

Deadly in Design: New (Novel) Psychoactive Substances Update

23RD ANNUAL PERINATAL PARTNERSHIP CONFERENCE
MONDAY, SEPTEMBER 19, 2016
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Disclosure

- Member of Forensic Science Network LLC, a privately held company that provides forensic services to coroners, pathologists, and the law enforcement, medical and legal communities
- The opinions expressed herein are those of the author and not those of any other individual or entity.

Objectives

At the completion of this activity, the learner should be able to:

- Recall the "classic" pills, powders, potions and paraphernalia encountered in drug seizures, emergency department presentations, and death investigations
- Describe emerging trends in the use of new (novel) psychoactive substances
- Discuss the various challenges associated with new (novel) psychoactive substances classification and identification
- Recall what is currently known about the pharmacology and toxicology of "legal highs"
- Identify common routes of controlled and new (novel) psychoactive substances administration
- Understand the limitations of clinical laboratory testing as applied to identification of new (novel) psychoactive substances
- Understand current approaches to patient treatment when new (novel) psychoactive substances use is suspected

Substance Categories Most Frequently Involved in Human Exposures (Top 25)

- Analgesics (11.26%)
- Cosmetics/Personal Care Products (7.73%)
- Cleaning Substances (Household) (7.68%)
- Sedative/Hypnotics/Antipsychotics (5.85%)
- Antidepressants (4.36%)
- Antihistamines (4.01%)
- CV Drugs (3.96%)
- Foreign Bodies/Toys/Miscellaneous (3.87%)
- Pesticides (3.22%)
- Topical Preparations (3.21%)
- Alcohols (2.66%)
- Vitamins (2.56%)
- Cough/Cold Preparations (2.38%)
- Stimulants and Street Drugs (2.32%)
- Anticonvulsants (2.20%)
- Hormones/Hormone Antagonists (2.20%)
- Antimicrobials (2.20%)
- Bites and Envenomations (2.13%)
- GI Preparations (1.88%)
- Plants (1.74%)
- Dietary Supplements/Herbals/Homopathic (1.65%)
- Chemicals (1.51%)
- Fumes/Gases/Vapors (1.32%)
- Other/Unknowns/Nondrug Substances (1.24%)
- Hydrocarbons (1.24%)

Adapted from the 2014 AAFCC Annual Report

NFLIS Laboratories



25 Most Frequently Identified Drugs*

- Cannabis/THC
- Methamphetamine
- Cocaine
- Heroin
- Alprazolam
- Oxycodone
- Hydrocodone
- Buprenorphine
- Amphetamine
- Clonazepam
- Fentanyl
- Ethylone
- alpha-PVP
- XLR11
- AB-CHMINACA
- Morphine
- Diazepam
- Tramadol
- Methadone
- MDMA
- Phencyclidine (PCP)
- Non-controlled, non-narcotic
- Hydromorphone
- Psilocin/psilocybin
- AB-PINACA

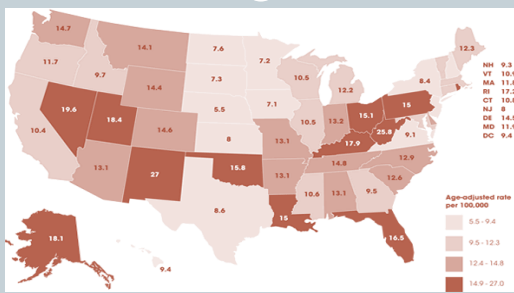
*NFLIS Midyear Report 2015

European Monitoring Centre for Drugs and Drug Addiction

[HTTP://WWW.EMCDDA.EUROPA.EU/](http://www.emcdda.europa.eu/)

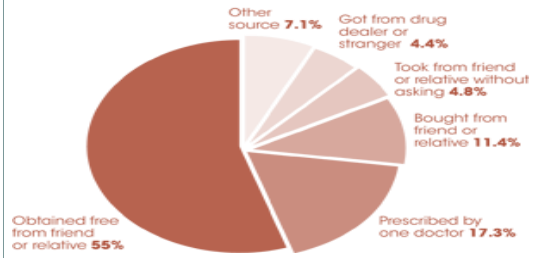
PRESCRIPTION AND "CLASSIC" STREET DRUGS

Drug Overdose Rates by State

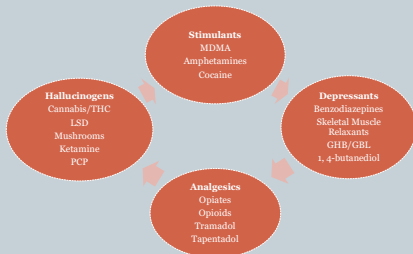


National Survey on Drug Use and Health

People who abuse prescription painkillers get drugs from a variety of sources⁷



The Familiar

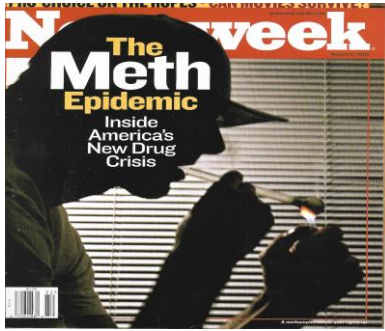


Cocaine HCl and Crack Cocaine



- **Cocaine HCl (195°C)**
 - Coca Leaf Chewing (3-5 minutes)
 - Snorting/Inhalation (10-15 minutes)
 - Topical
 - Oral (Swallowing, 30 minutes)
 - Injection (15-30 seconds)
- **Crack Cocaine (98°C)**
 - Smoking (5-8 seconds)

Clandestine Manufacture



Clandestine Lab Sites

- Houses
- Apartments
- Motel Rooms
- Storage Facilities
- Barns
- Garages
- Boats
- Backpacks
- Luggage
- Farms
- Vacant Buildings
- Vehicles
- Crawl Spaces
- Underground Bunkers

Opiates and Opioids



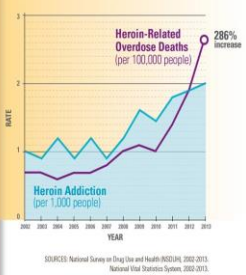
Papaver somniferum

- **Natural:** morphine, codeine
- **Semi-synthetic:** heroin
- **Synthetics:** methadone, meperidine, oxycodone, oxymorphone, hydrocodone, hydromorphone, propoxyphene, nalbuphine, diphenoxylate, butorphanol, pentazocine, buprenorphine, fentanyl....

Heroin Use Has INCREASED Among Most Demographic Groups

	2002-2004*	2011-2013*	% CHANGE
SEX			
Male	2.4	3.6	50%
Female	0.8	1.6	100%
AGE, YEARS			
12-17	1.8	1.6	--
18-25	3.5	7.3	109%
26 or older	1.2	1.9	58%
RACE/ETHNICITY			
Non-Hispanic white	1.4	3	114%
Other	2	1.7	--
ANNUAL HOUSEHOLD INCOME			
Less than \$20,000	3.4	5.5	62%
\$20,000-\$49,999	1.3	2.3	77%
\$50,000 or more	1	1.6	60%
HEALTH INSURANCE COVERAGE			
None	4.2	6.7	60%
Medicaid	4.3	4.7	--
Private or other	0.8	1.3	63%

Heroin Addiction and Overdose Deaths are Climbing

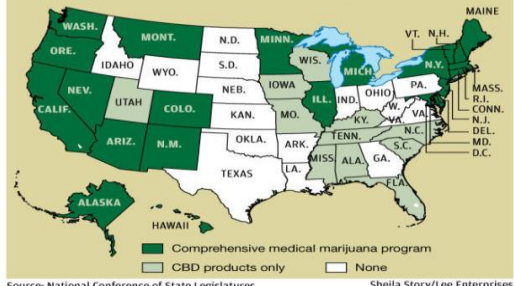


From this.....



Medical marijuana in U.S.

Twenty-three states and the District of Columbia allow use of marijuana for medical purposes. In 11 other states, lawmakers have OK'd low THC, high cannabidiol (or CBD) products for certain medical reasons.



To this.. Cannabis and the Edibles Industry



Hallucinogens



Mushrooms

Psilocin/Psilocybin



Adulterants and Diluents

- Adulterant-substances added to the analyte of interest with the intent of altering its character in some way. An adulterant will typically have some pharmacologic action of its own.
- Diluent-those substances *devoid* of physiologic effects that are added to increase the bulk of the final product.

A Few Adulterants

- Quinine
- Diphenhydramine
- Caffeine
- Acetaminophen
- Aspirin
- Niacinamide
- Diltiazem
- Levamisole
- mCPP
- Benzocaine
- Tetracaine
- Procaine
- Cocaine
- Lidocaine
- Methamphetamine
- MDA
- Clenbuterol
- Fentanyl
- Acetyl Fentanyl.....

With A Few Diluents

- Lactose
- Sodium Bicarbonate
- Sodium Chloride
- Mannitol
- Flour
- Cornstarch
- Dextrose
- Dimethylsulfone.....



Mimic (Counterfeit) Pharmaceuticals

Produced to resemble legitimate dosage forms
Mimic tablets typically contain illicit substances






NEW (NOVEL) PSYCHOACTIVE SUBSTANCES AND TRENDS IN THEIR USE

Definition

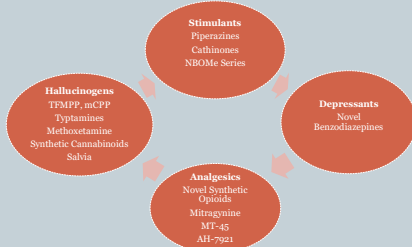
New psychoactive substance: a new narcotic or psychotropic drug, in pure form or in preparation, that is not controlled by the 1961 United Nations Single Convention on Narcotic Drugs or the 1971 United Nations Convention on Psychotropic Substances, but which may pose a public health threat comparable to that posed by substances listed in these conventions. (Council Decision 2005/387/JHA)

More Definitions

-  **Legal highs**
 - o Marketed in bright/attractive packaging. Sold openly in head shops and online. Aimed at recreational users.
-  **Research chemicals**
 - o Sold under the pretense of being used for scientific research. Aimed at those who explore the effects of psychoactive substances. Sold openly online.
-  **Food/Dietary Supplements**
 - o Sold under the pretense of being food or dietary supplements. Aimed at those who desire to enhance body and mind. Sold openly in nutrition centers and online.
-  **Designer Drugs**
 - o Distributed as MDMA, heroin and others. Produced in clandestine labs by organized crime. Sold on the illicit drug market by drug dealers.
-  **Medications**
 - o Medications diverted from patients or illegally imported into Europe/US. Sold on the illicit market by drug dealers.

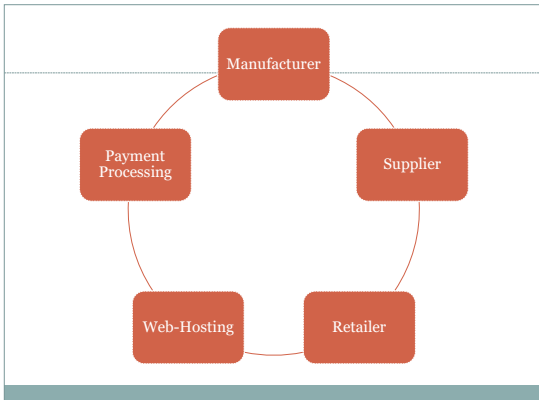
New Psychoactive Substances in Europe-2015

And The Not So Familiar




The Internet as Marketplace





NPS-Global Implications

- “In 2009, the European Monitoring Centre for Drugs and Drug Addiction Early Warning System (EWS) identified 24 new substances. In 2010, it identified 41. In 2011, there were 49 identified and in 2012, there were 73 more reported. By October 2013, an additional 56 compounds had been identified. In 2014, 101 compounds were reported.”




- ◆ Synthetic cannabinoids
- ◆ Phenethylamines
- ◆ Arylamines
- ◆ Synthetic cathinones
- ◆ Opioids
- ◆ Benzodiazepines
- ◆ Tryptamines
- ◆ Piperazines
- ◆ Others

New Psychoactive Substances in Europe-2015


Structural or Functional Analogs as NPS

- Production-Clandestine labs
 - Lack of quality control
 - No medical indication
- Structural/functional CS analogs
- Synthesized as new “molecular entity”
 - Evade regulation (CSA)
- Analytical challenges
 - Pills Powders Potions Paraphernalia
 - Biological matrices
- Potent toxicological effects
- Safety and efficacy-?
 - Dose→Concentration→Effect
 - Case Reports
 - Emergency Department
 - Death Investigations


Amphetamine




Pseudoephedrine




Tramadol



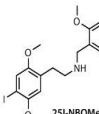
MBMA (“vostay”)




mCPP



25I-NBOMe

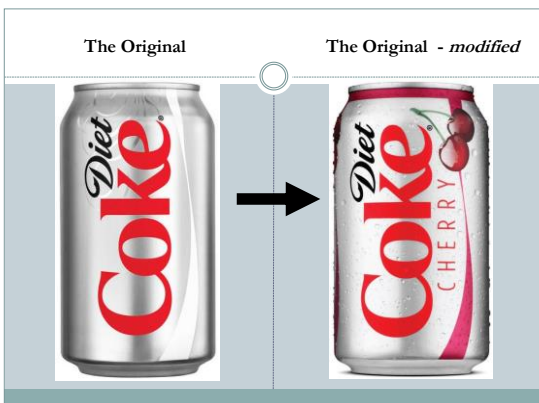


Amphetamine



The Controlled Substances Analog Law

- Any new substance may be considered a controlled “analog” if:
 - It has a substantially similar structure to a Schedule I or II hallucinogen, stimulant, or opiate, **AND**,
 - It has the same CNS effects as the related Schedule I or II hallucinogen, stimulant, or opiate, **OR**,
 - It was possessed or sold with the knowledge of being an analog
- Application can be *extremely* difficult
- FDA Safety and Innovation Act (2012)
 - Synthetic Drug Abuse Prevention Act



Building the Case

Information Sources-Drug Use and Toxicity

- 📄 Pharmacological studies (*in vitro*)
- 📄 Animal studies
- 📄 Self-reports/social media/crowdsourcing
- 📄 Published case reports
- 📄 Pre-hospital emergency services data
- 📄 Emergency department presentations
- 📄 Poison Center services
- 📄 Data collection through specialist centers

STIMULANTS

SYNTHETIC CATHINONES
 PIPERAZINES
 PHENETHYLAMINES
 NBOMe SERIES

SYNTHETIC CATHINONES (“BATH SALTS”)

Khat and the Synthetic Cathinones

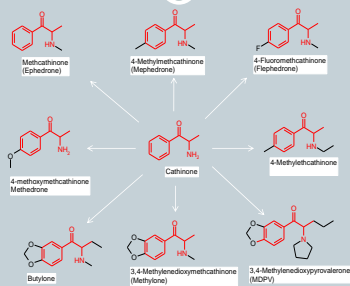


Khat contains the naturally occurring alkaloid **cathinone**, an amphetamine-like compound with stimulant, anorexic and euphoriant properties; **synthetic cathinones** bear a similar structural relationship to the naturally occurring compound

Synthetic Cathinones

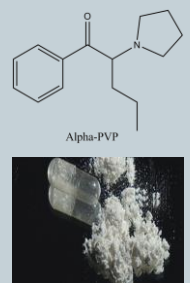


Synthetic Cathinones



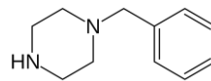
Synthetic Cathinones

- Mephedrone (4-MEC)
- MDPV
- Pentadrone
- Methylone (bk-MDMA)
- **Alpha-PVP (Flakka)**
- Buphedrone
- Ethylone
- MPPP
- Pentylone...



PIPERAZINES, PHENETHYLAMINES AND NBOME SERIES

Benzylpiperazine (BZP)



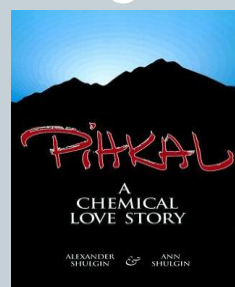
- Piperazines
 - Anthelmintic (1950's)
 - Antidepressant (1970's)
 - Recreational (1990's)
- Mixed MOA
 - Serotonin
 - Dopamine
 - "Weak MDMA"
- Analogs
- Adulterants
 - Caffeine
 - Illicit Stimulants

BZP Analogs

- 1-methyl-4-piperazine (MBZP)
- 1, 4-dibenzylpiperazine (DBZP)
- 3-chlorophenylpiperazine (mCPP)
- 3-trifluoromethylpiperazine (TFMPP), CI
- 3, 4-methylenedioxy-1-benzylpiperazine (MDBZP)
- 4-bromo-2, 5-dimethoxy-1-benzylpiperazine (2C-B-BZP)
- 4-methoxyphenylpiperazine (MeOPP)
- Para-fluorophenylpiperazine (pFPP)



Phenethylamines

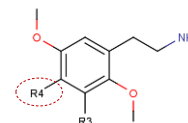


Phenethylamines



2C-Phenethylamines

- 2C-B
- 2C-E ("Europa")
- 2C-I (precursor to NBOMe compounds)
- 2C-T-2
- 2C-T-7
- 2C-C
- 2C-P
- 2C-H



NBOMe derivatives

19

- Work by Dr. Nichols et al., discovered modifications of hallucinogenic phenethylamines increases potency

1055-8452/06/7006-1956-1966\$20.00
 © 2006 The American Society for Pharmacology and Experimental Therapeutics
 DOI: 10.1093/ajph.70.6.1956

Vol. 70, No. 6
 2006

Molecular Interaction of Serotonin 5-HT_{2A} Receptor Residues Phe339^(6,51) and Phe340^(6,52) with Superpotent *N*-Benzyl Phenethylamine Agonists²¹

Michael R. Braden, Jason C. Parrish, John C. Naylor, and David E. Nichols

Death by NBOMe

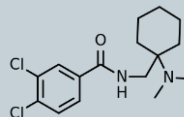


<http://www.abcnews.com/datetime/video/full-episode-one-small-dose-633409603895>

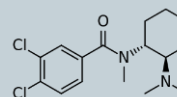
ANALGESICS

SYNTHETIC OPIOIDS MITRAGYNINE

The Magic of Chemistry



AH-7921



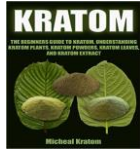
U-47700

Name	Medical Use	Pharmaceutical Name
Acetyl-alpha-methylfentanyl	None	
Alfentanil	Surgical analgesic, anesthetic	Alfenta, Rapifen
alpha-methylfentanyl	None	
alpha-methylthiofentanyl	None	
beta-hydroxyfentanyl	None	
beta-hydroxy-3-methylfentanyl	None	
Fentanyl	Analgesic, anesthetic	Sublimaze, Duragesic, Durogesic, Actiq, Effentora
3-methylfentanyl	None	
3-methylthiofentanyl	None	
para-fluorofentanyl	None	
Remifentanil	Short-acting analgesic during anesthesia	Ultiva
Sufentanil	Analgesic in anesthesia	Sufenta
Thiofentanyl	None	
Carfentanil	Immobilization of large animals (veterinary practice)	Wildnil

A Closer Look: Fentanyl Analogs

- **Acetyl fentanyl**
 - 16 x potency of morphine
 - Identified alone/combo with heroin, fentanyl
 - 14 deaths-Rhode Island (2013); PA, VA, NC, SC, LA
 - Cross-reactivity with ELISA
- **Butyryl fentanyl**
 - 7 x potency of morphine
 - Not scheduled; controlled substance analog
 - 5 deaths-MD (2015)
 - Cross-reactivity with ELISA
- **beta-hydroxythiofentanyl**
 - Synthesized directly from thiofentanyl
 - 10 deaths-South Florida (early 2015)
 - No cross-reactivity with ELISA (< 50 ng/mL)

Mitragynine-Kratom

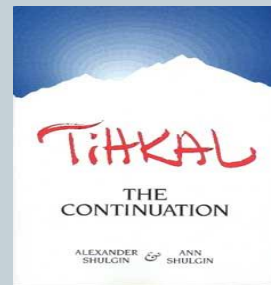


HALLUCINOGENS

TRYPTAMINES
METHOXYETAMINE
BHO
SYNTHETIC CANNABINOIDS
SALVIA DIVINORUM

TRYPTAMINES

Tryptamines



Tryptamines

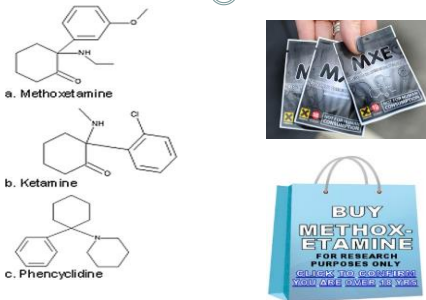


Tryptamine Palace
The information source for DMT, 5-MeO-DMT, and Visionary Culture

Tryptamines

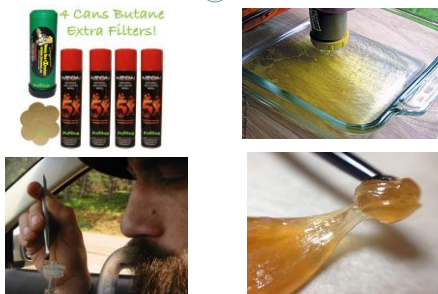
- DMT
- 5-MeO-DIPT
- 5-MeO-DPT
- 4-ACO-DMT
- 5-MeO-DMT
- 5-MeO-MIPT
- 5-MeO-AMT
- 5-MeO-DET
- 4-MeO-MIPT
- 5-MT
- AMT
- DPT

Methoxetamine



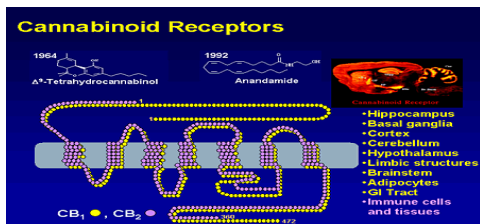
BUTANE HONEY OIL (BHO)

Butane Honey Oil (BHO)



SYNTHETIC CANNABINOIDS

Cannabinoid Research



Cannabinoids bind reversibly to cannabinoid receptors

Cannabinoid receptor affinity dictates clinical effects

Antagonists-obesity, osteoporosis, nicotine dependence, psychiatry

Agonists-inflammation, multiple sclerosis, cancers, cardiovascular disease

Synthetic Cannabinoids

- John W. Huffman, Ph.D. (Clemson)
 - Research with cannabinoid receptors (CB₁/CB₂)
 - Hundreds of indole/pyrrole derived compounds
 - Stronger agonists at CB₁ receptor
- Herbal blend mixture (inert) sprayed with synthetic cannabinoids
 - Smoking products
 - "Herbal Incense"
 - Head Shops, Internet, Gas Stations
- First seen in Europe (2004)
- Manufactured outside the US
- DEA-"drug of concern" (2009)
- Military Ban, Kansas (CI)
- DEA Emergency Schedule I (2011)



Synthetic Cannabinoids



Synthetic Cannabinoids

Over 100 compounds have been identified in the literature with potencies at least twice that of THC. This does not include the countless unpublished designer compounds which are likely to continue to arrive.

- | | | |
|-----------|------------------|------------------|
| ✦ JWH-018 | ✦ JWH-081 | ✦ JWH-307 |
| ✦ JWH-073 | ✦ WIN-55, 212-2 | ✦ CP47, 497 (C9) |
| ✦ JWH-250 | ✦ JWH-370 | ✦ AM-1220 |
| ✦ JWH-200 | ✦ CP47, 497 (C7) | ✦ RCS-4 (2-MeO) |
| ✦ JWH-210 | ✦ AM-630 | ✦ JWH-133 |
| ✦ JWH-203 | ✦ HU-210 | ✦ RCS-4 |
| ✦ JWH-122 | ✦ AM-2201 (C1) | ✦ RCS-4 (C4) |
| ✦ JWH-019 | ✦ CP47, 497 | ✦ RCS-8 |
| ✦ JWH-015 | ✦ Pravadoline | ✦ AM-2201 |
| ✦ JWH-251 | ✦ AM-1241 | ✦ AM-694 |
| ✦ JWH-398 | ✦ JWH-051 | ✦ And so on.... |

Reported Toxic Effects

Synthetic Cathinones and NBOME Series

- Agitation
- Tachycardia, Hypertension
- Mydriasis
- Nausea and Vomiting
- Chest pain
- Serotonin syndrome
- Headache
- Hallucinations
- Psychosis
- Hyperthermia
- Rhabdomyolysis
- Seizures

Synthetic Cannabinoids

- Agitation
- Tachycardia
- Chest pain
- Cardiac ischemia
- Hypertension
- Nausea and Vomiting
- Acute kidney injury
- Anxiety
- Depression

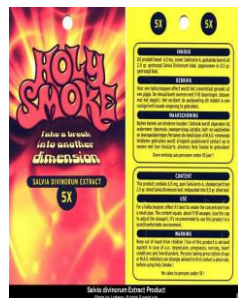
Salvia divinorum



"Diviner's Sage"
Religious use (Mazatec shamans)
Salvinorin A-psychoactive ingredient
Potent κ -opioid/ D_2 receptor agonist

Salvia divinorum

- Administration
 - Inhalation
 - Chewing ("Quid")
 - Sublingual (Tincture)
- Dose
- Effects
 - Onset
 - Peak
 - Duration of Action



CHALLENGES TO PATIENT CARE

Pick two.

Fast
Cheap
Accurate



What affects a compound's *presence* in the body?



- Dose
- Dosing Interval
- Route of administration
- Distribution
- Metabolism
- Clearance
- Stability-*in vivo*

What affects the compound's *detection*?

- Analyte of interest?
- "Best" Specimen
- Specimen collection/storage
- Analytical method(s)
- Stability
 - *in vivo*
 - *in vitro*
- Application of test results:
 - Clinical
 - Employee Drug Testing
 - Impaired Professionals
 - DUI/DWI
 - Death Investigation
 - Human Performance Testing....



What affects *interpretation* of toxicology results?

- The work of those who come before us!
- Biological matrix and specimen volume
- Analytical method(s)
- Documentation
- Knowledge/training/experience (toxicologist)
- And,
 - Case History
 - Clinical and/or Autopsy Findings
 - Postmortem redistribution
 - Criminalistics (PPPP)....



Challenges-PPPP and Toxicology

- Lack of certified reference standards
- Identification of isomers
- Increasing number of mixtures
- Difficulties in identification
 - How do we know to test for it?
 - Non-routine testing
- Limited capacity and analytical expertise (labs)
- Lack of formal PK/PD studies
 - Unknown metabolites
- Selectivity and sensitivity of screening methods
- Low dose, low concentrations (biological matrices)
- Rapid metabolism of parent compound
 - Short window of analytical detection

Risk Assessment

Physical, chemical, pharmaceutical and pharmacological information

Potential for dependence and abuse

Health risks

Social risks

Involvement of organized crime

Prevalence level

Serious Adverse Event

Serious adverse event means any adverse event associated with consumption of a new psychoactive substance in a human that:

- results in death;
- is life-threatening;
- requires hospitalization;
- results in persistent or significant disability or incapacity;
- consists of a congenital abnormality or birth defect;
- or is an important medical event that may not be immediately life-threatening or result in death or hospitalization but may jeopardize the patient or may require intervention to prevent one of the other outcomes listed above, should also be considered dangerous.

New Psychoactive Substances in Europe-2015

We are concerned about....

- New psychoactive substances
 - New to the market
 - Newly misused
- Changes in purity of established CS
- Nature of adulterants/diluents in established CS
 - Cocaine and Levamisole
 - Heroin and Fentanyl
- Substitutions in CS
 - Heroin sold as Cocaine
 - Fentanyl sold as Heroin
- New forms of use
 - Parenteral administration of synthetic cathinones
- Fatal/non-fatal intoxications
- Large seizures

Parting Thoughts

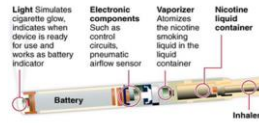
- Illicit drug market-evolving
- Market place: physical space to online
- Patterns of Use?
 - Acute-young, healthy, experimental attitudes
 - Chronic-adding NPS; lack of drugs of choice?
- Acute NPS toxicity-similar to "classic" drugs
 - Patient management
 - Symptomatic and supportive care
 - Duration of action appears longer
- Not all NPS are synthetics
 - If "natural" it must be safe



E-Cigarettes and Hookahs

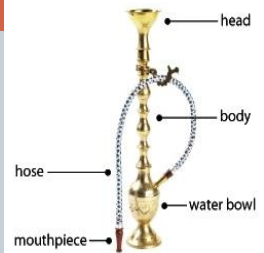
Electronic cigarette

An electronic cigarette, developed by a Chinese company, gives the user nicotine but no tar, no tar, no carbon monoxide, no ash and no stub.



Electronic cigarette	Comparison Equivalent	Regular cigarette
One e-cigarette	100 Puffs per cigarette	6-7 cigarettes
6-24 mg. Nicotine per puff	Nicotine level	0.6-2.4 mg.
E-cigarette with 24 mg of nicotine: 0.16 mg/puff	Nicotine per puff	Cigarette with 1.8 mg of nicotine: 0.16 mg/puff

Source: E-Cig. Graph: East Park, Elsebeth Nielsen © 2008 MCT



References

- Baselt, R., Disposition of Toxic Drugs and Chemicals in Man, Biomedical Publications, Foster City, CA., 2008
- CDC. Vital Signs: Overdoses of Prescription Opioid Pain Relievers—United States, 1999-2008. MMWR 2011; 60:1-6.
- Substance Abuse and Mental Health Services Administration. Results from the 2010 National Survey on Drug Use and Health: volume 1: summary of national findings. Rockville, MD: Substance and Mental Health Services Administration, Office of Applied Studies; 2011. <http://www.samhsa.gov/NSDUH/2k10NSDUHResults.htm#2.16>.
- Warner M, Chen LH, Makuc DM, Anderson RN, Minitio AM. Drug poisoning deaths in the United States, 1980-2008. NCHS data brief, no 81. Hyattsville, MD: National Center for Health Statistics; 2011.
- Whalen, J. "In Quest for Legal Highs, Chemists Outfox Law", Wall Street Journal. Oct. 29, 2010.
- NPLS Annual Midyear 2010 Report
- Mowry JB, Spyker DA, Brooks DE, et al. 2014 Annual Report of the American Association of Poison Control Centers' National Poison Data System (NPDS); 32nd Annual Report. Clinical Toxicology, 53:10, 962-1147, DOI: 10.1177/055656220131102927.
- European Monitoring Centre for Drugs and Drug Addiction, European Drug Report: Trends and Developments 2015, doi: 10.2810/084165.
- European Monitoring Centre for Drugs and Drug Addiction, European Drug Report: Trends and Developments 2016, doi: 10.2810/04912.
- Warrick BJ, Hill M, Hekman K, et al., A 9-state analysis of designer stimulant, "bath salt," hospital visits reported to poison control centers. Ann Emerg Med 2013 Sep; 62 (3): 244-251.
- Schwartz MD, Trevisi J, Edison LA, et al., A Common Source Outbreak of Severe Delirium Associated with Exposure to the Novel Synthetic Cannabinoid ADB-PINACA. J Emerg Med. 2015 May;48(5):573-80.
- European Monitoring Centre for Drugs and Drug Addiction, New Psychoactive Substances: Innovative Legal Responses June 2015, doi: 10.2810/90544.
- www.erowid.org
- www.scitec.gov