

Street Drug Pharmacology 2021

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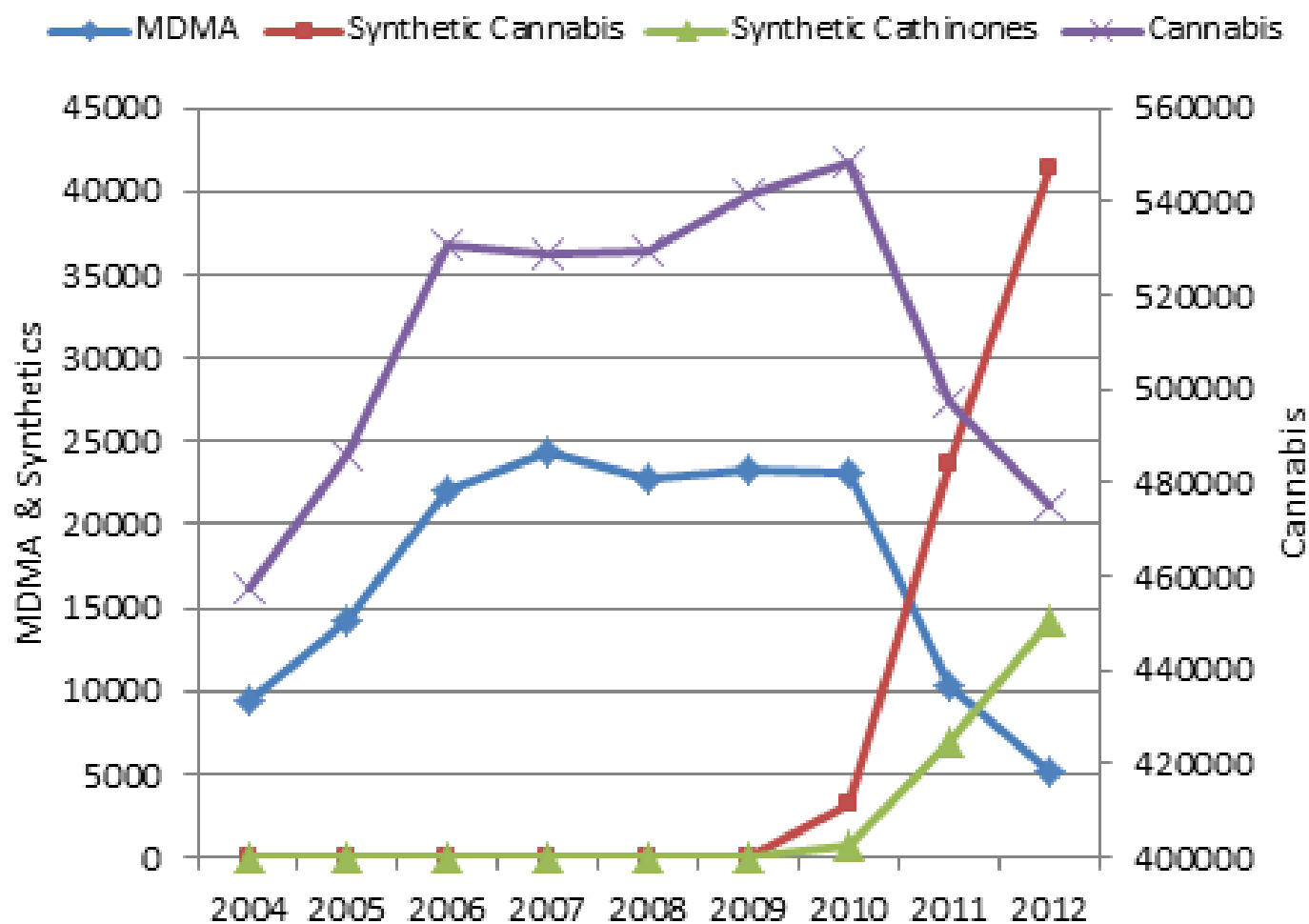


www.linkedin.com

Emerging Drugs of Abuse discussion group

Stimulants: Synthetic Cathinones

Changes in Number of Items Examined in DEA NFLIS:2004-2012



Khat

- Native to tropical East Africa and the Arabian Peninsula
- Fresh leaves/tops chewed or consumed as tea
- Stimulation and euphoria
- Part of social culture in many countries (coffee, tea, coca or khat?)



Khat cultivation in Yemen



Women in Somalia Selling Khat/Quat



Khat

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- Part of social culture in many countries (coffee, tea, coca or khat?)

Khat

- Coca-----Cocaine
- Khat-----Cathinone (Schedule I)
- Cathinone: Structure similar to amphetamines

BATH SALTS*

* Contain schedule I substances as of October 2011



Bath Salts: The 'Cannibal' From Miami's Alleged Dangerous Drug Of Choice

Posted: 05/30/2012 10:58 am Updated: 05/31/2012 10:39 am

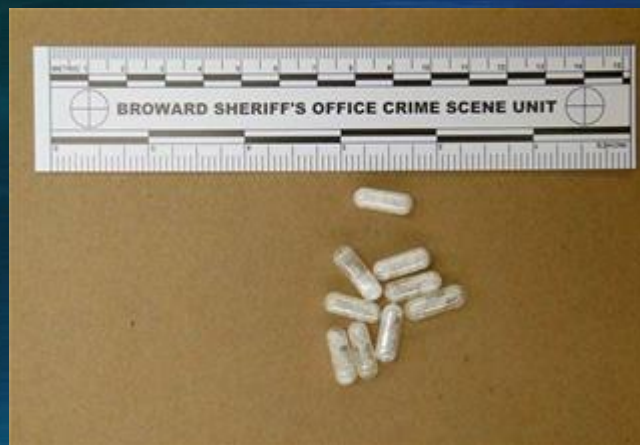


Rudy Eugene, 31, the so-called "Miami Cannibal" who was fatally shot as he chewed on another man's face in a gruesome attack over the weekend, is suspected to have been high on a drug known as "bath salts."

Miami cannibal case: NO bath salts or other street drugs found in his system, only marijuana

The Miami-Dade County Medical Examiner's released the toxicology results Tuesday on 31-year-old Rudy Eugene. Lab results found marijuana in his system, but not any other street drugs, alcohol or prescription drugs.

How Flakka Can Turn Man to Cannibal



No evidence exist that the person had taken “flakka”/alpha-PVP

“Bath Salts”

- Energizing Aromatherapy
- Down2Earth White Horse
- Kamikaze
- Ivory Wave
- Purple Wave
- Red Dove
- Blue Silk
- Vanilla Sky
- White Blizzard
- *Fake Cocaine*



“White Blizzard”

Possible Substances in “Bath Salts”

- All related to cathinone/methcathinone
 - 4 – Methylmethcathinone (Mephedrone, M-Cat, Meow, 4-MMC)
 - 3,4 – Methylenedioxymethcathinone (Methylone, MDMC)
 - 3,4 – Methylenedioxypropylone (MDPV)
 - Alpha-PVP
 - Pentedrone
 - Butylone
 - Pentylone

Possible Substances in “Bath Salts”

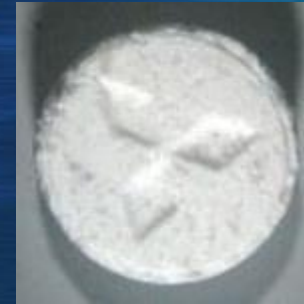
- **All related to cathinone/methcathinone**
 - **Ethylone**
 - Buphedrone
 - 4-MEC
 - 3,4-DMMC
 - Isopentadrone
 - pyrovalerone

Mephedrone

M-CAT



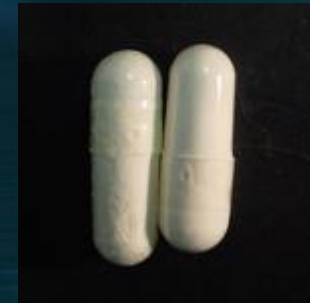
4-Methylmethcathinone
& **Caffeine**:



MDMA, caffeine & 4-Methylmethcathinone



4-Methylmethcathinone & **Caffeine**



4-Methylmethcathinone & **Methylone**

Mephedrone

- (4-methylmethcathinone /(4-MMC) or 4-methylephedrone)
- Do not confuse with methadone or methylone
- Onset:
 - Oral: 15–45 minutes
 - Insufflation (nasal/“snorting”): 10 minutes
 - i.v. injection (rare): 30 seconds
- Duration:
 - Oral/Nasal: 2-3 hours
 - Intravenous: 30 minutes



UNODC

United Nations Office on Drugs and Crime

VOLUME 15
March

GLOBAL SMART UPDATE



Special Segment

Injecting use of synthetic drugs

2016

Mephedrone

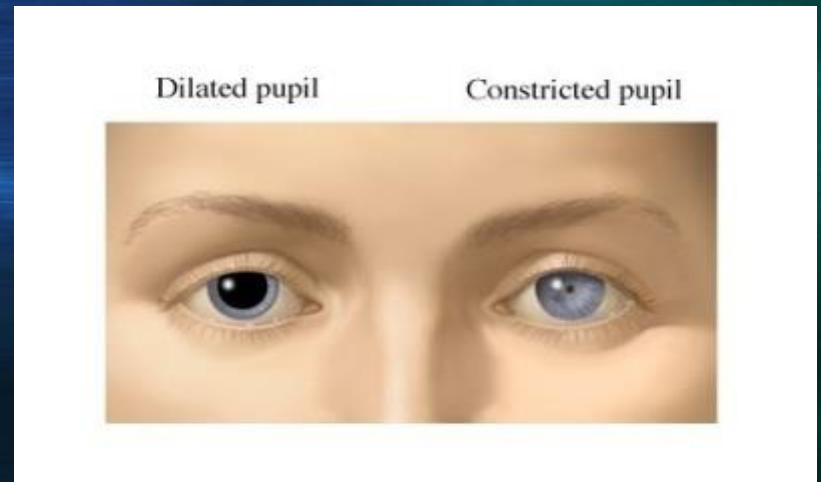
- Controlled under federal analog act
- No formal published studies effects on humans
- A few animal studies that could be applied to humans

Mephedrone

- Intended Effects: (Similar to MDMA/"ecstasy", amphetamines and/or cocaine)
 - Euphoria
 - Stimulation
 - Enhanced music appreciation
 - Decreased hostility/heightened empathy
 - Improved mental function
 - Mild sexual stimulation

Mephedrone

- Unintended (Side) Effects:
 - Dilated pupils
 - Poor concentration
 - Bruxism (teeth grinding)
 - Problems focusing visually
 - Poor short-term memory
 - Hallucinations
 - Delusions



Mephedrone Research

- UK Study:
 - Users w/ previous cocaine experience:
 - Better quality and longer lasting high
 - Less addictive
- Malanga, et. al. (2012)

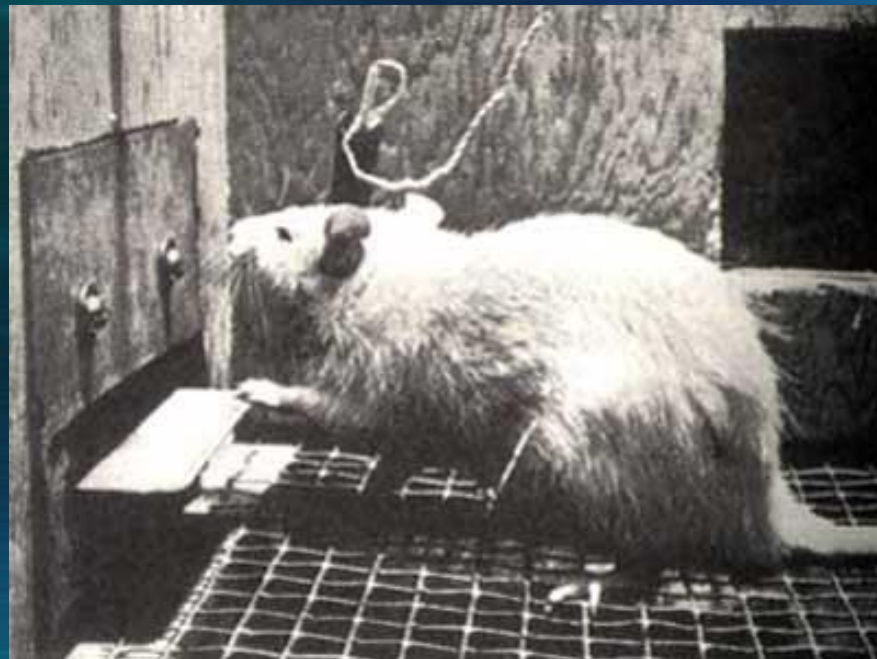
prefrontal
cortex

nucleus
accumbens

VTA

Intracranial Self-Stimulation

- Animal is fitted with an electrode implanted in mesolimbic reward pathway (MRP)
- Animal allowed to stimulate MRP by bar pressing
- Results in brain stimulation reward (BSR).



Cocaine and Intracranial Self-Stimulation

- Allowing an animal already fitted for ICSS to self-administer cocaine decreases ICSS
- Cocaine augments the pleasurable sensations produced by BSR and reduces the animal's desire to engage in ICSS
- When cocaine is available, ICSS is less desirable

Mephedrone and Intracranial Self-Stimulation

- Animals allowed to self-administer mephedrone decrease their ICSS
- Like cocaine, mephedrone makes ICSS less desirable
- Consistent with user self-reports

MDPV

MDPV Addiction Potential

- August 2013 journal *Neuropharmacology*
- Animal self-administration
- Found to be more rewarding than methamphetamine

Methylone

Methylone

- One of the most common synthetic cathinones
- Similar to MDMA/"ecstasy"
- Was an ingredient (along with MDMA) in one of two "Molly" overdoses at the Zoo Music Festival in New York over the 2013 Labor Day weekend
- Has appeared in "Molly" samples in other parts of the country

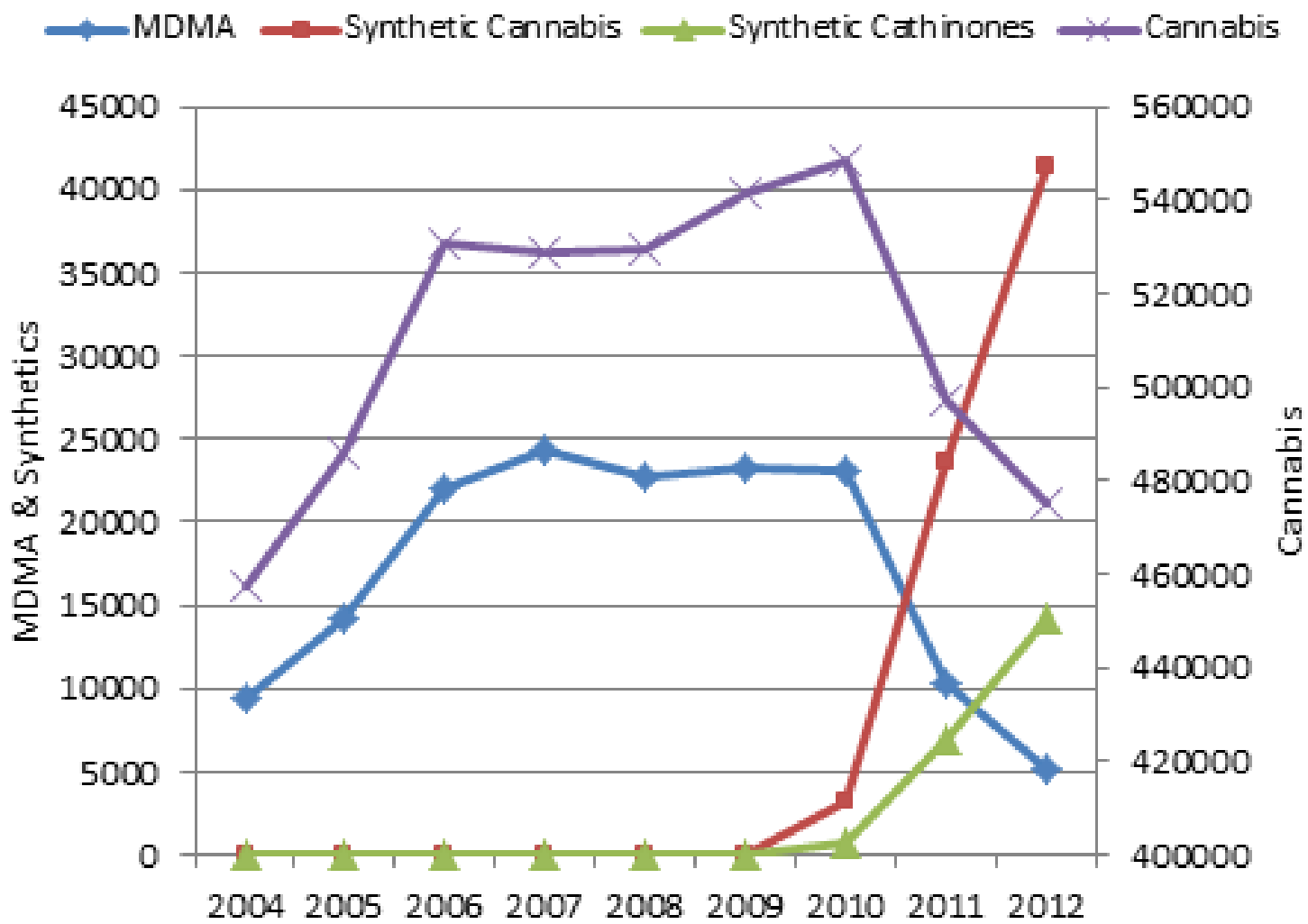
Good golly Miss Molly Who are you today?

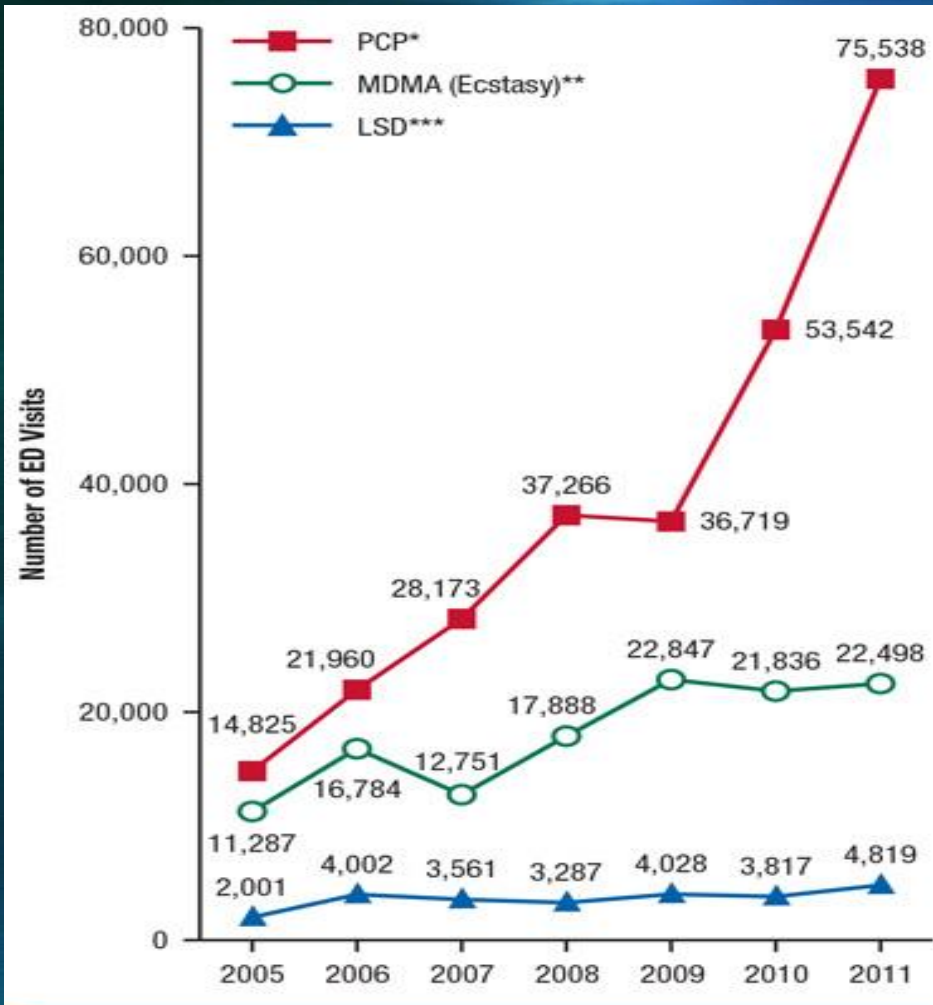
- Pop quiz: What is “Molly”?

MDMA

- “Ecstasy”
- “Molly”
- “Flat”/”Chicago Mints” (Chicago)

Changes in Number of Items Examined in DEA NFLIS:2004-2012





+410%

* The number of visits involving PCP in 2005, 2006, 2007, 2008, 2009, and 2010 is significantly different from 2011 at the .05 level.

** The number of visits involving MDMA (Ecstasy) in 2005 and 2007 is significantly different from 2011 at the .05 level.

*** The number of visits involving LSD in 2005 is significantly different from 2011 at the .05 level.

Source: 2005 to 2011 SAMHSA Drug Abuse Warning Network (DAWN).

ED visits involving PCP, LSD and MDMA: 2005-2011

MDMA vs Methamphetamine: Primary Effects

MDMA

- ED: 150 mg
- Addiction potential*: 5
- CNS stimulation: 5
- Appetite suppression: 4
- Risk of psychosis at 24 hours: 3
- Potential for violent behavior: 1

Methamphetamine

- ED: 10 mg
- Addiction potential: 9
- CNS Stimulation: 10
- Appetite suppression: 9
- Risk of psychosis at 24 hours: 5
- Potential for violent behavior: 5

* All scales = 0 (low) to 10 (high)

Drugs Sold as “Ecstasy” (2013)

Location/Name	Drug
• Purple Lamborghini/Seattle	• MDMA
• Angry Bird Pink/Las Vegas	• TFMPP/caffeine
• Moon Rocks/Las Vegas	• MDMA/1-(3,4-methylenedioxyphenyl)-2-propanol
• Blue Pacman Ghost/Los Angeles	• MDMA/caffeine
• Pink Gucci/Las Vegas	• TFMPP/caffeine
• Speckled Pink/NY, NY	• None detected
• Capsule/San Jose	• 2-Methylethcathinone (?)
• Molly	• No drug detected
• White Puma/SF	• MDMA/methamphetamine



Rocky Mountain Molly
Denver, CO
May 2013
4-MEC



Puma
San Francisco, CA
January 2014
MDMA/Methamphetamine

The New York Times

Overdoses of 'Molly' Led to Electric Zoo Deaths

By [James C. McKinley Jr.](#) September 12, 2013 6:06 pm

(One of the deceased) had taken a fatal mix of MDMA and **methyone**, a closely related stimulant that is also often sold under the name molly. Methyone is one of several stimulants and psychedelic drugs often used by drug dealers to cut MDMA, law enforcement officials said.

The New York Times

Overdoses of 'Molly' Led to Electric Zoo Deaths

By [James C. McKinley Jr.](#) September 12, 2013 6:06 pm

A third New Yorker died on July 15 of an **overdose of methyldone** after attending a different electronic dance music concert on Governors Island, the medical examiner's office said.



February 23, 2015

12 hospitalized due to MDMA overdose on Wesleyan campus

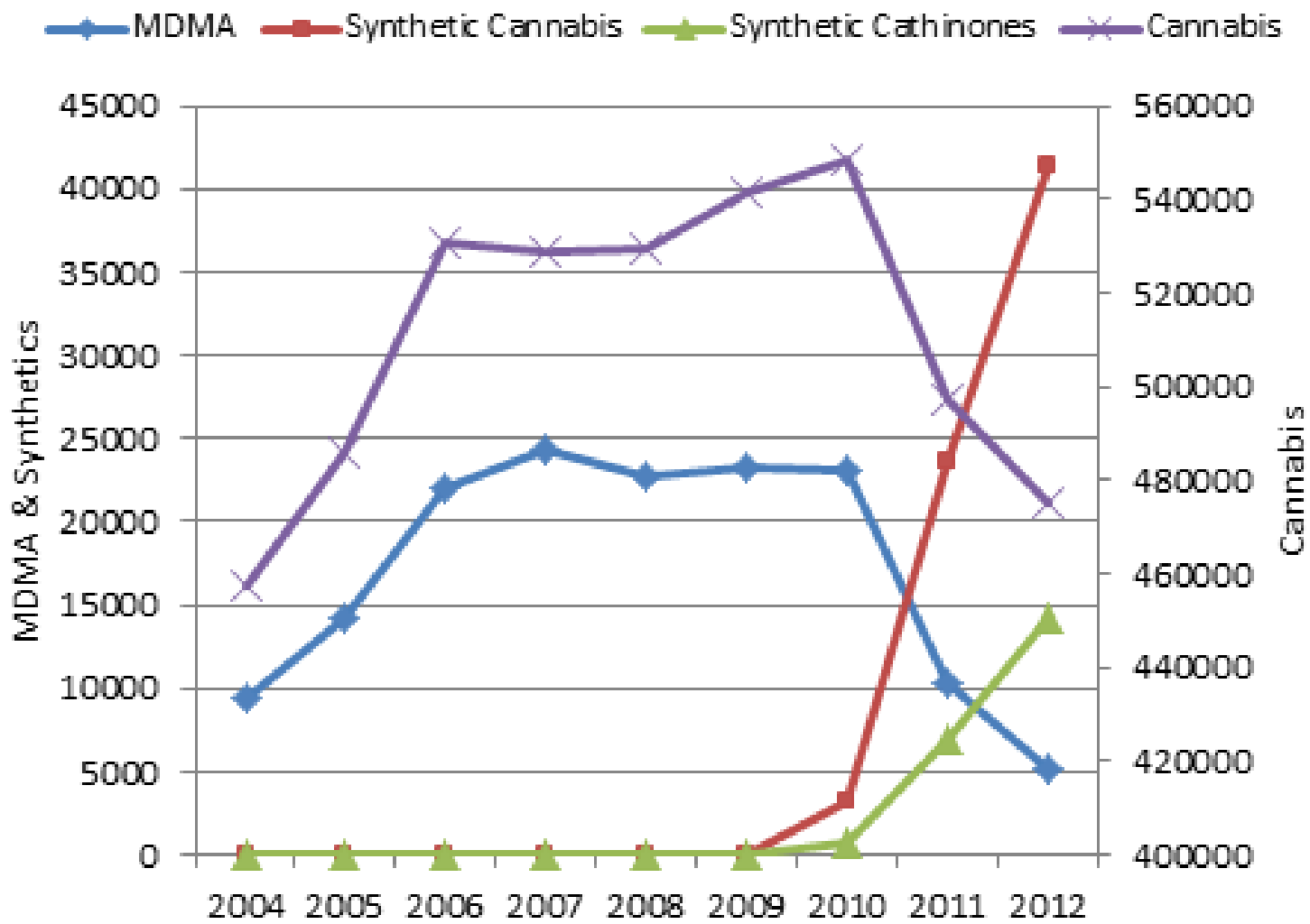
Dr. Mark Neavyn, chief of toxicology at Hartford Hospital: **"When we see these people in the emergency department and they claim to have taken Molly, we don't pay attention to that word anymore."**



Synthetic Cannabinoids

“K2”, “Spice”, “herbal incense”, “synthetic marijuana”

Changes in Number of Items Examined in DEA NFLIS:2004-2012



Herbal Incense

- Crushed, non-psychoactive herbal/plant matter treated with one or more synthetic cannabinoids
 - First Generation: “K2”, “Spice”, “Black Mamba”, “Red Dragon”
 - Second Generation: “K3”, “Splice”, “Apocalypse”, “Destiny”, “Cloud Ten”, “Head Trip”, house mixes

Herbal incense Pharmacology

- Hundreds of synthetic cannabinoids (similar to both Δ^9 -THC and endogenous cannabinoids) have been created
- Potency ranges from hundreds of times *more* potent than THC to over 1000x *less* potent
- Most common psychoactive ingredients in herbal incense were JWH series
- Synthesized in the 1990s by Dr. John W. Huffman at Clemson University

First Generation Herbal Incense: Typical Effects

- Cannabis-like intoxication
- Dreaminess
- Euphoria
- Introspective mood
- Hilarity
- Forgetfulness
- Heightened sensory perception

**THESE ARE THE EFFECTS MOST COMMONLY
REPORTED BY USERS**

First Generation Herbal Incense: Other Effects

- Severe anxiety (may persist after herbal incense use is discontinued)
- Panic attacks
- Dissociation (e.g., derealization)
- Racing thoughts
- Hallucinations
- Rapid pulse (tachycardia)
- Seizures (*Journal of Addiction Medicine*, Sept 2012)

User Report #2: "Apocalypse"

- 3 individual “hits” from a small pipe
- “organic” taste/no chemical odor or taste
- 5 minutes: Feels like Cannabis
- 10 minutes: Like an intense cannabis high
- More than 3 puffs might be too much

Case Study 1

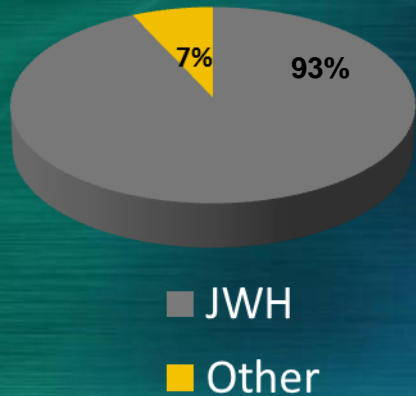
- 33 y.o. man
- Imaging technician
- Stable 8-year marriage
- Previous drug use: marijuana, alcohol, tobacco
- Used herbal incense daily
- After 3 months of use suddenly experienced a panic attack
- Immediately discontinued all AOD use
- Repeated episodes of anxiety still occurring after 18 months of abstinence

Case Study 2

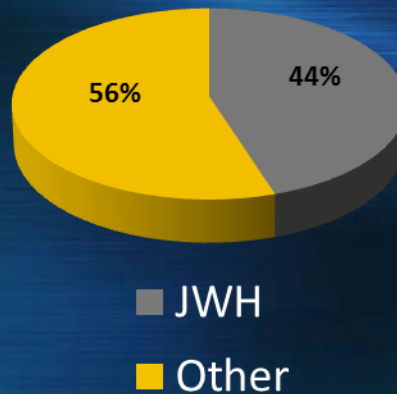
- 16 y.o. female
- In treatment for alcohol dependency
- History of bipolar disorder
- Smoked 3 “hits” of herbal incense
- 10 minutes (8:00 P.M.) later experienced psychotic episode
- Following observation at hospital, returned to normal at 12:00 A.M.
- Next day no apparent aftereffects

Rapid Growth in Number of Synthetic Cannabinoids Identified by DEA

19 variations in 2010
N=2,386



47 Variations in 2011
N=23,688



61 Variations in 2012
N=41,458

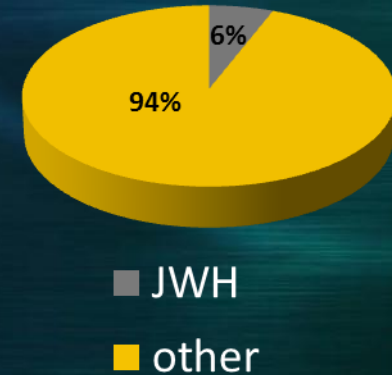


Fig. 1 Synthetic Cannabinoids in the U.S. NFLIS Toxicology Labs as of 9/27/13



The New Era: Herbal Incense Becomes Pure Synthetic Cannabinoids

Rapid Growth in Number of Synthetic Cannabinoids Identified by DEA

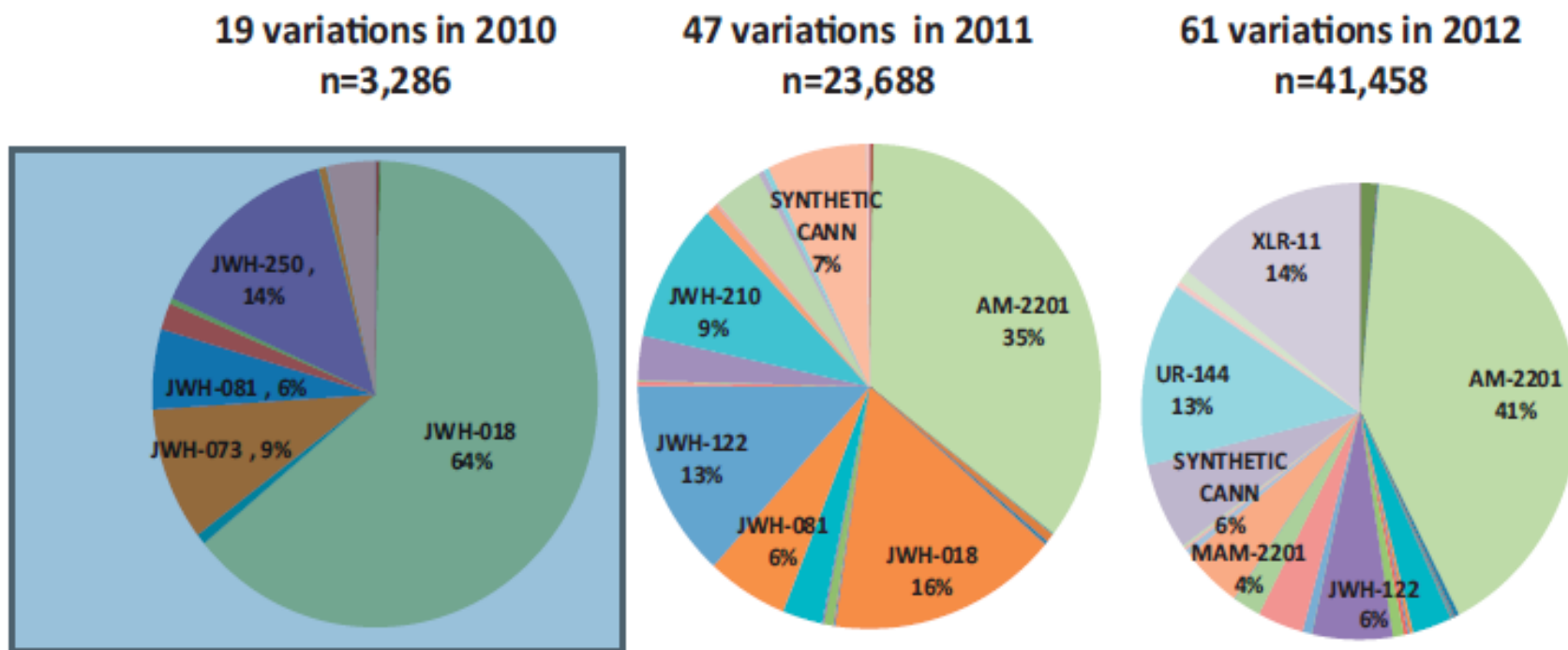


Fig. 1. Synthetic cannabinoids identified in U.S. NFLIS Toxicology Labs as of 9/7/13.

Calls to Poison Control Centers

- Data from the American Association of Poison Control Centers' "National Poison Data Center"
- 2010: 2,874 calls
- 2016 (January-July): 1,682
- 2021: (January-March): 161

Newer Synthetic Cannabinoids

● AM-2201

- Doses can be as low as 500 micrograms ($1/2000^{\text{th}}$ of a gram & $1/56,000^{\text{th}}$ of an ounce)
- Users' experiences (experienced outside observer) at 10 mg ($1/100$ of a gram)
 - Blacked out (unconscious)
 - Vomiting
 - Trouble breathing
 - Clenching every muscle in their bodies
 - (One person) Acting psychotic and screaming at the top of his lungs
 - (All three): Confusion for another hour or so

Rapid Growth in Number of Synthetic Cannabinoids Identified by DEA

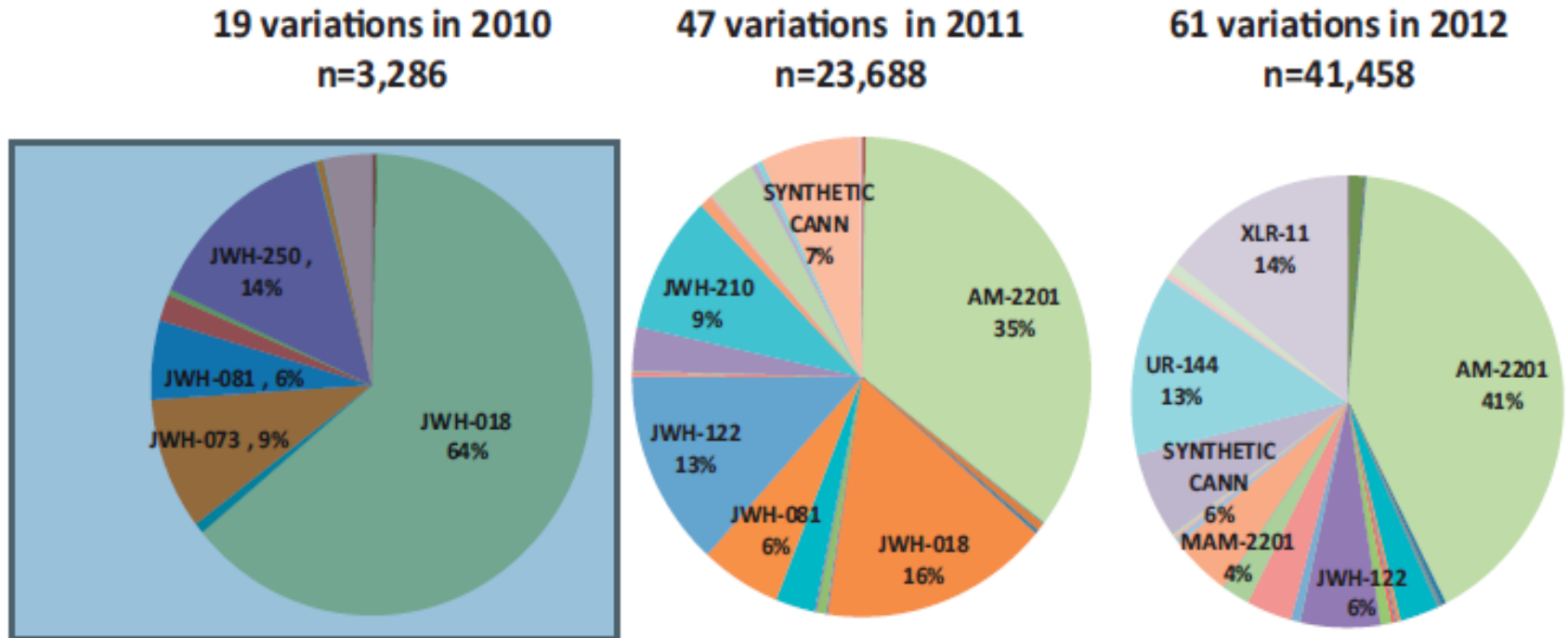


Fig. 1. Synthetic cannabinoids identified in U.S. NFLIS Toxicology Labs as of 9/7/13.

New Synthetic Cannabinoids

● XLR-11

- Potent CB₁ & CB₂ agonist
- First identified by laboratories in 2012 as an ingredient in synthetic cannabis smoking blends
- A novel compound invented specifically for grey-market recreational use
- Banned in New Zealand July 2012
- Placed in Schedule I by DEA May 2013
- Toxicity
 - Linked to acute kidney injury in some users



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People.™

Morbidity and Mortality Weekly Report (MMWR)

February 15, 2013

Acute Kidney Injury Associated with Synthetic Cannabinoid Use — Multiple States, 2012

Rapid Growth in Number of Synthetic Cannabinoids Identified by DEA

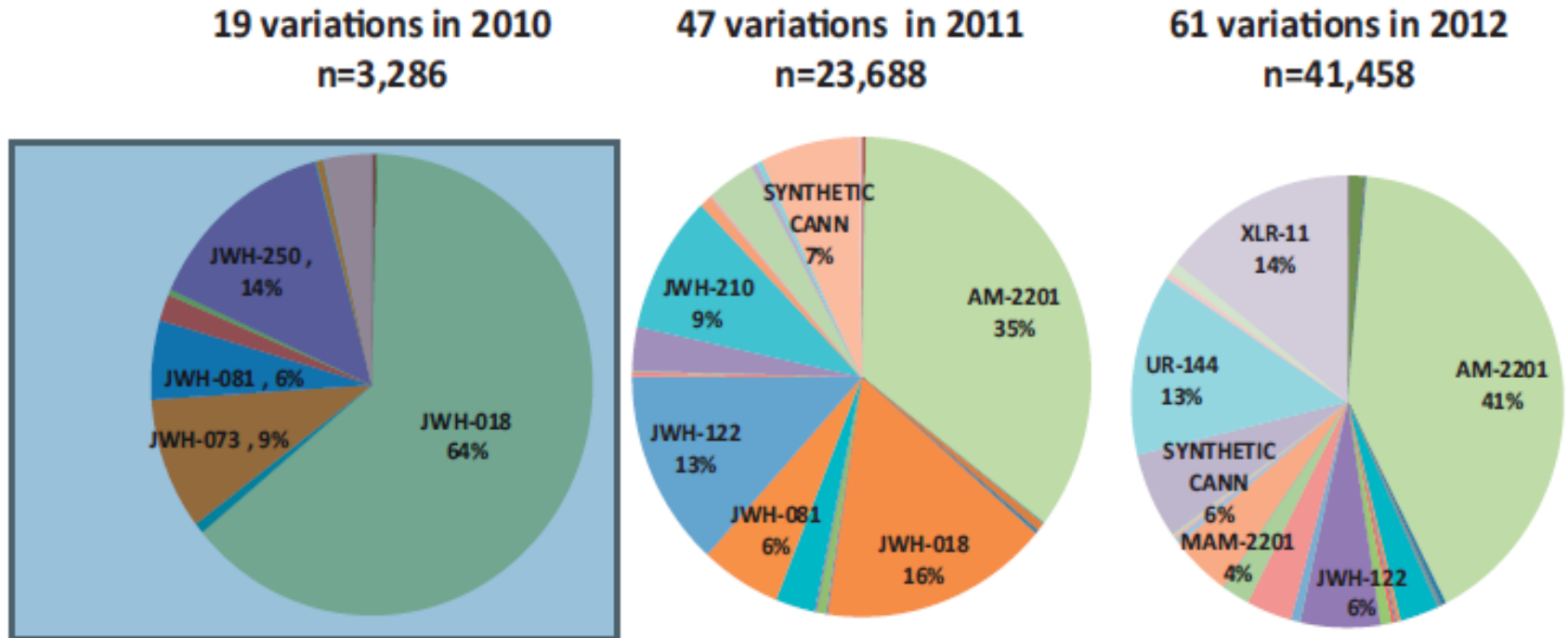


Fig. 1. Synthetic cannabinoids identified in U.S. NFLIS Toxicology Labs as of 9/7/13.

New Synthetic Cannabinoids

● UR-144

- Placed in Schedule I by DEA May 2013
- Users' experience:
 - Very mellow and enjoyable
 - A blissful glow...intellectually and artistically stimulating (then with more) Catapulted into another dimension where the stakes are high. On trial in front of God.
 - The familiar becomes strange and different, an alternate reality
 - The woods.....large and deep....the weeds actively malevolent, almost alive
 - I had no idea these chemicals could do something that intense. Thought the entire world was ending and I losing my mind.
 - Extreme addiction & depression after only half a week of use. Also major anxiety lasting for 2 days

Additional Synthetic Cannabinoids

- THJ-2201
- 5F-PB-22
- AB-CHMINACA
- AB-PINACA
- MAB-CHMINACA

Overview

- Synthetic cannabinoids are substances related to THC & the endogenous cannabinoids
- The number of SCs has increased dramatically
- Many times, the effects mimic those of cannabis
- Reports and observations of severe and persistent anxiety, psychotic episodes, seizure activity, overly rapid heart beat and kidney problems have appeared in the medical literature
- Some deaths have been reported, but since SCs are often used with other drugs, difficult to establish SCs as cause
- SCs are now available as powders to be snorted, injected or vaporized

Kratom

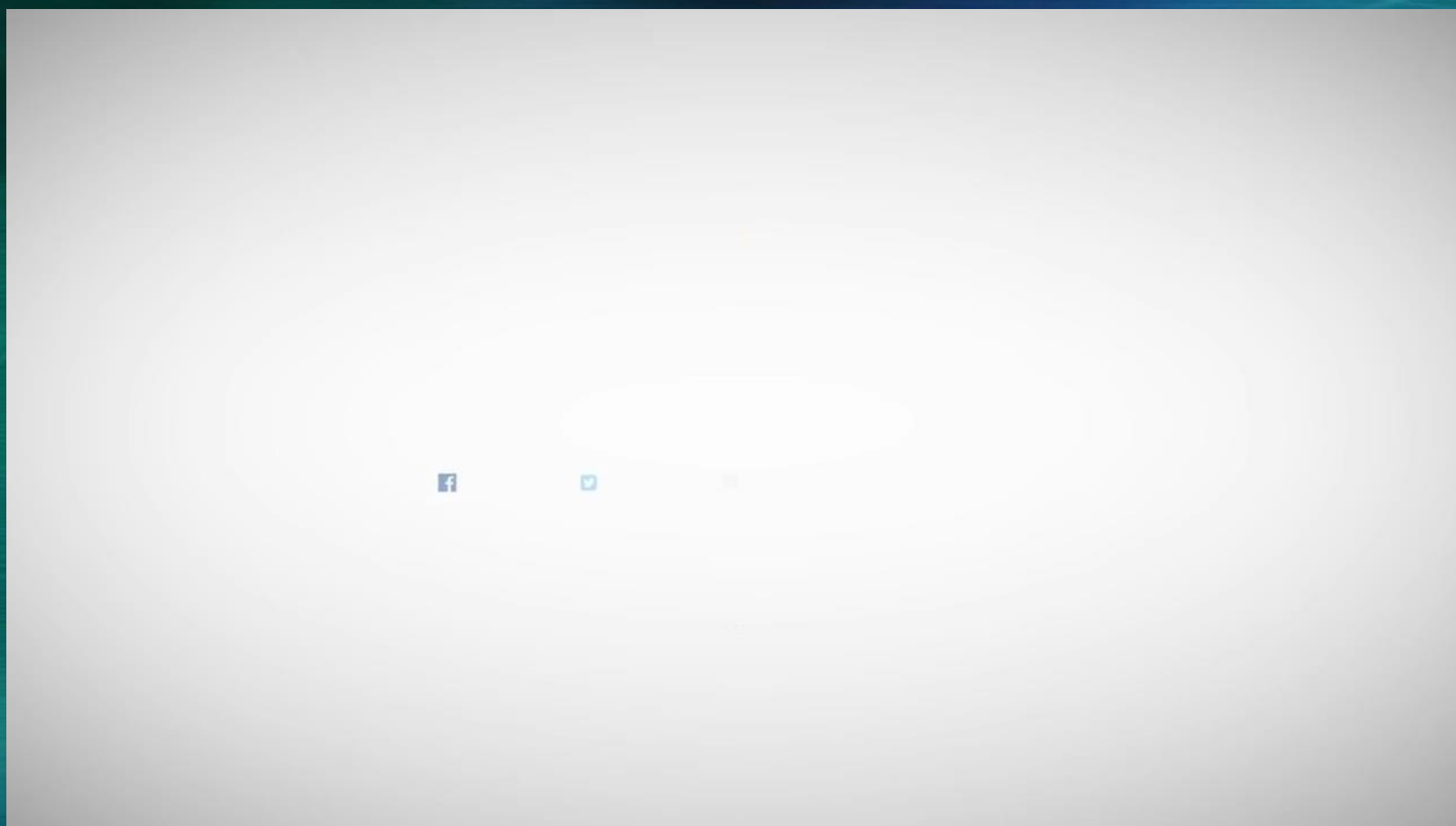
Will be placed in Schedule I in November



2 Investigators: Dangerous New Drug Kratom Being Sold Legally In Illinois



“This is as dangerous as it comes. It can cause heart rate going up sweating going up blood pressure going up and if you have other medical conditions it could actually be life threatening”. (Jack Riley, Special Agent in Charge, Chicago Field Division, U.S. Drug Enforcement Administration)



Kratom

- *Mitragyna speciosa*
- Used in
 - Malaysia
 - Thailand
 - Indonesia
- Local names:
 - ithang
 - biak biak
 - Ketum
 - Kakuam
 - Thom

Young Kratom Tree



Kratom Leaf



DRIED KRATOM LEAF



KRATOM CAPSULES



Kratom Powder and Tea



Kratom Packages



DEA Warns about Kratom



7-hydroxymitragynine

- Recently identified as main active ingredient.
- Animal research: Potent opiate agonist
- Ceiling effect: limits respiratory depression and euphoria.
- No fatal overdose of kratom known to have occurred

Kratom

- Processed kratom is sold in “smoke shops”
- Many brands
- Still legal
- No quality control
- Varying potency
- Different recommendations for use on packages and on the Internet

The kratom controversy

- DEA says kratom is dangerous and should not be used by physicians in treating patients
- NIDA is studying kratom as a possible alternative to methadone
- Other researchers are also studying kratom
- All non-government research will stop when kratom is placed in Schedule I

Purple Drank

- Drank
- Syrup
- Sizzup
- Lean

Purple Drank

- Codeine/promethazine cough syrup
- Mountain Dew/Sprit
- Jolly Rancher candy



Purple Drank

- Codeine/promethazine cough syrup
- Mountain Dew/Sprit
- Jolly Rancher candy

Purple Drank



Purple Drank

- May have originated as early as 1960s
- Popular in Texas in early 90s
- Spread through southern states, then nationwide
- Mentioned in rap and hip-hop music
- 2014: Justin Bieber

Purple Drank

- Codeine: Opiate effect
 - Sedation
 - Pain relief
 - Euphoria
- Promethazine (Antihistamine):
 - Sedation
 - Potentiates codeine
 - May be more lethal than codeine

Purple Drank

- Sometimes (less often) hydrocodone (Vicodin) cough syrup
- Cheaper “knock-off” version contains dextromethorphan (DXM)
 - Sedative in small doses
 - Dissociative anesthetic (like PCP) in high doses



Sippin Syrup



Slow your roll

PURPLE DRANK
ima grip and sip



WARNING!

**THIS
BEVERAGE
MAY BE
EXTREMELY
RELAXING AND
CALMING**



Purple Drank

The Nutritional Supplement of Champions

SALVIA

Salvia: One name-many plants

Salvia: One name-many plants

- Plants in the Mint family
 - Sage
 - Common Sage
 - Mexican Bush Sage
 - White Sage
 - Greek Sage
 - Diviner's Sage (*Salvia Divinorum*)

Meadow Sage



Salvia divinorum/Herba de Maria



Sierra Mazateca





Doña Ramona, a Seri shaman from Punta Chueca, Sonora, Mexico o



0.5 gm of



Salvia Divinorum: Recreational Use

- Smoked
 - Uncontrollable laughter
 - Past memories/revisiting places from childhood memory
 - Sensations of motion/being pulled or twisted by forces
 - Visions of membranes, films and various two-dimensional surfaces
 - Merging with or becoming objects
 - Overlapping realities/perception of being in several locations at once







IMPORTANT QUESTIONS

WHAT ARE THESE DRUGS?

WHAT EFFECTS DO THEY HAVE?

WHAT ARE THE DANGERS?

WHAT IS THEIR ADDICTION POTENTIAL?

ARE THEY IN MY COMMUNITY?