3.8, 11.8)
Synthetic cathinones ("bath salts")	6.9 (2.9, 10.8)
Non-synthetic cathinone phenethylamines	4.4 (1.5, 7.2)
Tryptamines	5.1 (1.9, 8.3)
Arylcyclohexylamines (dissociatives)	4.3 (1.0, 7.7)
Psychedelics (non-phenylethylamine)	6.6 (3.1, 10.1)
1P-LSD	2.9 (1.2, 4.7)
Narcotic, benzodiazepine, and depressant NPS	4.1 (1.9, 6.4)

# Detection of “Bath Salts” and Other Novel Psychoactive Substances in Hair Samples of Ecstasy/MDMA/“Molly” Users

Joseph J. Palamar<sup>1,2,\*</sup>, Alberto Salomone<sup>3</sup>, Marco Vincenti<sup>3,4</sup>, and Charles M. Cleland<sup>2,5</sup>



# Common Classes of Novel Psychoactive Substances

- Novel Opioids
- Synthetic cannabinoids (“Spice, K2”)
- Substituted cathinones (“Bath Salts”)
- Designer Benzodiazepines
- Ketamine/PCP analogs (“MXE”)
- Piperazines “Party Pills”
- Phenethylamine derivatives
- Tryptamines
- 2C drugs (“Nbomb”)





[News / Maryland / Har](#)

## Fentanyl found in majority of heroin, opioid-related overdoses in 2017



Today's Morning

**3.18%**

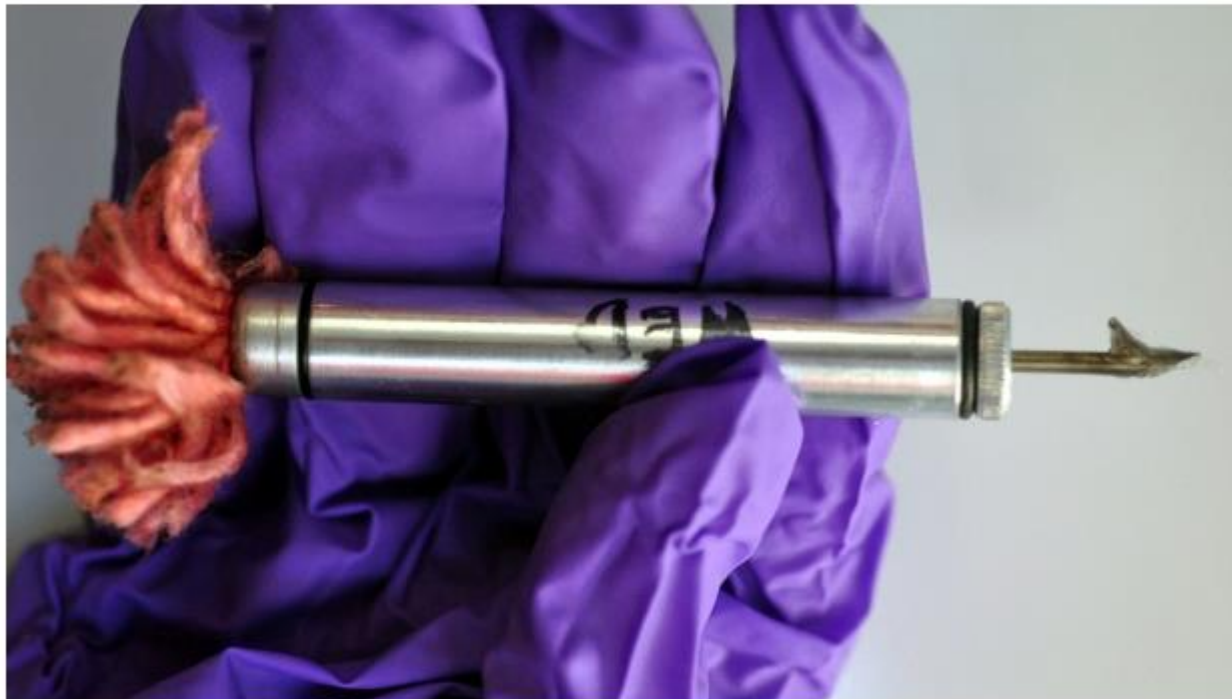
15 Year



# Elephant sedative carfentanil becomes deadly street drug

'It's very dangerous. This is nothing to mess with'

By Greg Layson, CBC News | Posted: Sep 10, 2016 7:00 AM ET | Last Updated: Sep 12, 2016 5:48 PM ET



A dart loaded with carfentanil, an opiate, and xylazine, a muscle relaxer, is ready to tranquilize a moose. People are using carfentanil to get high. (Dave Gribik/Associated Press/Pioneer Press, )

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REVIEW ARTICLE

# **Fentanyl continue to replace heroin in the drug arena: the cases of ocfentanil and carfentanil**

**Nektaria Misailidi<sup>1</sup> · Ioannis Papoutsis<sup>1</sup> · Panagiota Nikolaou<sup>1</sup> · Artemisia Dona<sup>1</sup> · Chara Spiliopoulou<sup>1</sup> · Sotiris Athanaselis<sup>1</sup>**

Received: 2 June 2017 / Accepted: 23 July 2017 / Published online: 18 August 2017

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# Novel Opioids

- Fentanyl analogs

- Acetyl-, Butyryl-, Carfentanil, etc

- 1000+x more potent than heroin.

- Becoming rule, not exception.

International Journal of Drug Policy 46 (2017) 107–111



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International Journal of Drug Policy

journal homepage: [www.elsevier.com/locate/drugpo](http://www.elsevier.com/locate/drugpo)



Editorial

Fentanyl in the US heroin supply: A rapidly changing risk environment



The supply of heroin into the US has changed with new source-forms and market strategies. Of particular concern is the rampant and persistent adulteration of heroin with synthetic opioids, most conspicuously the family of fentanyls. Medical consequences including alarming reports of increasing opioid-related overdose,

2016; Roxburgh et al., 2013). There have been 1,019 fentanyl-detected deaths in Canada as of 2014 with more than half occurring 2013–2014 ([Canadian Community Epidemiology Network on Drug Use, 2015](#)). This Special Section focuses solely on the US situation and only on the overdose problem as it relates to heroin and

# Threat of Fentanyl...

Demographic characteristics/ Toxicology findings	% change from 2010–2012 to 2013–2014
Total	122.1*
Age group (yrs)	
Mean (SD)	—
14–25	247.4*
26–34	257.0*
35–50	143.2*
>50	37.0*

Peterson AB, Gladden RM, Delcher C, Spies E, Garcia-Williams A, Wang Y, Halpin J, Zibbell J, McCarty CL, DeFiore-Hyrmer J, DiOrio M, Goldberger BA. Increases in Fentanyl-Related Overdose Deaths - Florida and Ohio, 2013-2015. MMWR Morb Mortal Wkly Rep. 2016 Aug 26;65(33):844-9.



**Table 1**

Background characteristics, substance use patterns, and perceptions about fentanyl, by fentanyl toxicology test results.

	Sample (n = 231)	Fentanyl positive	
		No (n = 31)	Yes (n = 200)
Age of participant	34.0 ( $\pm 9.2$ )	35.8 ( $\pm 9.3$ )	33.8 ( $\pm 9.1$ )
n (%) male	169 (73.2%)	23 (74.2%)	146 (73.0%)
Race			
n (%) White	193 (83.6%)	25 (80.7%)	168 (84.0%)
n (%) Black	6 (2.6%)	0 (0.0%)	6 (3.0%)
n (%) other	32 (13.0%)	6 (19.4%)	26 (13.0%)
n (%) Latino/a	27 (11.7%)	4 (12.9%)	23 (11.5%)
Yrs education	12.0 ( $\pm 1.7$ )	12.6 ( $\pm 2.0$ )	11.9 ( $\pm 1.6$ )
n (%) history of OAT	161 (69.7%)	19 (61.3%)	142 (71.0%)
n (%) ever injected	177 (76.6%)	19 (61.3%)	158 (79.0%)
Used heroin past mo.			
n (%) no	18 (7.8%)	12 (38.7%)	6 (3.0%)
n (%) yes	213 (92.2%)	19 (61.3%)	194 (97.0%)
n (%) ever overdosed	127 (55.0%)	13 (41.9%)	114 (57.0%)
n (%) been given naloxone	109 (47.6%)	10 (32.2%)	99 (50.0%)
Self-reported fentanyl use			
n (%) never used fentanyl	33 (14.5%)	11 (36.7%)	22 (11.0%)
n (%) used (unintentionally)	35 (15.2%)	10 (33.3%)	25 (12.5%)
n (%) used (intentionally)	162 (70.4%)	9 (30.0%)	153 (76.5%)
Thinks fentanyl positive			
n (%) yes	141 (61.3%)	8 (26.7%)	133 (66.5%)
n (%) no	49 (21.3%)	14 (46.7%)	35 (17.5%)
n (%) don't know	40 (17.4%)	8 (26.7%)	32 (16.0%)

# Crews use extra precaution, resources when handling fentanyl



By Steve Nielsen and Sarah Doiron

Published: February 21, 2018, 5:18 pm | Updated: February 21, 2018, 7:23 pm



## Related Coverage

[Fentanyl discovery prompts hazmat response in Providence](#)

PROVIDENCE, R.I. (WPRI) — With fentanyl becoming more and more prevalent in Southern New England, officials say it's important for everyone to be careful.

# Threat to First Responders, EMS, Health Care Workers?

- **ACMT/AACT Statement:**
  - Inhalation: require ~ 200 min of exposure
  - Dermal: cover both palms with fentanyl patches, toxicity expected in 14 minutes.
  - Mucous membrane: could be risk
- Bottom line: Standard precautions (i.e. gloves) should be sufficient.

# Potent synthetic drug sweeping through Johnson County hard to detect, and can be deadly

POSTED 9:09 PM, MAY 26, 2016, BY [MEGAN DILLARD](#), UPDATED AT 10:30PM, MAY 26, 2016

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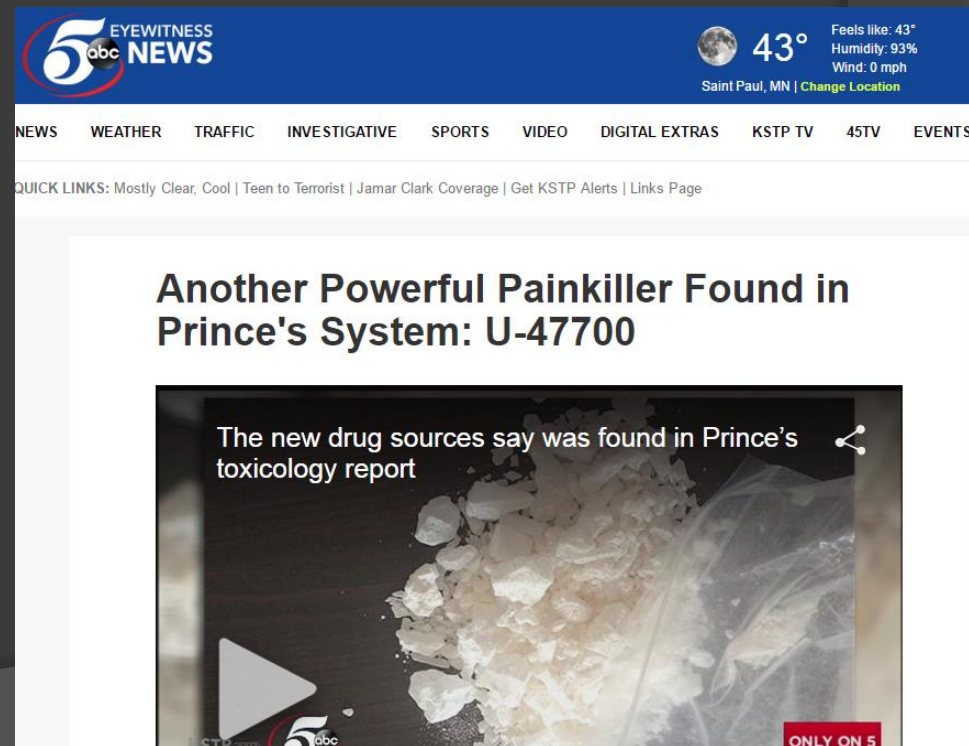
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# “Research” Opioids

- U-47700 (“Pink”)
- AH-7921
- MT-45
- Bromadol
- Variable potency





# Remember Krokodil?

TV: CNN | CNNi | CNN en Español | HLN

**CNN Health**

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## Flesh-eating 'zombie' drug 'kills you from the inside out'

By Jen Christensen, CNN  
updated 7:48 AM EDT, Fri October 18, 2013

N.Y. O

Click to play ▶

# Desomorphine (“Krokodil”)

- ⦿ Potent derivative of codeine.
- ⦿ Previously rx drug in Switzerland
- ⦿ “Krokodil” originated in Russia
- ⦿ Multiple solvents/hydrocarbons used in manufacturing → tissue necrosis.
- ⦿ No lab confirmed cases in USA.
- ⦿ Unlikely to be seen.

# Novel Spawns of the Opioid Epidemic

- **Kratom**
- **Ibogaine**
- **Loperamide**



## Is Kratom Really As Dangerous As the FDA Makes It Out to Be?

The FDA recently issued a warning that kratom is unsafe. But did the FDA ignore scientific evidence -- as well as patient experience -- supporting kratom?



# Kratom

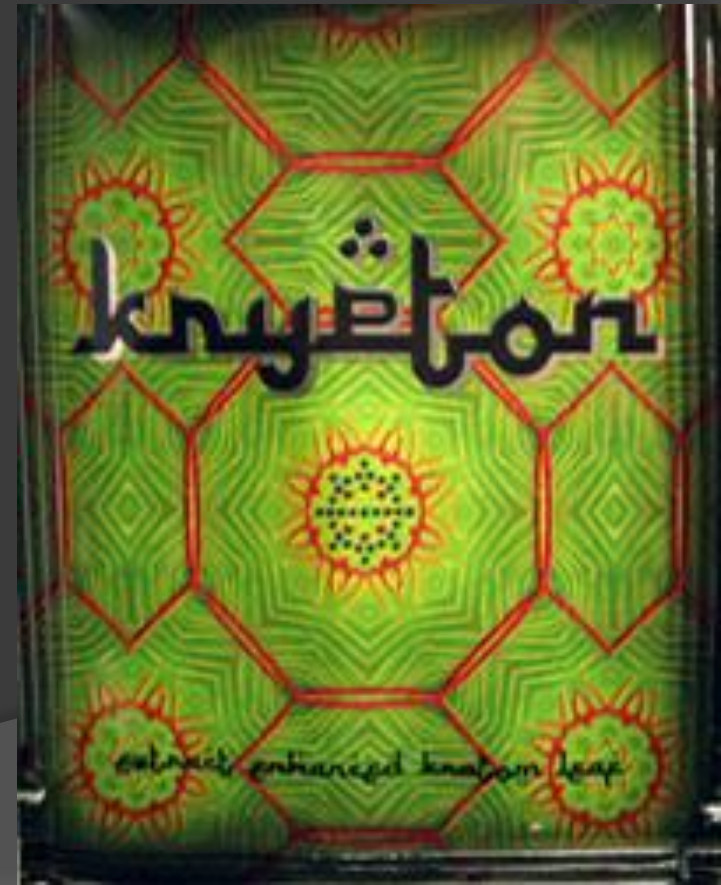
- ⦿ *Mitragyna speciosa*: endemic to SE Asia
- ⦿ Mitragynine – “primary” active compound
- ⦿ Low dose: stimulant
- ⦿ High dose: opioid-like
- ⦿ Used recreationally but also to self-treat opioid withdrawal.
- ⦿ Might see opioid effects but serious toxicity rarely reported.
- ⦿ Withdrawal has been described.



# Krypton :

It isn't just bad for Superman

- **Kratom and o-desmethyiltramadol mix**
- **Seizures**
- **Deaths reported**



# Medical Tourist Suffered Ibogaine Death in Costa Rica

By Jaime Lopez – March 19, 2015

Crime Safety

Guanacaste

Health

*Share this article*



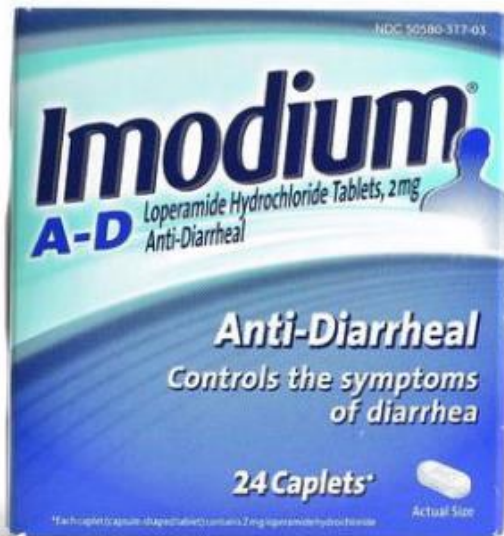
A 42-year old woman from Norway who came to Costa Rica in search of a controversial addiction treatment suffered a fatal heart attack after ingesting ibogaine, a hallucinogenic substance derived from plants native to Western Africa. According to a [news report filed by David Delgado of national newspaper La Nacion](#), the Norwegian woman passed away in 2014, but her cause of death was recently confirmed by forensic officials.



# Ibogaine

- ⦿ Found in root of the African rainforest shrub *Tabernanthe iboga* in 1901.
- ⦿ DEA schedule 1 (1970)
- ⦿ Active CYP2D6 metabolite (noribogaine)
- ⦿ Resurgence as anti-addiction therapy.
- ⦿ Multiple effects: NMDA antagonism, opioid receptor binding, potassium channel blocker.
- ⦿ Risk is QT prolongation → TdP

# FDA targets anti-diarrhea pills that Lehigh Valley doctor calls 'poor man's methadone'



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# Loperamide

- ⦿ FDA approved since 1976
- ⦿ Peripheral acting opioid
- ⦿ Does not normally penetrate blood/brain barrier due to P-glycoprotein (PGP) activity.
- ⦿ Huge doses (>40x) or co-ingestion with PGP inhibitor (omeprazole, cimetidine) result in typical central opioid results.
- ⦿ Huge doses → QT prolongation → TdP



## *Case Report*

# **Loperamide Induced Torsades de Pointes: A Case Report and Review of the Literature**

**O. Mukarram,<sup>1</sup> Y. Hindi,<sup>1</sup> G. Catalasan,<sup>2</sup> and J. Ward<sup>3</sup>**

<sup>1</sup>*Department of Internal Medicine, Texas Tech University Health Sciences Center, Permian Basin, USA*

<sup>2</sup>*Department of Critical Care, Texas Tech University Health Sciences Center, Midland Memorial Hospital, Midland, TX, USA*

<sup>3</sup>*Department of Clinical Pharmacology, Medical Center Hospital, Odessa, TX, USA*

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Received 2 January 2016; Accepted 1 February 2016

Academic Editor: Alexander Bauer

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Abuse of over the counter drugs often gets overlooked by health care providers. Loperamide is one such over the counter drug that is often abused by drug addicts. We present here a case of a young male attaining euphoria from taking massive doses of loperamide. He developed Torsades de Pointes and subsequent cardiac arrest. We found similarities in the progression of myocardial electrical conduction abnormalities among loperamide and other previously known arrhythmogenic drugs. We intend to raise concern over the ease of availability of such drugs over the counter and increase the index of suspicion for over the counter drug abuse from our experience.

# Novel Opioids

## Associated Clinical Symptoms

### Common

CNS depression

Respiratory Depression

Miosis

### Severe/Uncommon

Apnea

???



# Synthetic marijuana becoming bigger issue in South Bend

By: **Andrea Alvarez** [Facebook](#) | [Twitter](#)

Posted: Feb 19, 2018 8:17



This Feb. 15, 2010, file photo shows a package of K2, a concoction of dried herbs sprayed with chemicals. **Kelley McCall** - AP

CRIME

## Independence merchant guilty of swapping food stamps for synthetic marijuana



BY TONY RIZZO  
[trizzo@kcstar.com](mailto:trizzo@kcstar.com)



February 06, 2018 11:41 AM  
Updated February 06, 2018 01:39 PM

ORIGINAL ARTICLE

# “Zombie” Outbreak Caused by the Synthetic Cannabinoid AMB-FUBINACA in New York

Axel J. Adams, B.S., Samuel D. Banister, Ph.D., Lisandro Irizarry, M.D., Jordan Trecki, Ph.D., Michael Schwartz, M.D., M.P.H., and Roy Gerona, Ph.D.

## ABSTRACT

### BACKGROUND

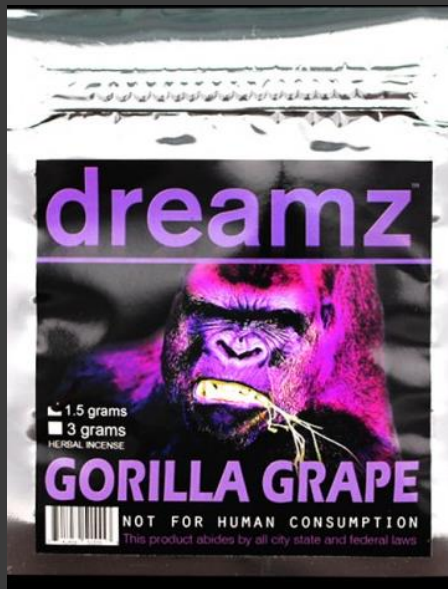
New psychoactive substances constitute a growing and dynamic class of abused drugs in the United States. On July 12, 2016, a synthetic cannabinoid caused mass intoxication of 33 persons in one New York City neighborhood, in an event described in the popular press as a “zombie” outbreak because of the appearance of the intoxicated persons.



# Synthetic Cannabinoids

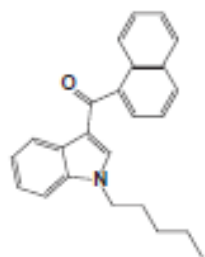
(“Synthetic marijuana, Spice, K2...”)

- Multiple compounds and product names.
- Usually sprayed on “herbs” and smoked.
- Bind to cannabinoid-1 & 2 receptors.

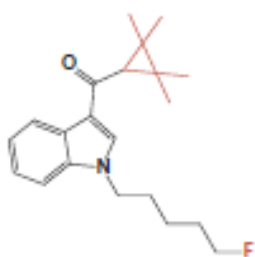




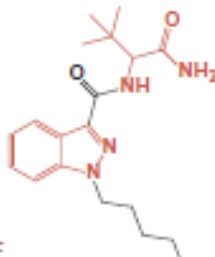
**JWH-018**  
 $EC_{50}=102$  nmol/liter



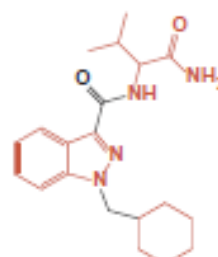
**XLR-11**  
 $EC_{50}=98$  nmol/liter



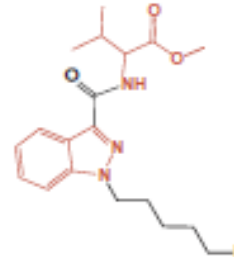
**ADB-PINACA**  
 $EC_{50}=0.53$  nmol/liter



**AB-CHMINACA**  
 $EC_{50}=7.8$  nmol/liter



**5F-AMB**  
 $EC_{50}=1.9$  nmol/liter



2010

2011

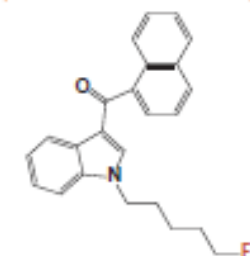
2012

2013

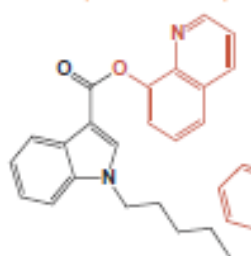
2014

2015

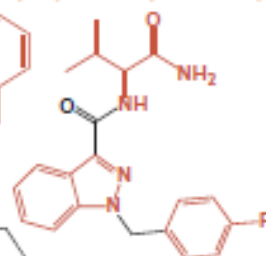
2016



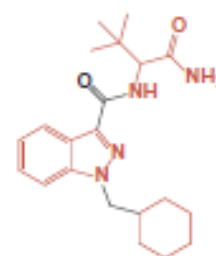
**AM-2201**  
 $EC_{50}=38$  nmol/liter



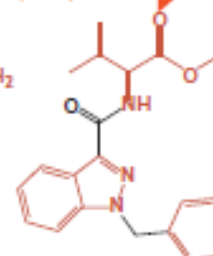
**PB-22**  
 $EC_{50}=5.1$  nmol/liter



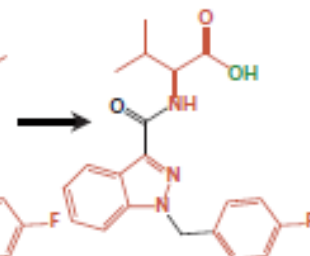
**AB-FUBINACA**  
 $EC_{50}=1.8$  nmol/liter



**MAB-CHMINACA**  
 $EC_{50}=5.1$  nmol/liter



**AMB-FUBINACA**  
 $EC_{50}=2.0$  nmol/liter



**AMB-FUBINACA  
Acid Metabolite**

# Synthetic Cannabinoids

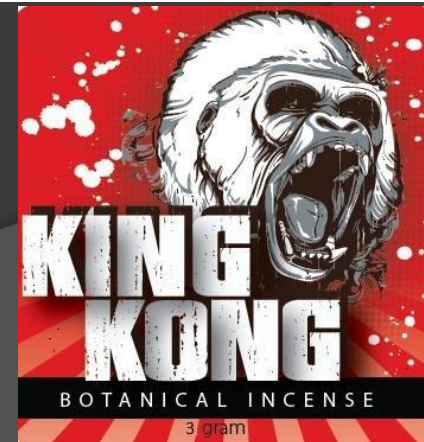
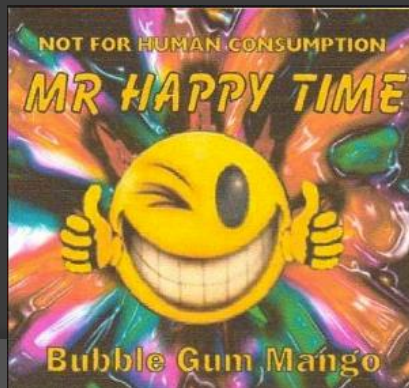
## Associated Clinical Symptoms

### Common

- Nausea/Vomiting
- Agitation
- Tachycardia
- Seizures

### Severe/Uncommon

- Hyperemesis Syndrome
- Prolonged psychosis
- Renal Injury
- Myocardial Infarction
- Stroke





Alpha-PVP, also known as flakka, has caused a rash of emergency room visits and overdose deaths. - National Institute on Drug Abuse

LOCAL

## Naked people rampage through Missouri town, barking and showering in soda water



BY ADAM DARBY  
[adarby@kcstar.com](mailto:adarby@kcstar.com)

# Florida Zombie Drug Flakka: Everything You Need to Know

Designer drug related to bath salts causes terrible hallucinations, paranoia and psychosis



# Synthetic Cathinones ("Bath Salts, Plant Food")

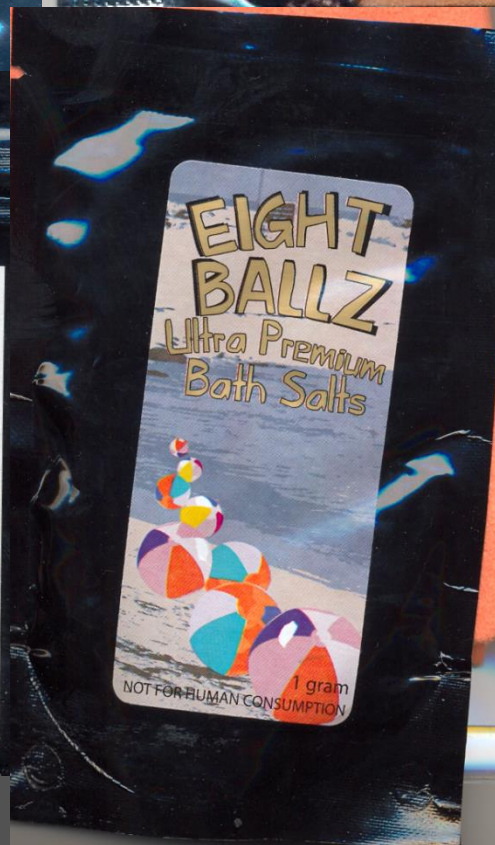
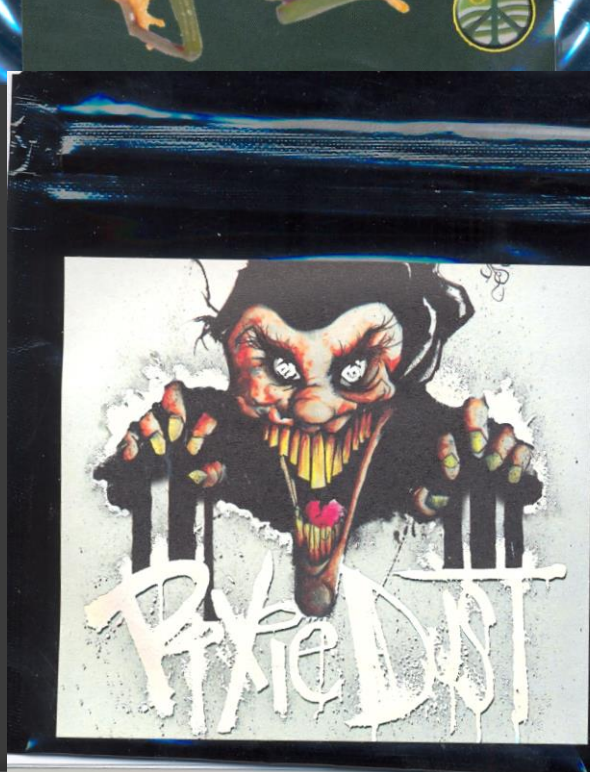
- ⦿ **Cousins of amphetamines.**
- ⦿ **Many compounds and product names.**
- ⦿ **Usually insufflated or injected.**
- ⦿ **Promote release of norepi, dopamine, & serotonin.**





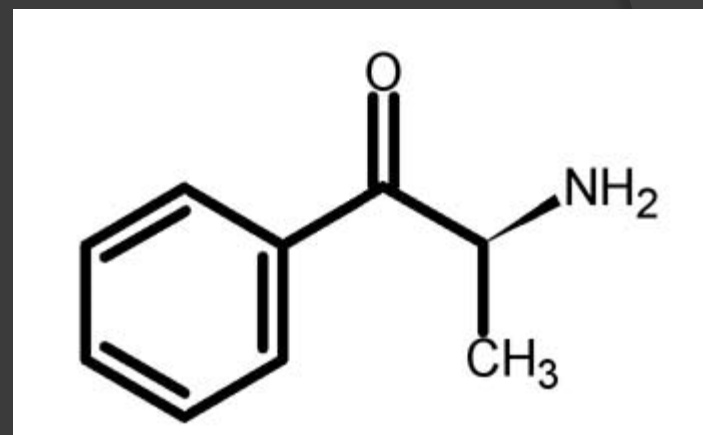


200mg  
CONCENTRATED  
SAMPLE  
SIZE



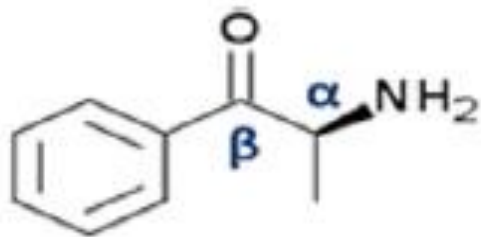


# The Story of Cathinone

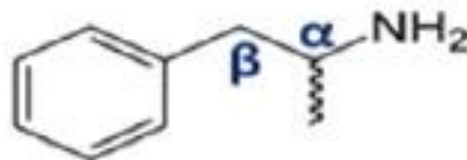


*Catha edulis*

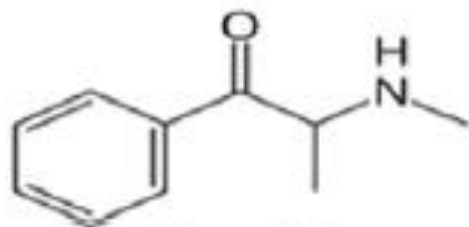
# Amphetamines Ugly Cousin:



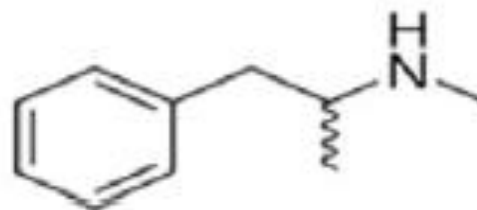
**Cathinone**



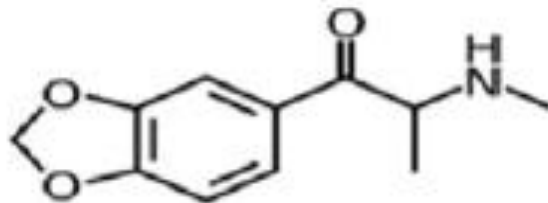
**Amphetamine**



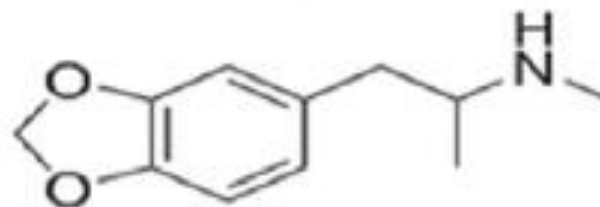
**Methcathinone**



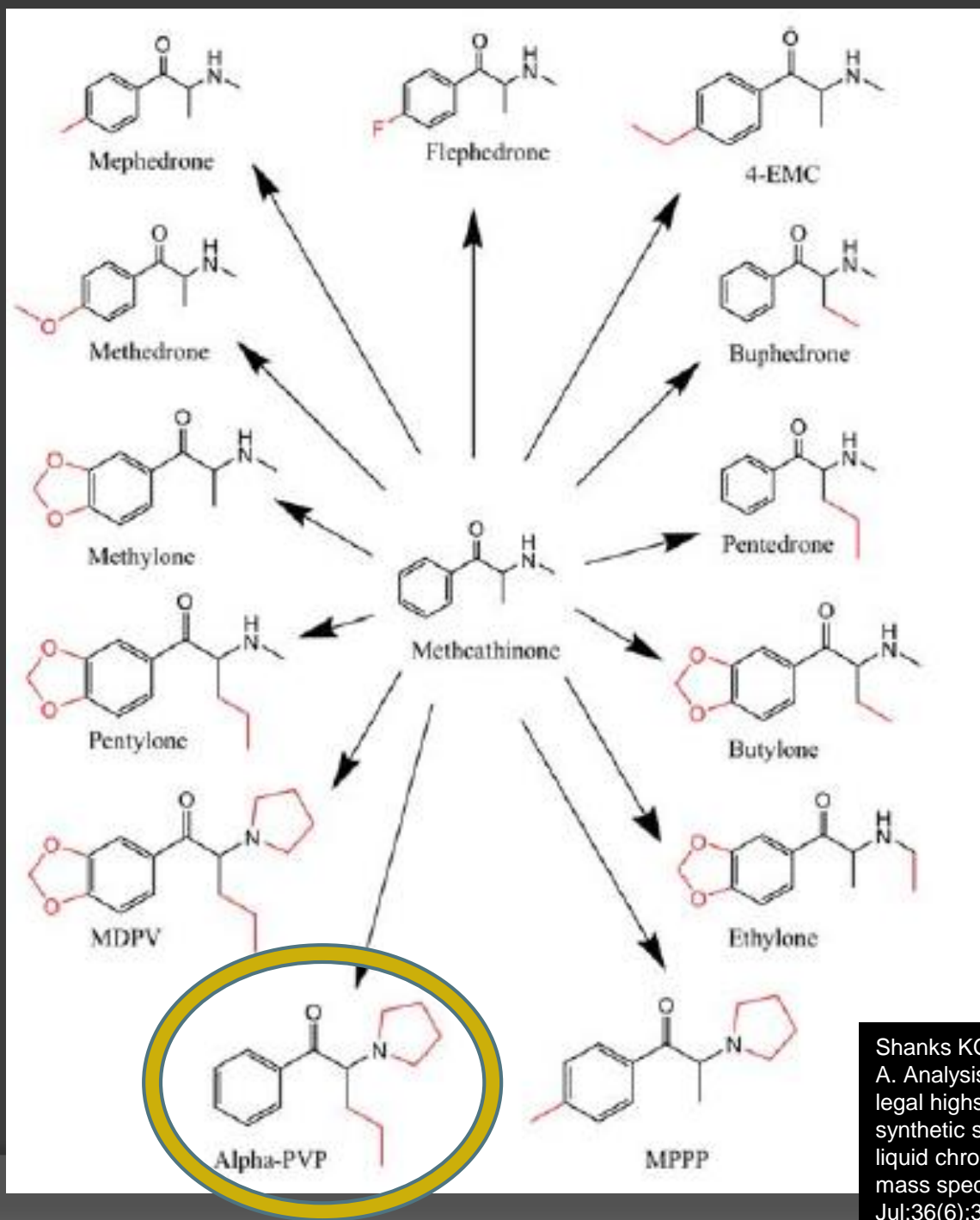
**Methamphetamine**



**Methyldone**



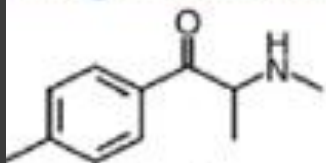
**MDMA**



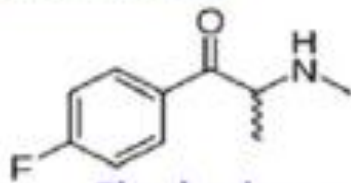
Shanks KG, Dahn T, Behonick G, Terrell A. Analysis of first and second generation legal highs for synthetic cannabinoids and synthetic stimulants by ultra-performance liquid chromatography and time of flight mass spectrometry. J Anal Toxicol. 2012 Jul;36(6):360-71.

# Organic Chemistry Gone Bad

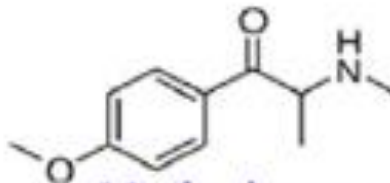
## Ring-substituted cathinones



Mephedrone



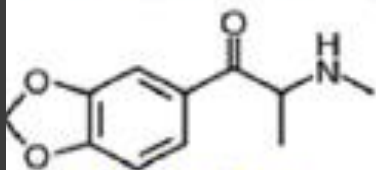
Flephedrone



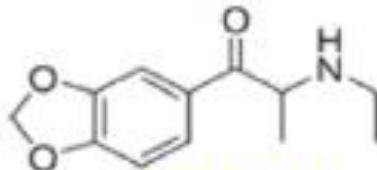
Methedrone

- **Meth-like**

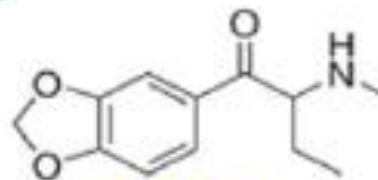
## Methylenedioxy-substituted cathinones



Methylone



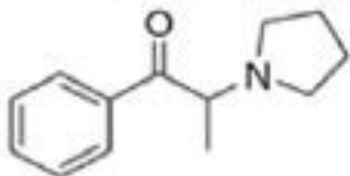
Ethylone



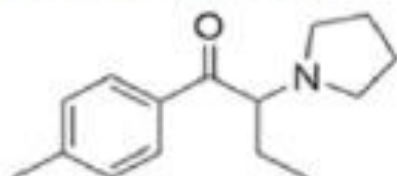
Butylone

- **“Ecstasy”-like**

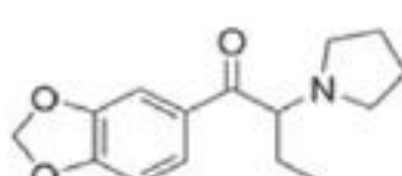
## Pyrrolidinyl-substituted cathinones



α-PPP



Pyrovalerone

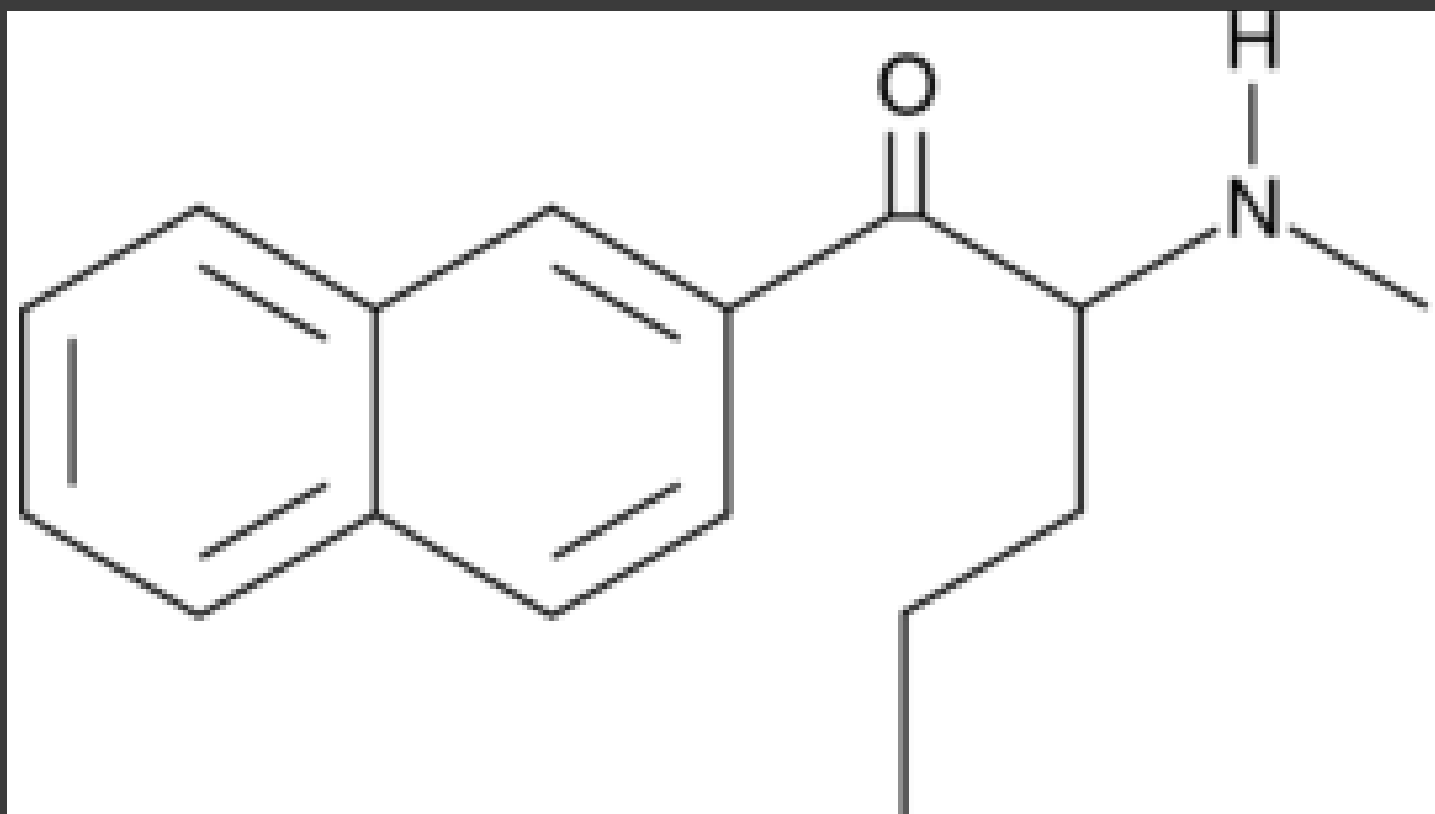


MDPV

- **Cocaine-like**



# NRG-3



# Synthetic Cathinones

## Associated Clinical Symptoms

### Common

- Tachycardia
- Hypertension
- Anxiety/Agitation
- Seizures

### Severe/Uncommon

- Excited delirium
- Prolonged psychosis
- Serotonin Toxicity
- Hyponatremia





MENTION THE OBSERVER FOR 15% OFF  
GROUPS OF 10+ MENTION THE OBSERVER FOR 20% OFF


# Phenazepam, the Soviet-Made Designer Drug, Hits North Texas

BY ERIC NICHOLSON

TUESDAY, MARCH 18, 2014 AT 9:17 A.M.

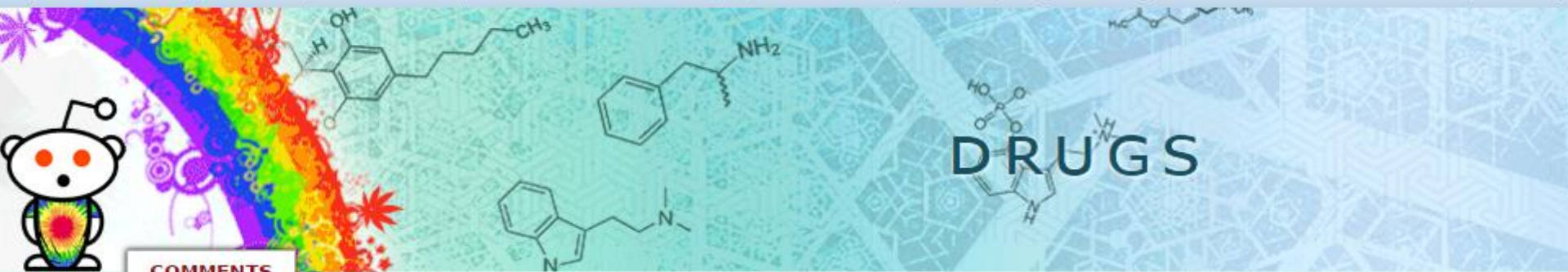
In case you missed the **September 2012 issue of *Innovations in Clinical Neuroscience***, here's a heads up: phenazepam, a powerful anti-anxiety drug sometimes sold as "Zannie" or "bonsai," is hitting the U.S. streets.

advertisement



TAKE THE  
GUESSWORK  
OUT OF YOUR  
COURSEWORK

SUMMER/FALL 2017  
REGISTRATION



COMMENTS



This is an archived post. You won't be able to vote or comment.

↑  
19  
↓



Flubromazepam is the ultimate

benzo (self Drugs)

submitted 3 years ago by [deleted]

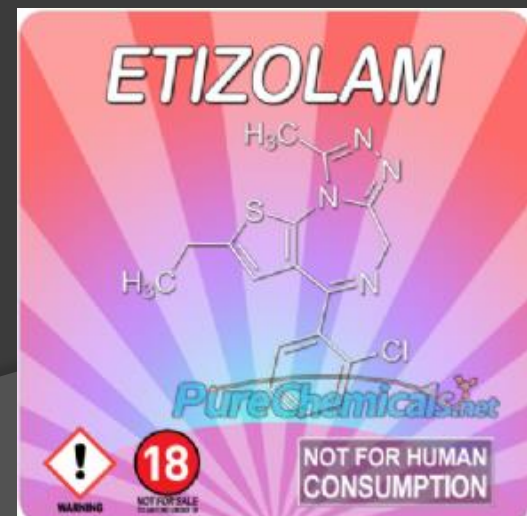
I've always enjoyed benzos because when I get stressed and anxious benzos help with that a lot. It's also nice to just get nice and chilled sometimes. But they've never been super recreational for me, and from what I've seen there's a lot of people on here and other communities who agree.

To all these people I say unto you: pop some flubromazepam.

This is a drug that's just hit the usual UK and EU RC vendors and man, it's amazing. Better than etizolam, pyrazolam, and diclazepam combined. Better than prescription benzos? Bitch it might be.

# Designer Benzodiazepines

- Many variations and analogs.
- Etizolam, phenazepam, flubromazepam,...
- Many prescription drugs in other countries.
- All have similar effects as GABA<sub>A</sub> agonists.
- Usually taken orally.





## Compare Search terms ▼

**Diclozepam**

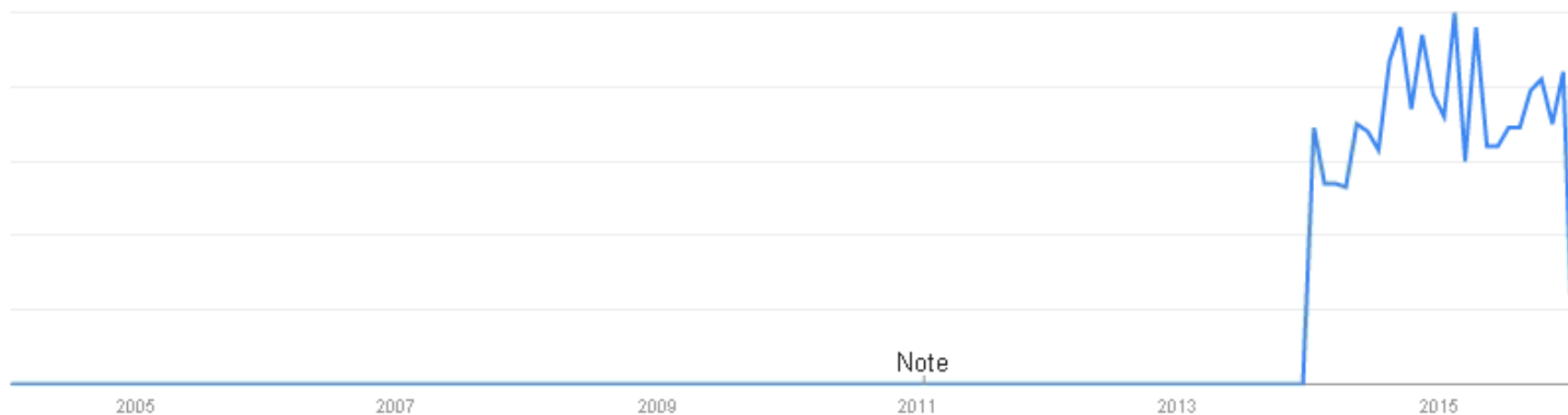
Search term

+ Add term

## Interest over time ?

☐ News headlines ?

☐ Forecast ?



Note



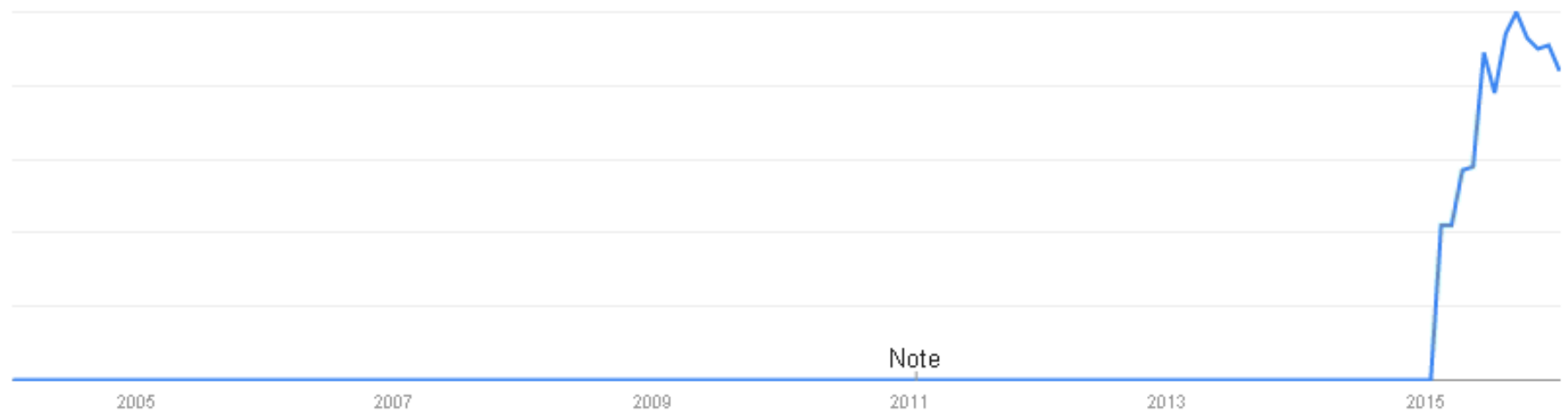
clonazepam

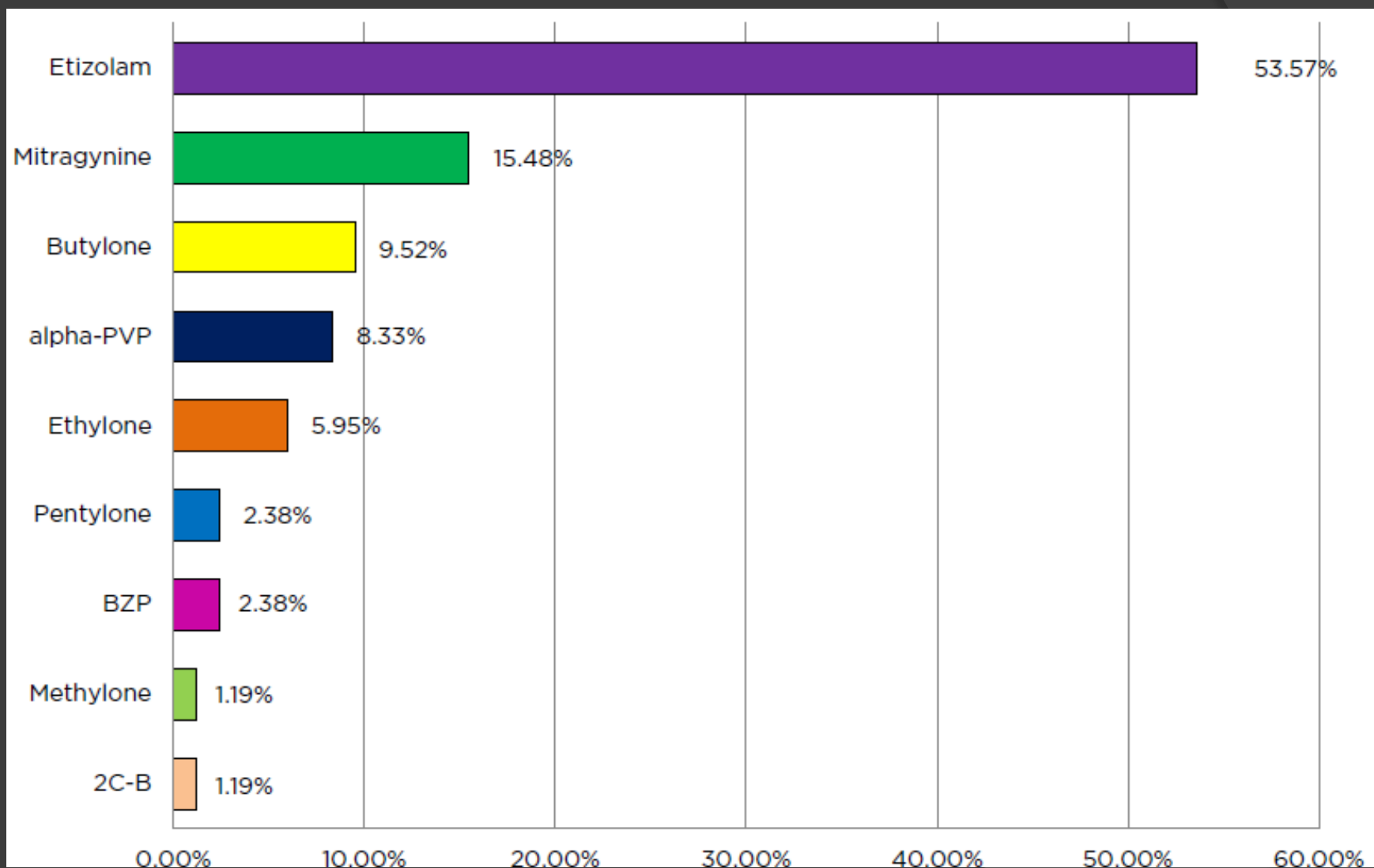
Search term

+ Add term

## Interest over time ?

News headlines ? Forecast ?





# Designer Benzodiazepines

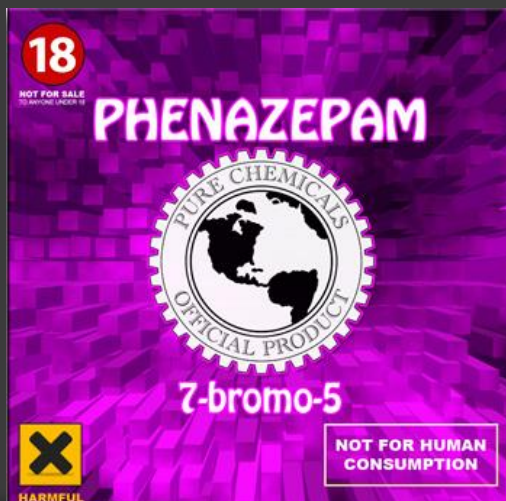
## Associated Clinical Symptoms

### Common

Sedation  
Respiratory depression\*\*

### Severe/Uncommon

Withdrawal?



# More and More NPS...

- Tryptamines – powerful hallucinogens
- 2C drugs – “synthetic LSD”
- PCP/Ketamine analogs
- Benzofurans
- Aminoindanes
- Designer amphetamines
- LSD analogs
- Cocaine analogs

**THE KANSAS CITY STAR.**  
kansascity.com

HOME NEWS SPORTS BUSINESS LIFESTYLE ENTERTAINMENT OPINION OBITS

NEWS  
October 19  
**Dangerous synthetic LSD moves into the Midwest**  
BY TONY RIZZO AND GLENN E. RICE  
The Kansas City Star

It's new, nasty and dangerous.

And people who take it are ending up in emergency rooms and morgues. Despite that, it remains, for now, legal.

It is a chemical compound that provides the same hallucinatory effects of LSD and is sometimes called fake acid, legal acid,







## ILLUSTRATIVE CASE

---

# Seizures, Systemic Inflammatory Response, and Rhabdomyolysis Associated With Laboratory-Confirmed 2C-I and 25-I Exposure

*Stephen L. Thornton, MD,\* Sarah Hoehn, MD,† and Roy R. Gerona, PhD‡*

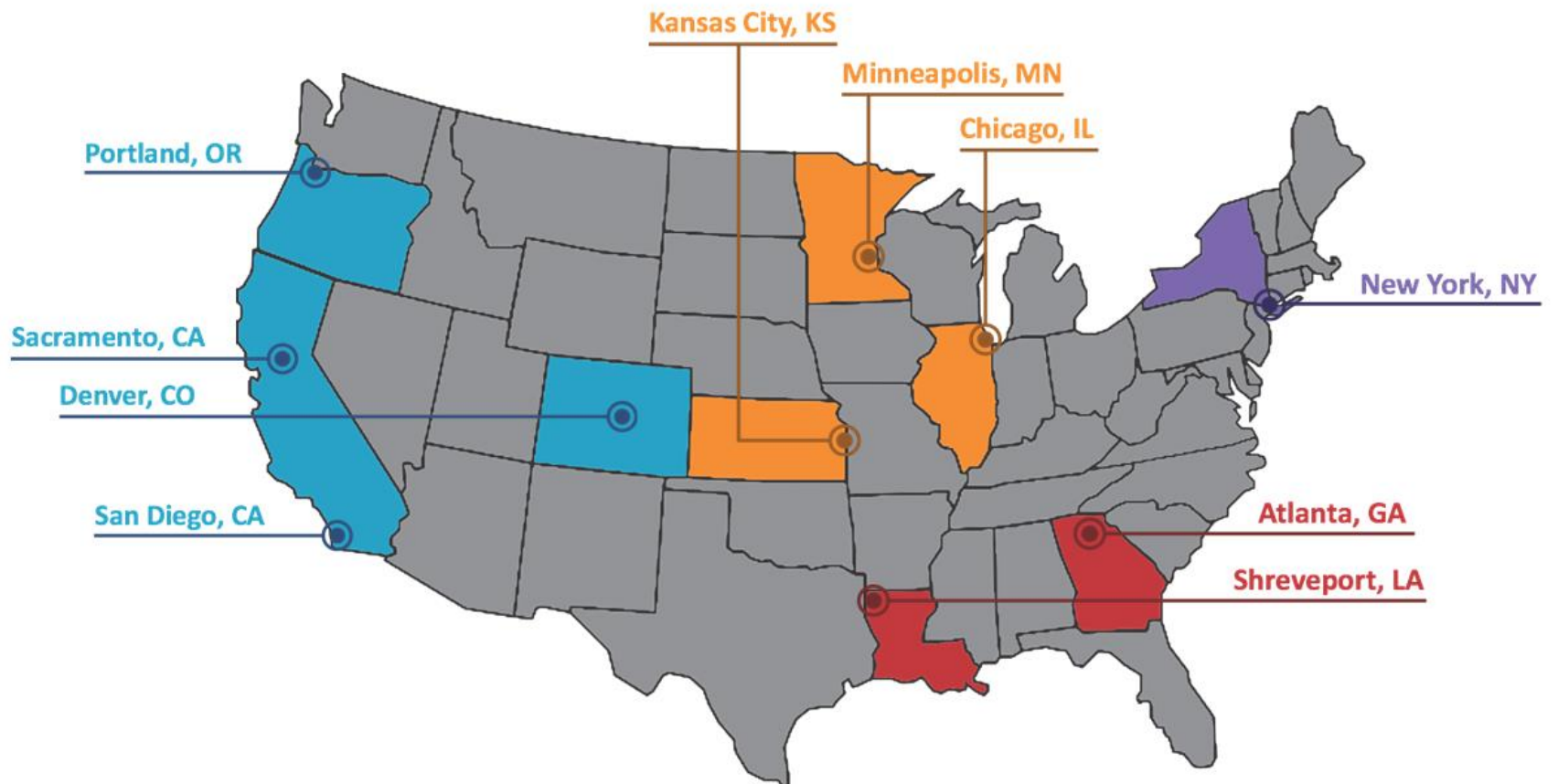
**Abstract:** The 2C drugs are hallucinogenic phenethylamines. They and their n-benzyloxymethyl analogs have become popular as “legal highs,” and significant toxicity has been attributed to their use. We report on a case of seizures, systemic inflammatory response, and rhabdomyolysis associated with laboratory-confirmed 4-iodo-2,5-dimethoxyphenethylamine and 4-iodo-2,5-dimethoxy-N-(2-methoxybenzyl) phenethylamine exposure. A 17-year-old male teenager developed seizures after taking “2 strips

## CASE

A previously healthy 72-kg 17-year-old male teenager was found at a friend's house having multiple seizures. Friends reported that he had taken “2 lines of acid” before onset of the seizures. He was reported to have been in his normal state of health before taking the drug. On arrival, emergency medical services personnel witnessed 2 tonic-clonic seizures and administered

# Trying to Address the Challenges of NPS...

- ⦿ **P-SCAN**
- ⦿ **Psychoactive Surveillance Consortium and Analysis Network**
- ⦿ Goal: Allow for “earlier” warning of NPS epidemics.
- ⦿ Multi-center (10 sites)
- ⦿ Analyze suspected NPS cases with LC-QTOF/MS from scavenged labs.



Center	Number of Cases	Confirmed Drugs of Abuse and Prescription Drugs	Confirmed and Suspect NPS
Sacramento, CA	1		
San Diego, CA	5	Amphetamine, Methamphetamine, MDMA, MDA, HMA, Fentanyl, Norfentanyl, Codeine, 11-nor-9-carboxy-THC	NRG-3, CHEICA-COOH, Deschloroetizolam
Oregon	9	Cocaine, 6-Acetylmorphine, Hydromorphone, Codeine, Oxycodone, Fentanyl, Methamphetamine, Lidocaine, Lopreamide, Lysergic acid, Ketamine, Tramadol	Phenibut, Mitragynine, DifenoXin
Colorado	27	Cocaine, Cocaethylene, Methamphetamine, Diphenhydramine, Codeine, Olanzapine	AMB-FUBINACA, ADB-FUBINACA, MDMB-FUBINACA, NRG-3
Minnesota	0		
Chicago	0		
Kansas	36	Heroin, 6-Acetylmorphine, Acetylcodeine, Codeine, Hydromorphone, Oxycodone, Lysergic acid, Methamphetamine, Amphetamine, Phencyclidine, Ketamine, 11-OH-THC, Cannabidiol, Mirtazapine, Trazodone, Aripiprazole, Lidocaine	NRG-3, Naphyrone, 2,3-Dimethylmethcathinone, MBDB, 4-Methoxybutyrfentanyl, 4-Methylaminorex
Georgia	13	Morphine, Oxycodone, Fentanyl, Lysergic acid, Methylphenidate, Meperidine, Lidocaine, Risperidone, Fluoxetine, Diphenhydramine	Diethylone, 2C-P, MAB-CHMINACA, Phenibut, Ocfentanyl
Louisiana	4		

Now for some good news...





# Common Treatment Pathway:

- Supportive care the key: Calm, Cool, Hydrate
- Watch QTc
- Excited Delirium common complication:
- If you have to calm them down:
  - Benzodiazepines, Haloperidol
  - Ketamine, Dexmedetomidine
- If you have to wake them up:
  - Naloxone for novel synthetic opioids.
  - Flumazenil for designer benzodiazepines.



# Take Home Points

- ◎ Characteristics/Challenges of NPS:
  - Research chemicals or foreign pharmaceuticals.
  - Start overseas.
  - Distributed via the internet.
  - Evolve rapidly.
  - “Not for human consumption” label.
  - Are difficult to detect and regulate.

# Take Home Points

## ⦿ Classes include:

- Synthetic Cannabinoids
- Synthetic Cathinones
- Novel Synthetic Opioids
- Designer Benzodiazepines
- Tryptamines
- 2C drugs
- Ketamine/PCP analogs
- Kratom

# Take Home Points

- ⦿ Severe complications include:
  - Respiratory arrest from novel synthetic opioids.
  - Strokes, MI, AKI from synthetic cannabinoids.
  - Excited delirium, hyponatremia and seizures from synthetic cathinones.
  - Withdrawal from designer benzos.

# Take Home Points

- ◎ Treatment is supportive:
  - Calm, Cool and Hydrate
  - Benzos, Haloperidol, Ketamine
  - Naloxone and flumazenil should work.



# Questions?

Call:

U of Kansas Health System

Poison Control Center:

8-6638

Dr. Thornton

913-917-0013

**POISON**  
**Help** <sup>®</sup>  
**1-800-222-1222**  
**KANSAS**



THE UNIVERSITY OF  
KANSAS HEALTH SYSTEM