



Designer Drugs: What Clinicians Need to Know

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Objectives

1. Ascertain the general characteristics and effects of synthetic drugs
2. Determine the scope of problem of synthetic drug use
3. Identify characteristics and effects of synthetic cannabinoids and synthetic cathinones
4. Assess and recognize presenting symptoms of patients who have ingested designer drugs
5. Understand first steps in treatment of synthetic drug use

The problem...

Agenda

- › Definitions
- › Scope of Problem
- › Clinical assessment of synthetic drug use
 - Cathinones
 - Cannabinoids
- › First steps in treatment of synthetic drug use

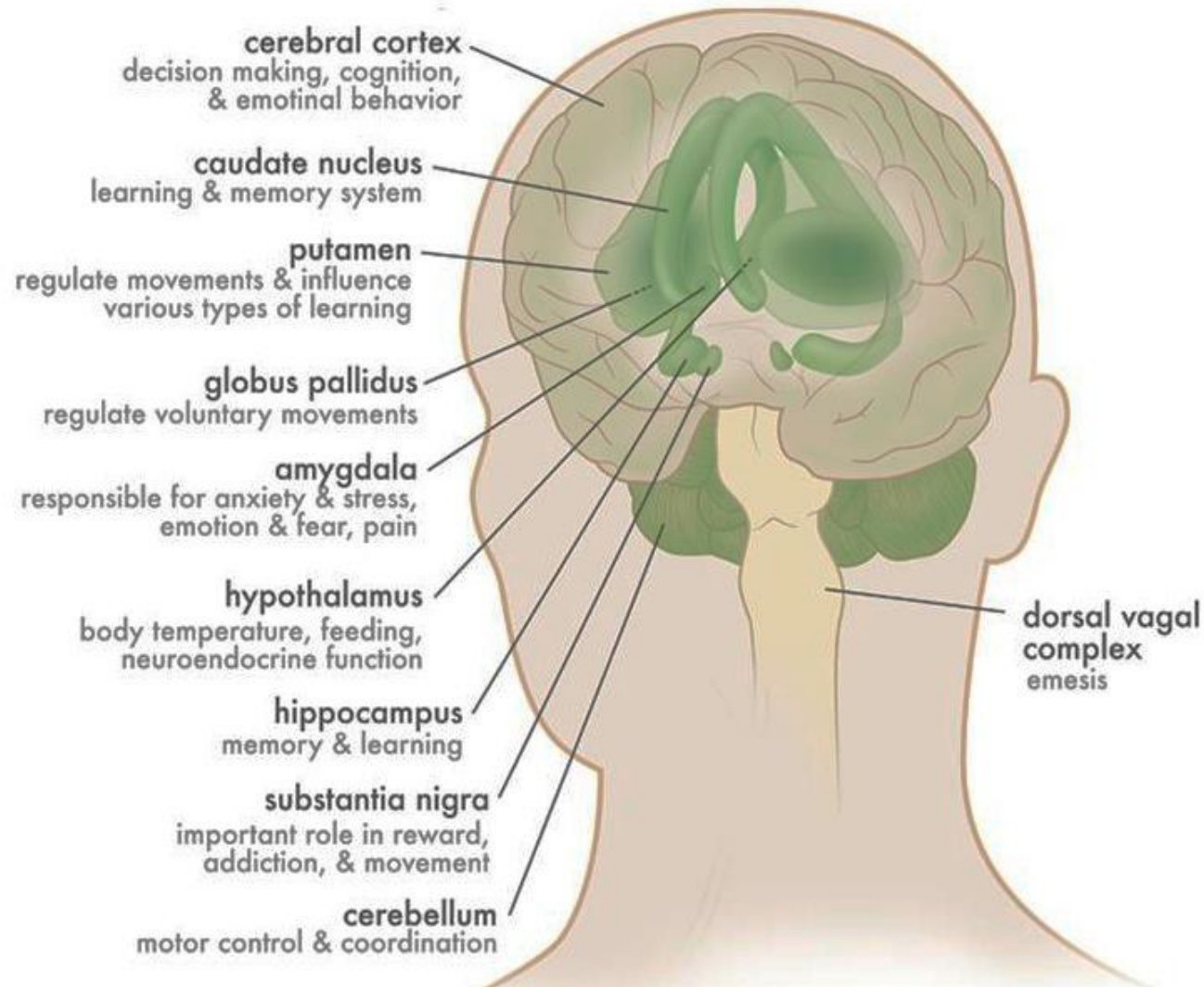
Definitions

- * Psychoactive substances
- * Synthetic Drugs
- * Types of synthetic drugs
 - * Cannabinoids
 - * Cathinones

Psychoactive Substances>

Distribution of CB1 Receptors

- > Have dramatic effect on **neurotransmitters** in central nervous system



Psychoactive Substances



Alcohol and drugs



Psychoactive Substances

**Taken to change the way one feels, thinks,
behaves, perceives**

Commonly Used Psychoactive Substances

SUBSTANCE	EFFECTS
Alcohol (liquor, beer, wine)	euphoria, stimulation, relaxation, lower inhibitions, drowsiness
Cannabinoids (marijuana, hashish)	euphoria, relaxations, slowed reaction time, distorted perception
Opioids (heroin, opium, many pain meds)	euphoria, drowsiness, sedation
Stimulants (cocaine, methamphetamine)	exhilaration, energy
Club Drugs (MDMA/Ecstasy, GHB)	hallucinations, tactile sensitivity, lowered inhibition
Dissociative Drugs (Ketamine, PCP, DXM)	feel separated from body, delirium, impaired motor function
Hallucinogens (LSD, Mescaline)	hallucinations, altered perception

Why People Use Psychoactive Substances

Why Start?

- Experimental
- Peer Pressure
- Medical

Why Continue?

- Relieve stress/pain
- Function better
- Have fun/relax
- Cope with mental health disorders

DEFINITIONS

Designer Drugs are **SYNTHETIC DRUGS**

COMMON TRAIT of producing psychoactive effects from **cannabis-like, psychomotor stimulation, dissociative anesthesia to hallucinogenic.**

Designer Drugs are **SYNTHETIC DRUGS**

Often found **online, chemically based, NOT plant derived**

Produced in laboratories, **chemically complex**, formula **constantly changing** to stay legal

Similar to but **chemically different** from illegal substances

Sold **inexpensively** in bulk powders

Deceptively labeled as “**research chemicals**”, “**bath salts**”, “**plant food**”, “**incense**”, designated as “**not for human consumption**”

SYNTHETIC DRUG CLASSIFICATIONS

SYNTHETIC DRUG CLASS	MIMICS THE EFFECTS OF	EXAMPLES
CANNABINOIDS	MARIJUANA	K2, SPICE, HERBAL INCENSE
PHENTHYLAMINES CATHINONES	STIMULANTS AND HALLUCINOGENS	BATH SALTS, 2-c SERIES COMPOUNDS
PHECYCLIDINES OR ARLCYCLHEAXAMIN ES	PCP	
TRYPTIAMINES	HALLUCINOGENS	
PIPERAZINES	BZP	
PIPRADROLS OR N- RING SYSTEMS	STIMULANTS	N-BOMB
TROPANE ALKALOIDS	COCAINE	

Synthetic Cannabinoids

*Chemicals made to **act** like the **active part** of cannabis-tetrahydrocannabinol (**THC**)

*Sold in “**herbal**” smoking mixtures that **sometimes** have **no synthetic cannabinoids at all**

Synthetic Cannabinoids (a.k.a. Spice)

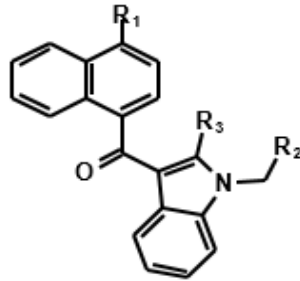
- > **Wide variety of herbal mixtures**
- > Marketed as “safe” alternatives to marijuana
- > **Brand names include: K2, fake weed, Yucatan Fire, Skunk, Moon Rocks**
- > Labeled “not for human consumption”
- > **Contain dried, shredded plant material and chemical additives**
 - **(sprayed/soaked)** that are responsible for their psychoactive
- > **effects.**

Synthetic Cannabinoids (Spice)

- › Mainly abused by **smoking** - alone or with marijuana
- › **Also be prepared as an herbal infusion for drinking**
- › **5 active chemicals** most frequently found in “Spice” products classified by the DEA as **Schedule I controlled substances**, and are **illegal to buy, sell, or possess**.

Synthetic Cannabinoids: The Major Compounds

a) Naphthoylindoles



JWH-018

JWH-073

JWH-398

JWH-200

JWH-081

JWH-015

JWH-122

JWH-210

JWH-019

JWH-007

AM-2201

JWH-020

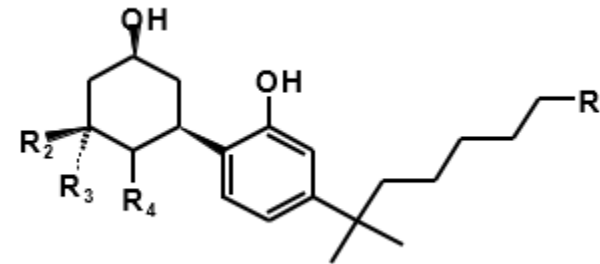
JWH-387

AM-1220

JWH-412

5-Fluoropentyl-JWH-122

b) Cyclohexylphenoles



CP-47,497-C8

Factors Associated with Spice Products' Popularity

- › **Induce psychoactive effects**
- › **Readily available** in retail stores and online
- › **Packaging is highly attractive**
- › **Perceived as safe** drugs
- › **Not easily detectable in urine and blood samples**

Case Study I: Clinical assessment and treatment

Case Study II:

Michael is a 16 yr old AA/Hispanic male with history of severe emotional and physical abuse as a young child. He has history of depression, anxiety and nightmares as well as emotional numbing. By the age of 13 he had abused a variety of substances- marijuana, cocaine, heroin, and methamphetamine primarily. He had 6 months sobriety after being placed in a longterm care. Once out he dropped out of school but had a job at a local fast food place and rarely missed a shift.

Today his mother brought him in as she noticed over the past month, he'd had mood swings and was rarely home. Then two weeks ago he began sleeping irregularly and had been talking rapidly, which was unlike him. He couldn't sit still for a blood pressure but allowed a pulse and his heart rate was 136 bmp.

Case Study II:

Mother reports he complained of “cotton mouth” and she noticed his eyes always looked red. He had been complaining of nightmares and felt that shapeless “ghosts” were talking to him, interfering with his ability to concentrate. He was always anxious and biting his nails.

When asked what his experience of the ghosts were he commented that “no one understands me, in fact they are trying to keep me quiet.”

Assessment

- › Mildly elevated BP
- › Xerostomia (dry mouth)
- › Tachycardia HR over 120 bpm
- › Blurred vision
- › Nightmares
- › Anxiety/Panic
- › Alteration in mood/perception
- › Numbness/Tingling/NV/SZ
- › Paranoia
- › Hallucinations
- › Agitated
- › Conjunctival injection

DIFFERENTIAL DX

Delirium

Primary psychiatric illness

Metabolic Disturbance

Infection

Nutritional Deficit

Endocrine

Bath salts ingestion

**Spice (synthetic cannabinoid)
ingestion**

› ACUTE TREATMENT PLAN

- Close observation or hospitalization depending on acuity
- Usually acute effects disappear in 2 hours after ingestion
- Monitor VS, neurological sx, risk of sz and violence
- Supportive care aimed at symptoms
- Psychotic reaction lasting 2 days to several weeks and up to mo5 months
- Calm, quiet environment, min stimuli

- Possible labs/procedures
 - › CBC, metabolic panel, serial cardiac enzymes if chest pain and urine toxicology UA, Chem7, CBC, LFTs, TSH
 - › ECG, cardiac enzymes, CPK
 - › If evidence of head injury- non contrasted CT, particularly if no evidence of improvement after 24 hours

- Benzodiazepines
 - › Treat agitation
 - › Reduce risk of sz that might happen with withdrawal
 - › Decrease risk of hyperthermia

- Judicious use of antipsychotics as lower sz threshold
 - › Treat psychosis, hallucinations, paranoia

Synthetic Cathinones

*Cathinone is **naturally occurring chemical stimulant** alkaline drug found on the shrub in E. Africa and S. Arabia- **Khat (pronounced 'cot')**

*Family of **synthetically produced and related chemicals** mephrodone, methylone (M1) and MDPV

***Cousins of amphetamine family of drugs**- speed and MDMA (ecstasy)

Synthetic Cathinones: “Bath Salts”

- MDPV, 4-MMC, mephedrone, or methylene
- **Sold on-line**
- **Minimal information on ingredients, dosage,**
- Advertised as legal highs, legal meth, cocaine, or ecstasy
- **Taken orally or by inhaling**
- **Labeled “not for human consumption” to get around laws prohibiting sales or possession**
- **Serious side effects** include tachycardia, hypertension, confusion or psychosis, nausea, convulsions

Case Study

Clinical assessment and treatment

Case Study I:

Sally is a 17 yr old Caucasian female with history of sexual abuse as a young child. She has history of depression, anxiety and nightmares as well as emotional numbing. She is the caretaker for her seriously mentally ill parents making sure they keep their psychiatric and social services appointments. She often has to keep strangers her parents meet, out of the house.

Always a good student and well liked by her peers, she dropped out at the age of 14 and began smoking marijuana but denied other drugs at that time. She was able to find a job at 15 and had a steady, live in boyfriend.

Case Study I:

Today she came in complaining of severe anxiety and admitted to using this “new stuff” her friends were selling to her . She had broken up with her boyfriend and had been using daily for “I don’t know... a long time.” She had just lost her job at a nearby thrift shop and was complaining of hallucinations that “usually didn’t scare me” and an inability to sleep.. Last night she woke up and since that time she was seeing and talking to her older sister, who had passed away 3 years ago from a drug overdose.

In the office she was agitated, pacing, wide eyed and was sweating profusely. Her blood pressure was 160/98, heart rate 92 and she complained of low back pain and a severe headache. She kept insisting that her sister was with us in the room but that we’d had done harm to her sister and would do so to her.

ASSESSMENT

- › Elevated BP and HR
- › Diaphoresis
- › Paranoia
- › Hallucinations
- › Agitated

- › **DIFFERENTIAL DX**
- › Delirium
- › Primary psychiatric illness
- › Metabolic Disturbance
- › Infection
- › Nutritional Deficit
- › Endocrine
- › Spice ingestion
- › **Bath salts (synthetic cathinone) ingestion**

› ACUTE TREATMENT PLAN

- Hospitalization
- Monitor VS, neurological sx, risk of sz and violence
- Supportive care
- High risk to self and others & may need sitter
- Calm, quiet environment, min stimuli

- Possible labs/procedures
 - › UA, Chem7, CBC, LFTs, TSH
 - › ECG, cardiac enzymes, CPK
 - › If evidence of head injury- non contrasted CT, particularly if no evidence of improvement after 24 hours

- Benzodiazepines
 - › Treat agitation
 - › Reduce risk of sz that might happen with withdrawal
 - › Decrease risk of hyperthermia

- Antipsychotics
 - › Treat psychosis, hallucinations, paranoia

Bath Salts Detectable in body?

- › Bath salts not detected through routine drug tests
 - › Bath salts are detected quantitatively through special labs Alpha- PVP, DMAA, MDPV, Mephedrone, Methyldone and Pentedrone.
- › Onset 15 depending on how you take
- › Duration of bath salts in the system about 4 to 6 hours

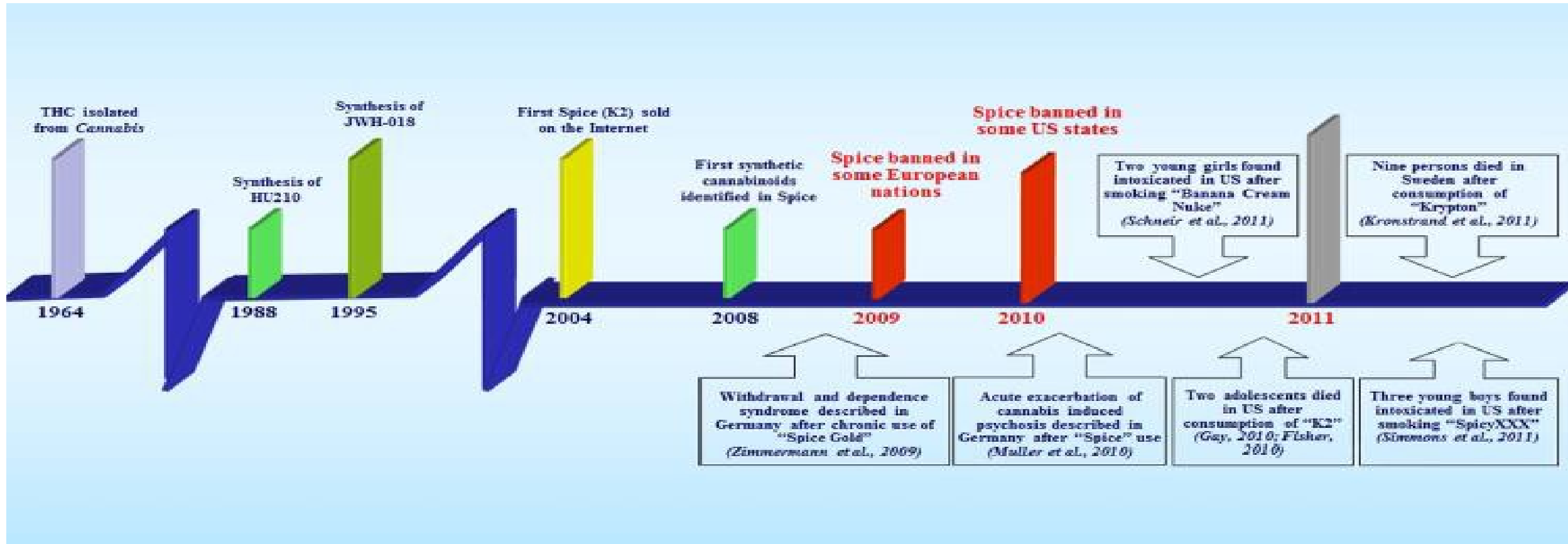
See more at: <http://www.nmslabs.com/services-forensic-designer-stimulants-testing#sthash.DWCLPaWK.dpuf>

Scope of Problem

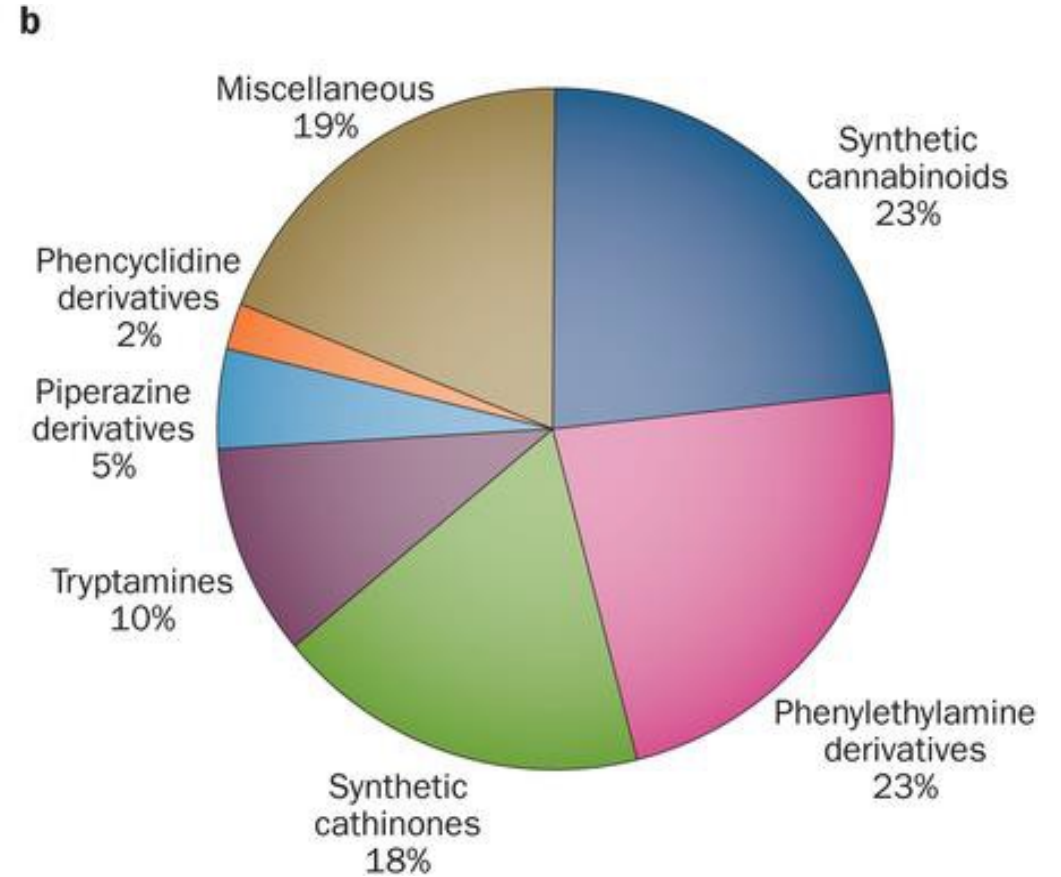
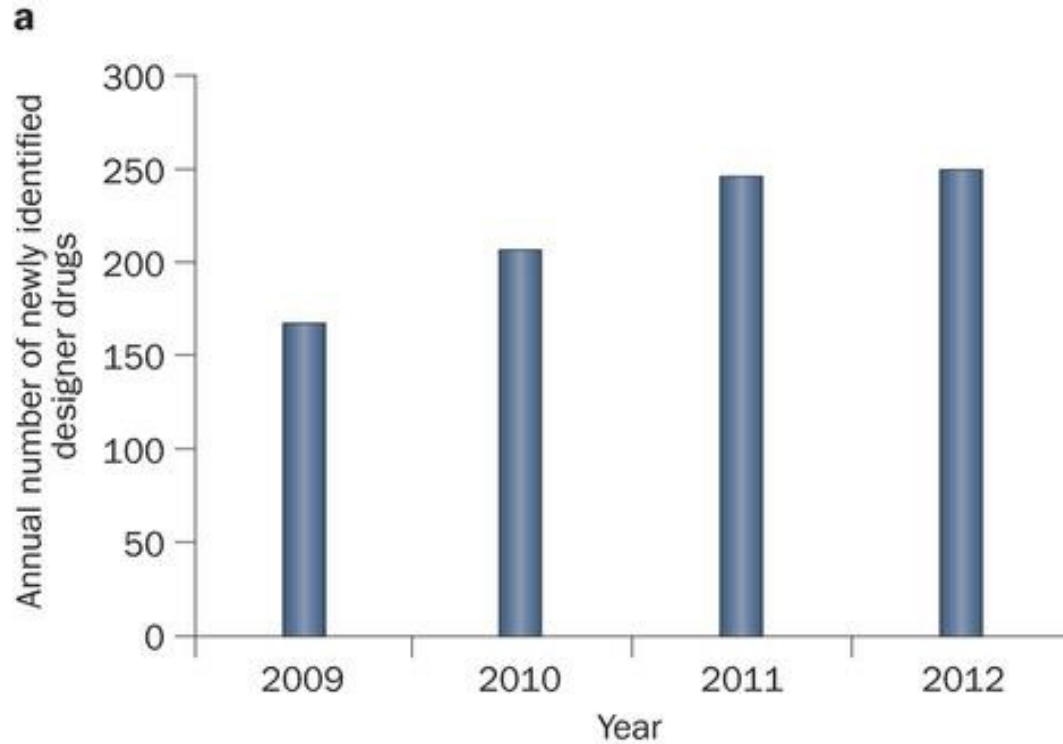
*Synthetic drugs -**multiplying faster** than can be tracked

*Last 5 years, **200 different versions of synthetic/designer drugs** have appeared in U.S. and **80 since July 2013**

Timeline of Synthetic Cannabinoids and Spice



Scope of Problem



Availability and Sources

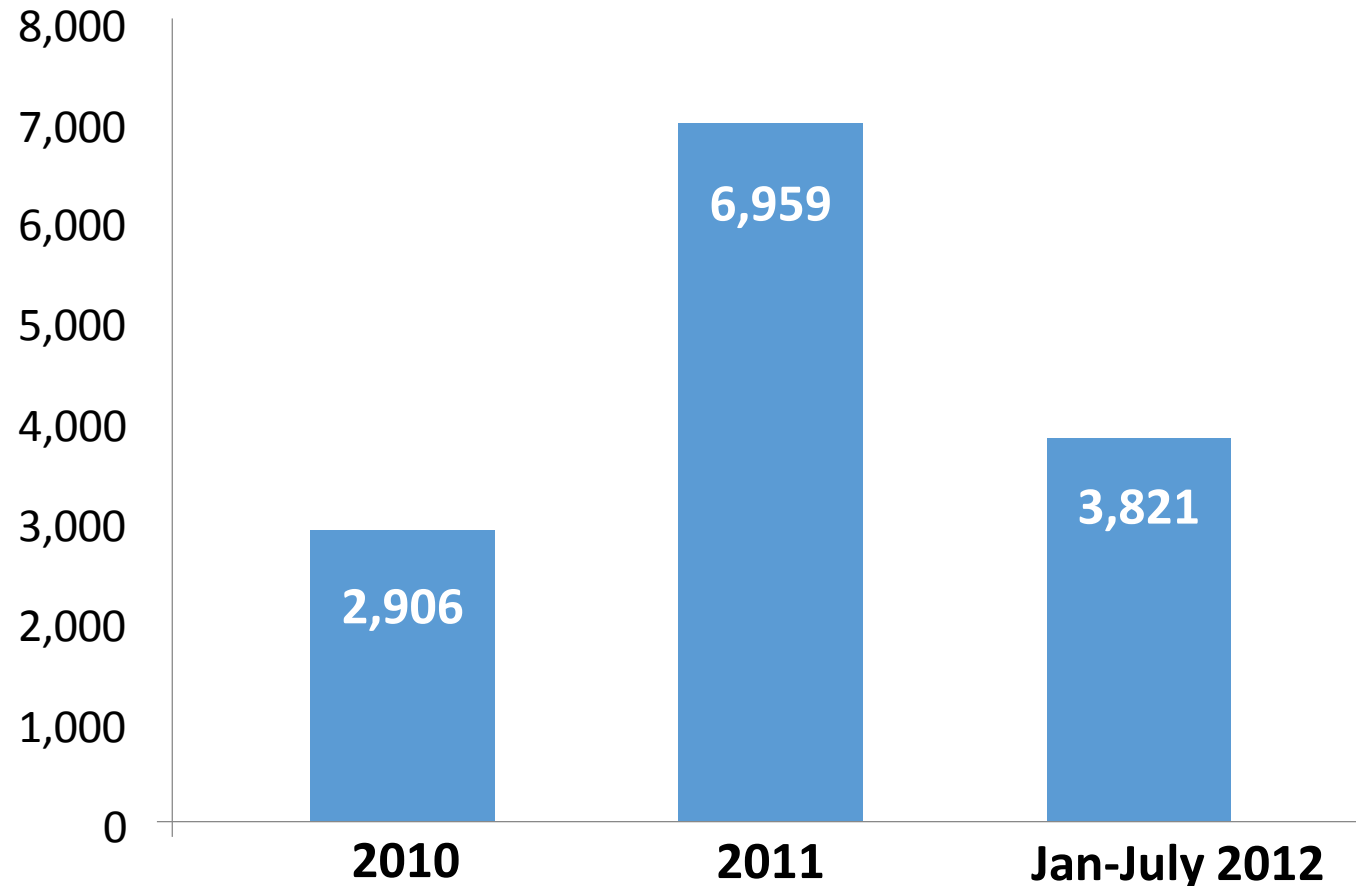
- › **Originate overseas**
- › **Manufactured without quality control**
- › **No regulatory/government oversight**
- › **Large profits**
- › **Easily synthesized and changed to be ahead of legal system**
- › **No incentive to discontinue retail distribution**

Federal Legislation to Ban Synthetic Drugs

- > **Mar 2011:** Five synthetic cannabinoids were temporarily categorized as
 - Schedule I substances under the CSA.
- > **Oct 2011:** DEA exercised its emergency scheduling authority to control some of the synthetic substances used to manufacture bath salts; these synthetic stimulants are now designated as Schedule I substances.
- > **Dec 2011:** House of Representatives approves the Synthetic Drug Control
 - Act (HR 1254).
- > **July 2012:** Congress passed and President Obama signed the *Synthetic Drug Abuse Prevention Act*.

Calls Received by U.S. Poison Control Centers for Human Exposure to Synthetic Marijuana, 2010 to July 2012

The number of calls in 2011 were more than double that in 2010



Calls Received by U.S. Poison Control Centers for Human Exposure to Bath Salts, 2010 to July 2012

The number of calls in 2011 were over 20 times that in 2010

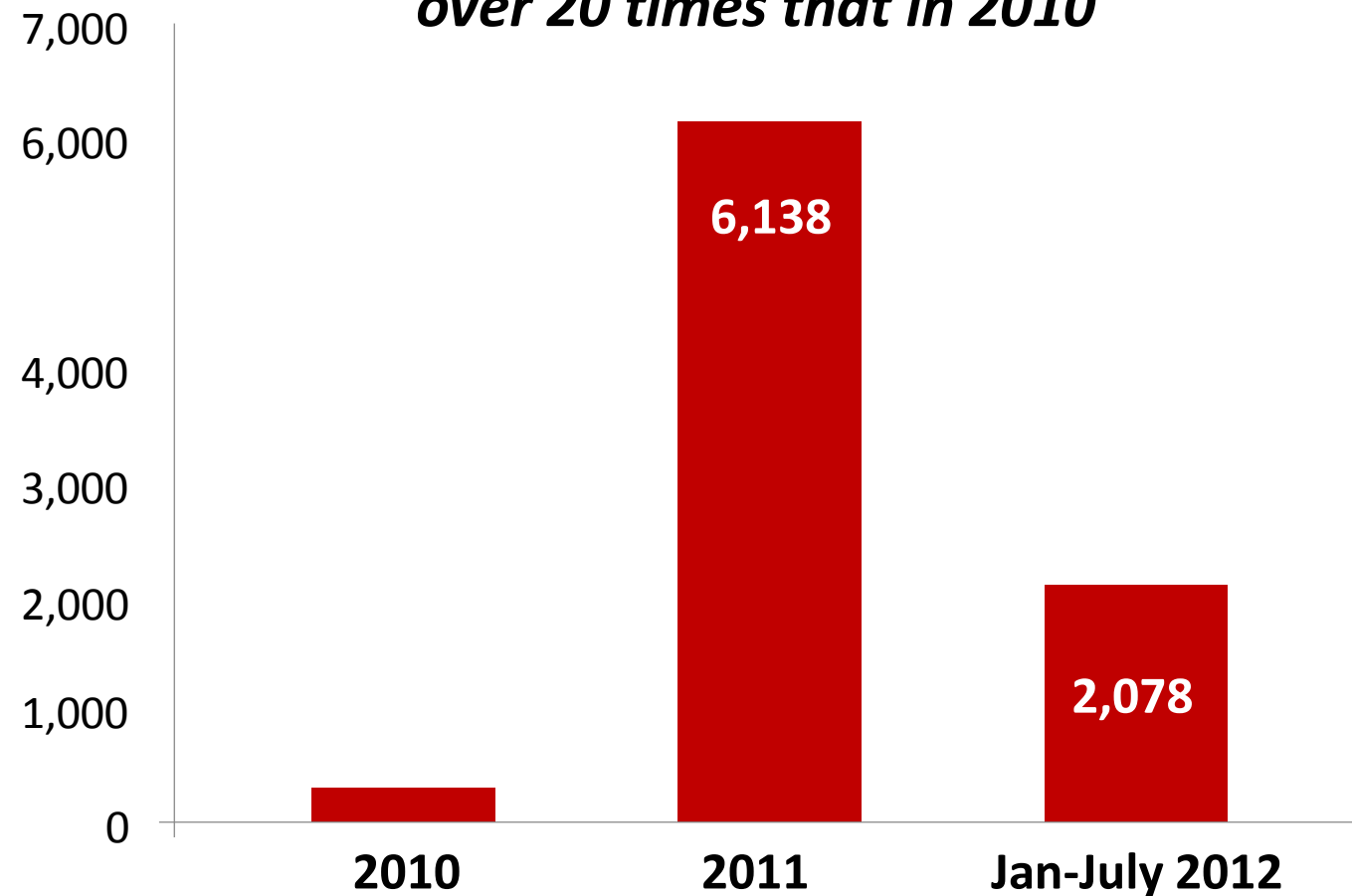
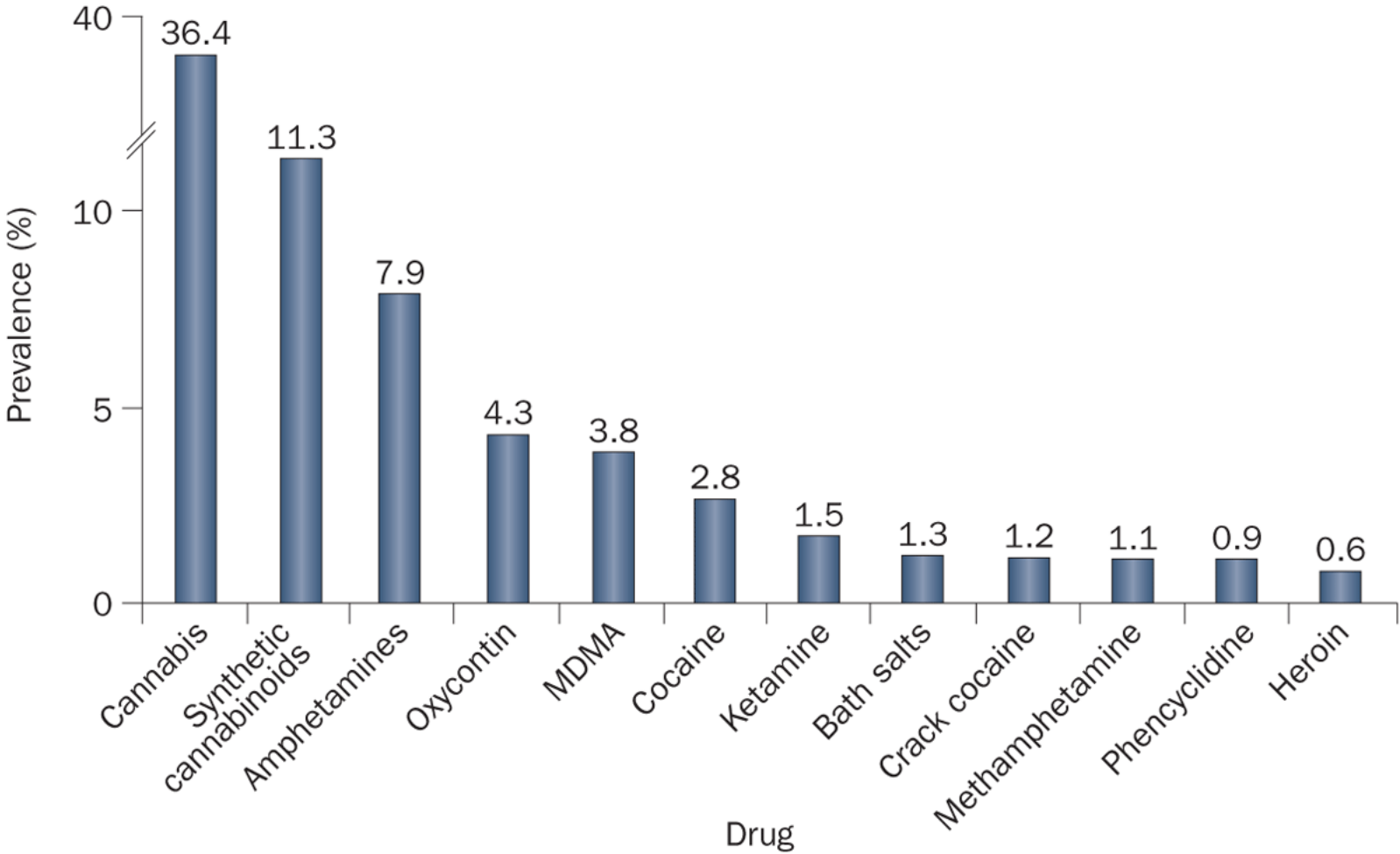
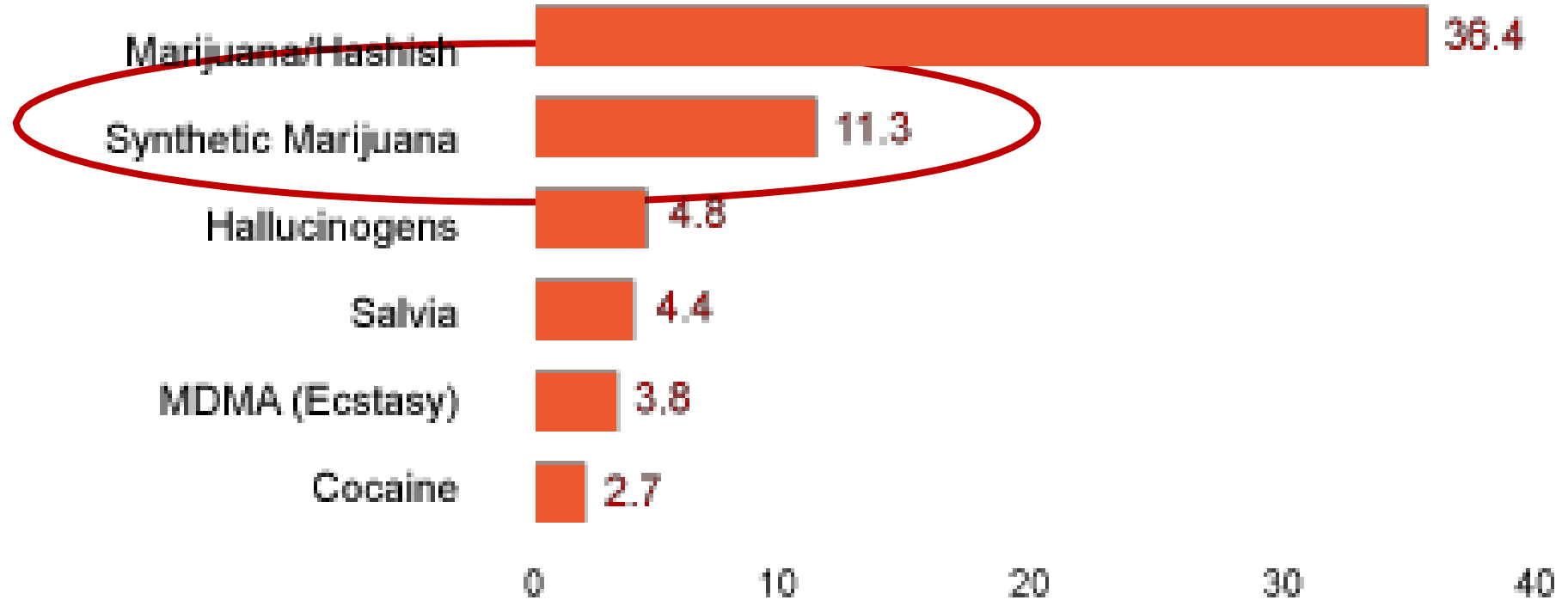


Figure 2 Prevalence of illicit drug use among high school students (aged 17–18 years) in the USA



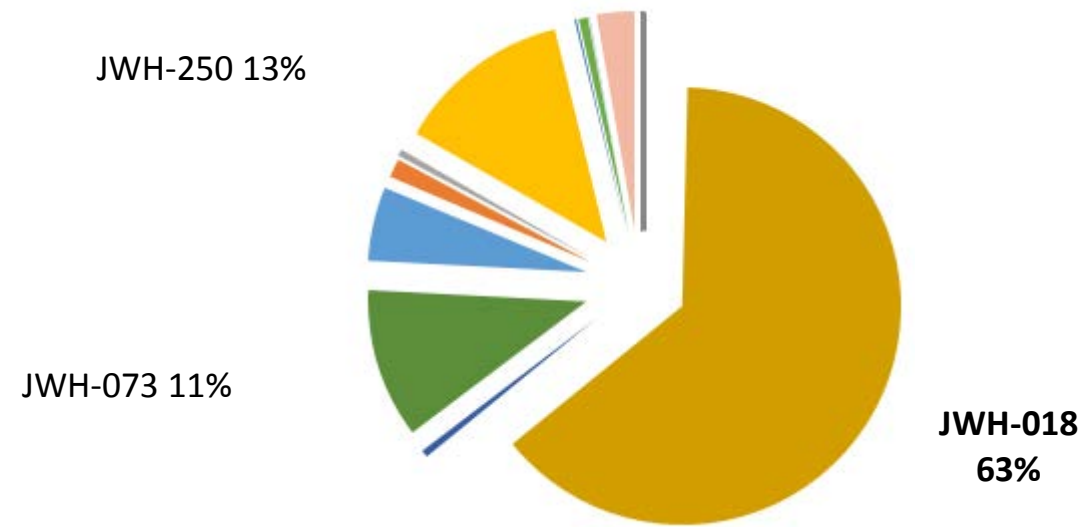
Luciano, R. L. & Perazella, M. A. (2014) Nephrotoxic effects of designer drugs: synthetic is not better! *Nat. Rev. Nephrol.* doi:10.1038/nrneph.2014.44

Past-Year Use of Illicit Drugs by High School Seniors (percent)

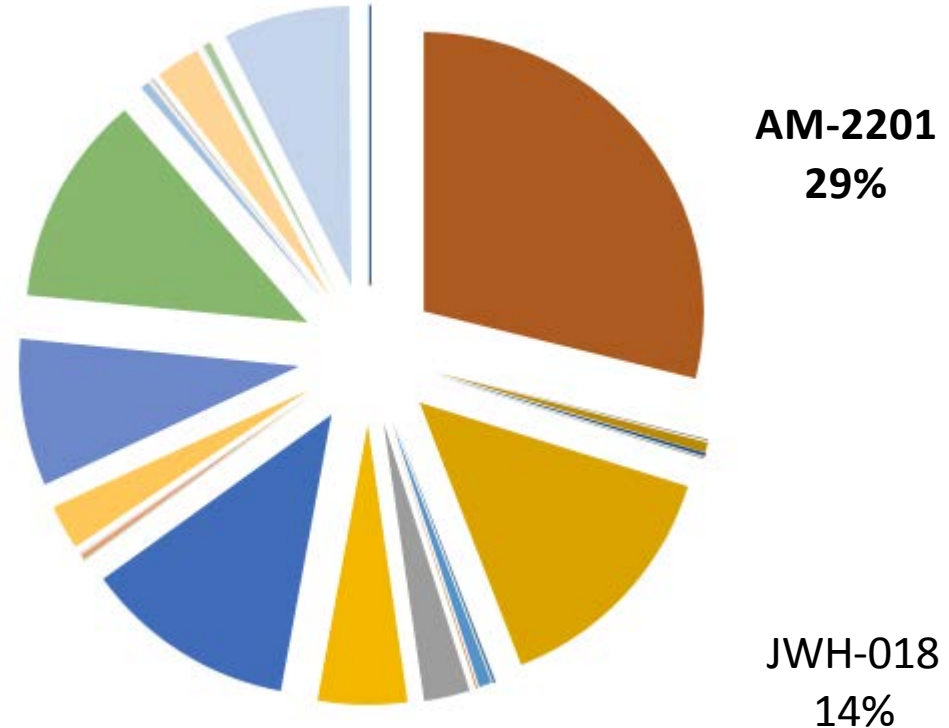


Source: University of Michigan, 2012 Monitoring the Future Study

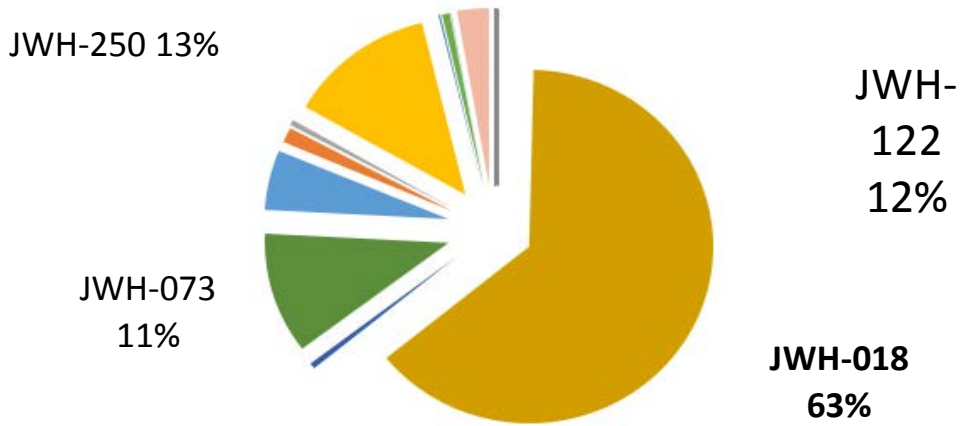
Synthetic Cannabinoid Varieties 2010



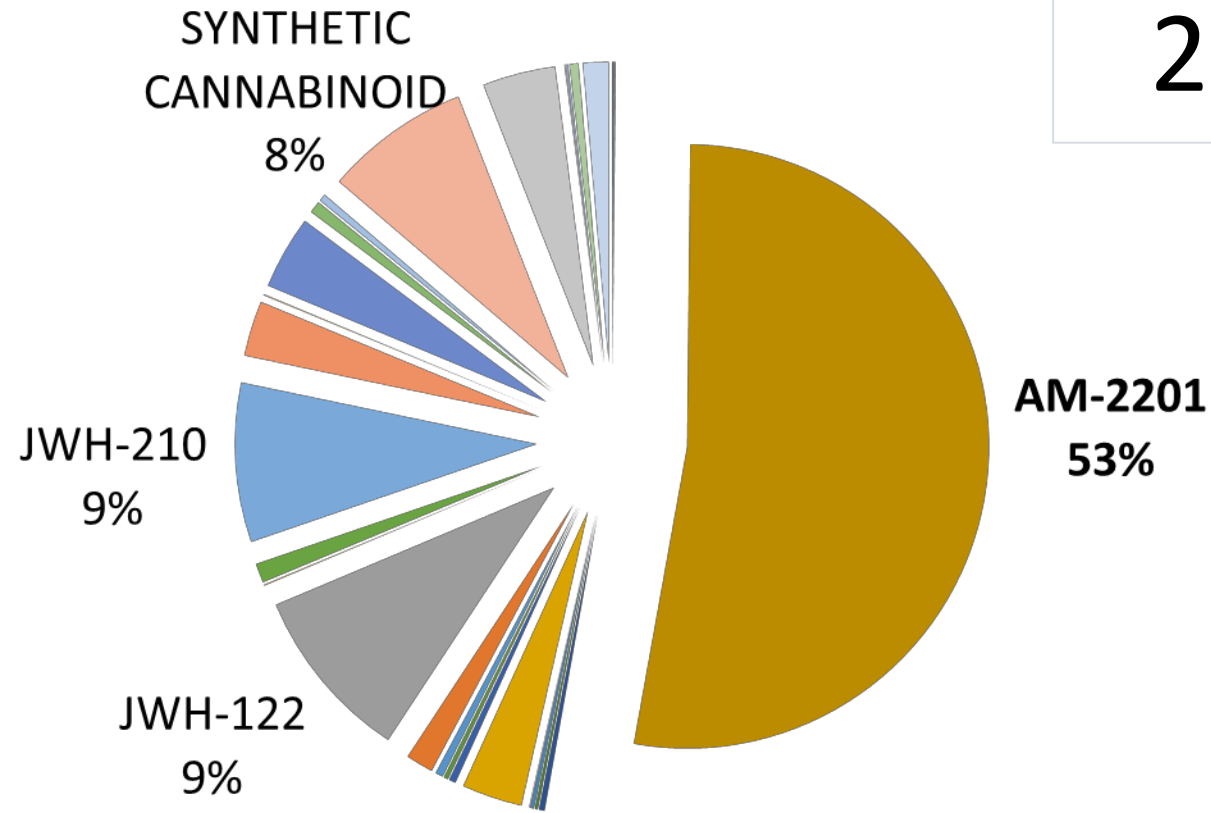
Synthetic Cannabinoid Varieties 2011



Synthetic Cannabinoid Varieties 2010



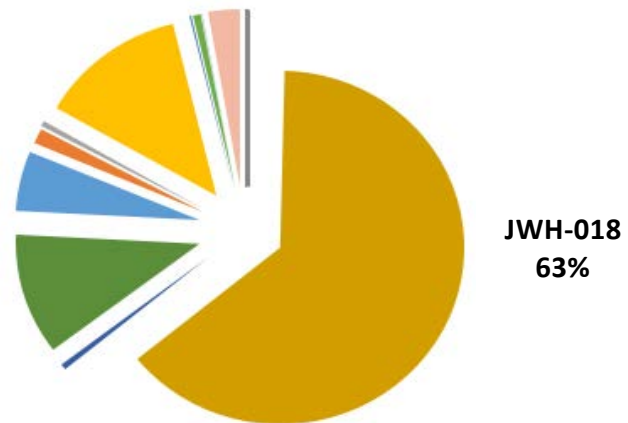
2012



Synthetic Cannabinoid Varieties 2010

JWH-250 13%

JWH-073
11%



Synthetic Cannabinoid Varieties 2011

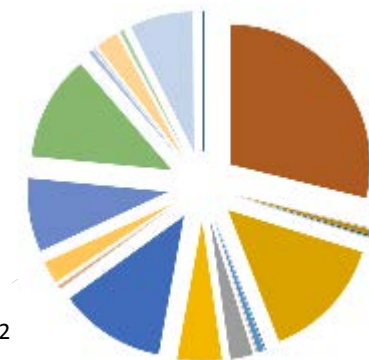
JWH-250
12%

JWH-210
9%

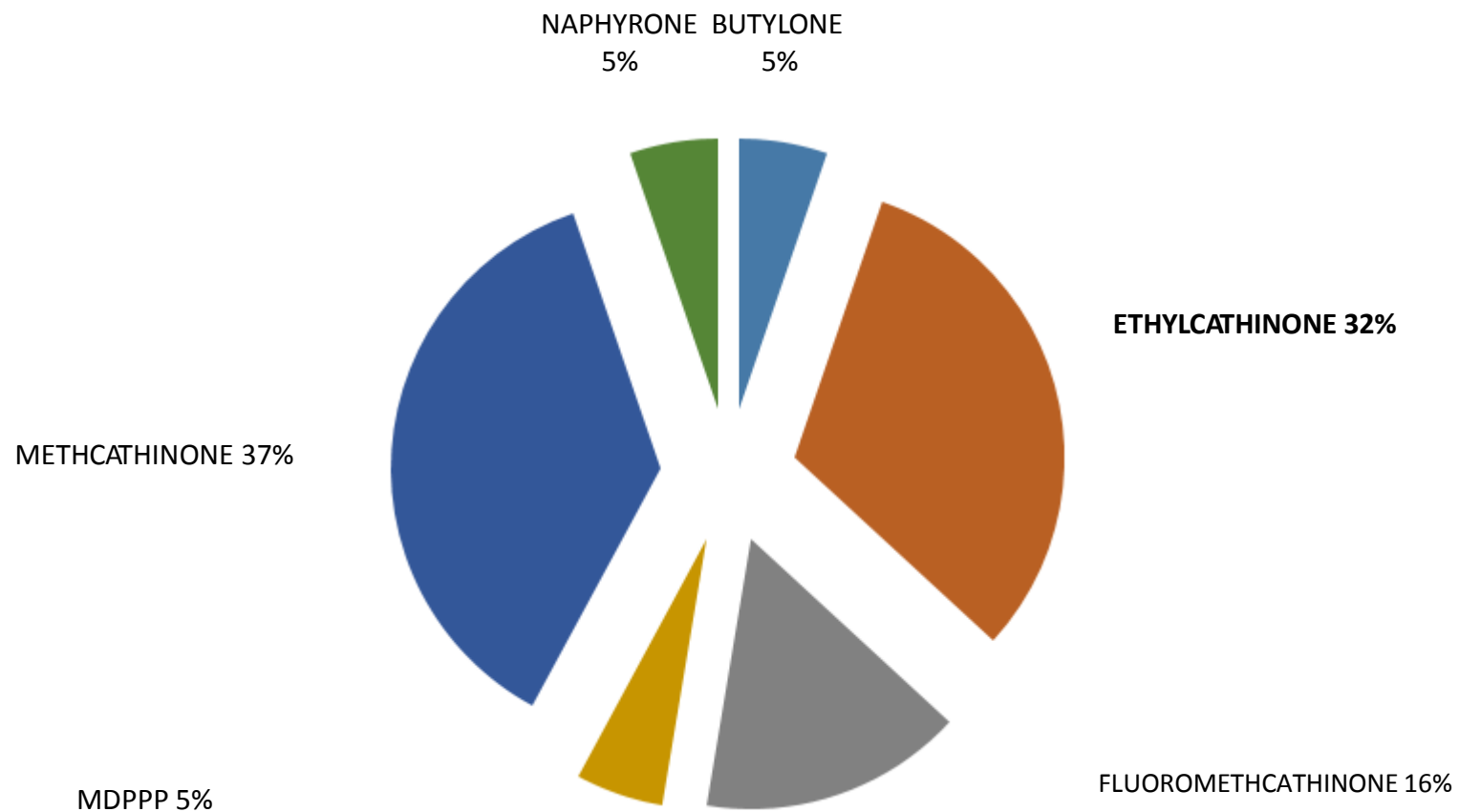
JWH-122
12%

AM-2201
29%

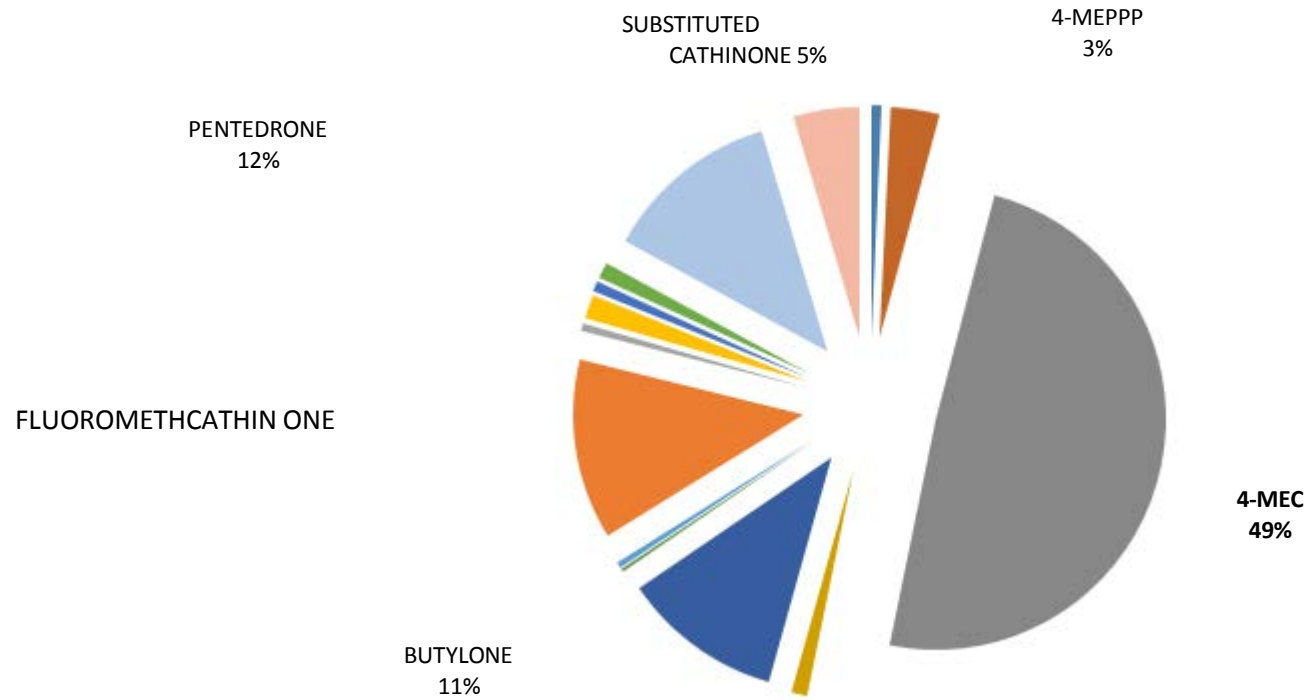
JWH-018
14%



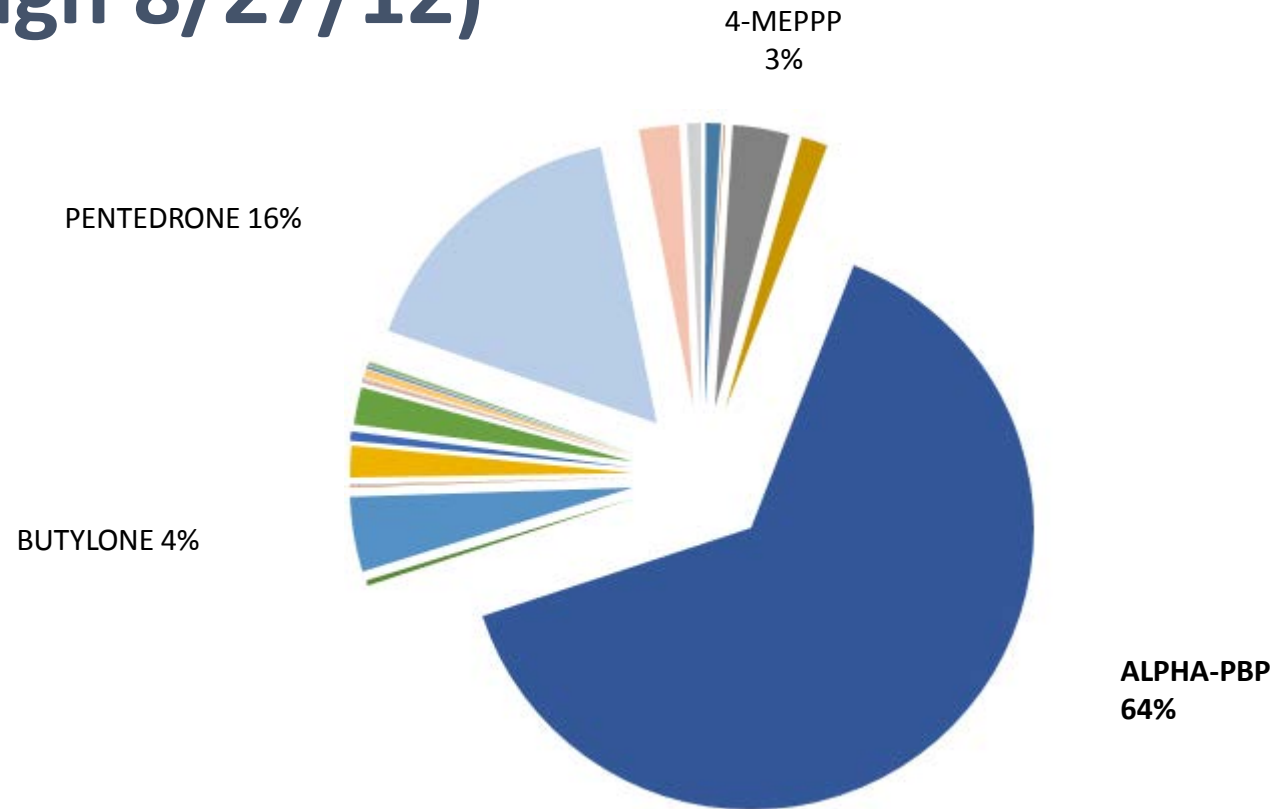
Synthetic Cathinone Varieties 2010



Synthetic Cathinone Varieties 2011



Synthetic Cathinone Varieties 2012 (through 8/27/12)



Spice Detectable in Body?

- › Spice can be detected in urine but does not show up on standard drug tests
- › Spice is detected using special urine tests which look for the synthetic substances typically used in various brands of the drug. The list includes HU-210, JWH-018, JWH-073, and CP-47,497
- › 5 to 40 minutes to onset depending on how you take
- › Duration of spice in the system about 3 days but may be longer in blood and hair

Current Laws in Place

- › **The Synthetic Drug Abuse Prevention Act** (part of the FDA Safety and Innovation Act of 2012,) signed into law by President Obama.
- › Permanently places **26 types of synthetic cannabinoids and cathinones** into **Schedule I of the Controlled Substances Act (CSA)**.
- › Doubled the maximum period of time that the Drug Enforcement Administration (DEA) can administratively schedule substances under its emergency scheduling authority, from 18 to 36 months.
- › **The Controlled Substance Analogue Enforcement Act of 1986** allows many synthetic drugs to be treated as controlled substances if they are proven to be chemically and/or pharmacologically similar to a Schedule I or Schedule II controlled substance.
- › In 2011, DEA exercised its **emergency scheduling authority to control five types of synthetic cannabinoids, and three of the synthetic substances used to manufacture synthetic cathinones**.
- › At least **43 states** have taken action to control one or more synthetic cannabinoids.
- › At least **44 states** have taken action to control one or more synthetic cathinones

Summary

- > Designer drugs
 - Found online
 - Research chemicals
 - Often not regulated by the law
 - Powders vs pills
 - “Not for human consumption”
 - Chemical makeup will change slightly to avoid breaking the law and being prosecuted.
 - Not well-known or monitored,
 - More likely for chemical errors to occur
 - Can lead to accidental deaths and
 - overdoses.
- > Acute tx often necessary
- > Substance abuse tx and psychiatric treatment possible
- > Laws now in place for many synthetic drugs

Additional Resources

- › <http://www.projectknow.com/research/new-and-designer-drugs/>
- › <http://www.justice.gov/dea/index.shtml>

- Jane Maxwell, Ph.D., Beth Rutkowski, M.P.H., and Thomas Freese, Ph.D. through a collaboration between the Gulf Coast ATTC (5 UD1 TI013423, SAMHSA/CSAT), Pacific Southwest ATTC (5 UD1 TI-013594, SAMHSA/CSAT), University of Texas, School of Social Work, and UCLA Integrated Substance Abuse Programs