

New Drugs of Abuse

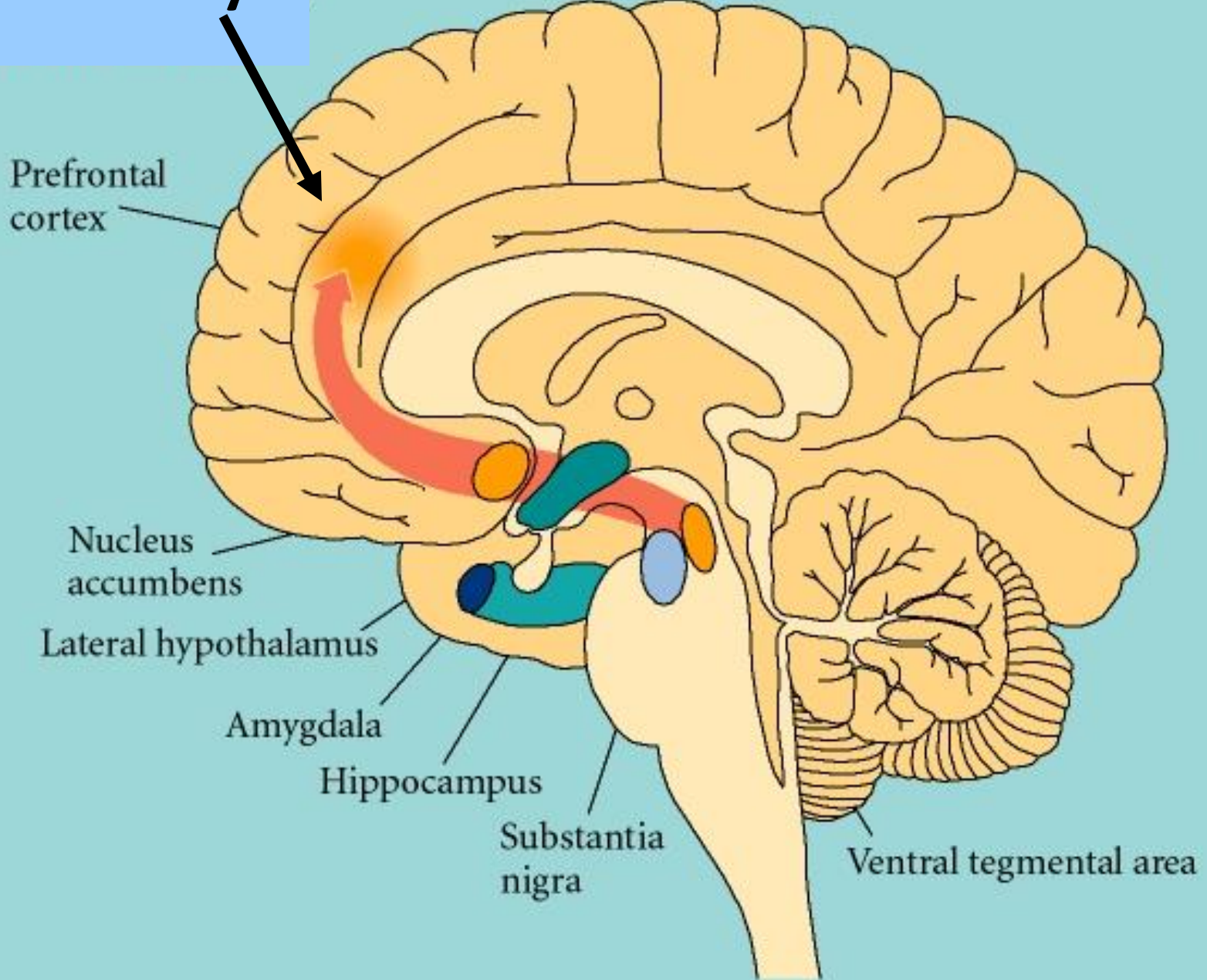
Phillip Treadwell, Pharm.D.

November 20, 2016

Disclosure

- I have no conflict of interest regarding the subject matter covered in this presentation.

Reward System of the Brain



New Drugs of Abuse

- Molly
- Spice (K2)
- Bath salts
- Carfentanil
- Kratom

New Drugs of Abuse

- Synthetic cannabinoids account for about 2.5% of all reported cases of illicit drug use.
- MDMA and “Bath Salts” comprise about 1% of cases.
- “Krokodil” has few, if any, documented cases in the U.S.
- Kratom and carfentanil are rapidly growing but good numbers don’t yet exist.

*National Forensic Laboratory Information System: Midyear Report
2013.Springfield, VA: U.S.Drug Enforcement Administration.*

Molly

- Short for “Molecular”
- Simply Ecstasy (MDMA) in a non-pill form.
- Sold as being “more pure” because of lack of excipients required to hold a tablet together.
- However, adulterants are common.
- Some batches are actually “bath salts”.
- AKA: Lovers speed, Peace, Eve, Clarity etc.

Molly



Marin Independent Journal, March 23, 2013.

Molly

- Made famous in songs by Miley Cyrus, Kanye West, Tyga, Rihanna, Nicki Minaj, Wyclef etc.
- Huge pop culture phenomenon.
- A fairly effective rebranding of an older drug.

Molly

- MDMA induces serotonin, norepinephrine and dopamine release .
- Serotonin release leads to euphoria, a sense of inner peace, and strong feelings of empathy and socialization.
- Dopamine stimulates reward mechanisms.
- Norepinephrine increases energy.

MDMA Adverse Events

- Bruxism
- Agitation, Paranoia
- Hypertension
- Arrhythmias
- Hyperthermia
- Rhabdomyolysis
- MI, Aortic Dissection

MDMA Adverse Effects

- In an attempt to treat the dehydration associated with “Rave” parties and MDMA induced hyperthermia, some users have ingested excessive amounts of water leading to water intoxication and hyponatremia.

MDMA “Hangover”

- Anxiety or paranoia
- Anhedonia
- Irritability
- Depression
- Memory Impairment
- May last for weeks

Spice (K2)



Photo courtesy: NMS labs

Spice (K2)

- Synthetic cannabinoids
- Most of the compounds encountered in early products were originally designed by John W. Huffman and his lab for research purposes into the endocannabinoid system.
- Abuse began more than a decade later in Europe and has spread rapidly.

Spice (K2)

- Various herbs sprayed with synthetic cannabinoids then dried and packaged.
- Sold as incense or as an alternative to tobacco.
- Seen in convenience stores and “head shops” prior to law enforcement crackdowns.

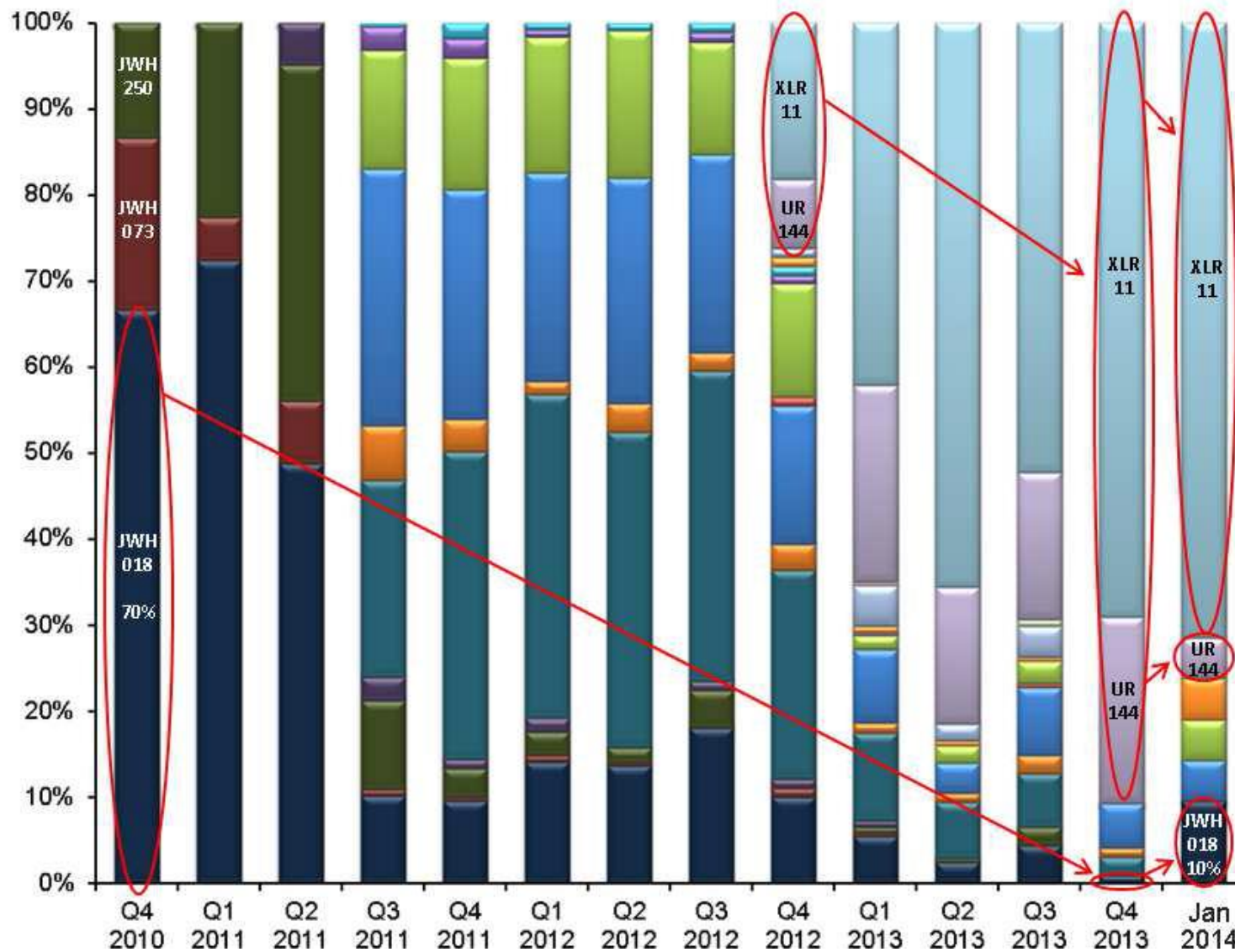
Spice (K2)

- Other street names:
 - Purple Haze
 - Dank
 - Black Mamba
 - Hawaiian Harvest
 - Scooby Snax
 - Etc.

Spice (K2)

- Smoked to achieve a marijuana-like high.
- Much more intense high since many of these compounds are full agonists
- Legal marijuana alternative prior to regulation
- Smell when smoked is less recognizable.

Synthetic Cannabinoids



Data extracted from *NMS Labs Laboratory Information Management System* . October 2010 - January 2014.

Spice Adverse Effects

- Agitation
- Hallucinations
- Psychosis
- Seizures
- Hypertension
- Tachycardia
- MI

Bath Salts

- A drug of abuse often sold as a bath salt (Epsom salts) because of their similar appearance.
- Packages often labeled as “Not for Human Consumption” to avoid drug laws.
- May contain any of a number of compounds.
- Generally a designer drug(s) with hallucinogenic properties

Bath Salts

This powder is often snorted, smoked or injected.



Bath Salts

- Other street names:
 - Vanilla Sky
 - Lunar Wave
 - Cloud Nine
 - Bloom
 - Ivory wave
 - Meow Meow
 - Also sold as jewelry cleaner or plant food

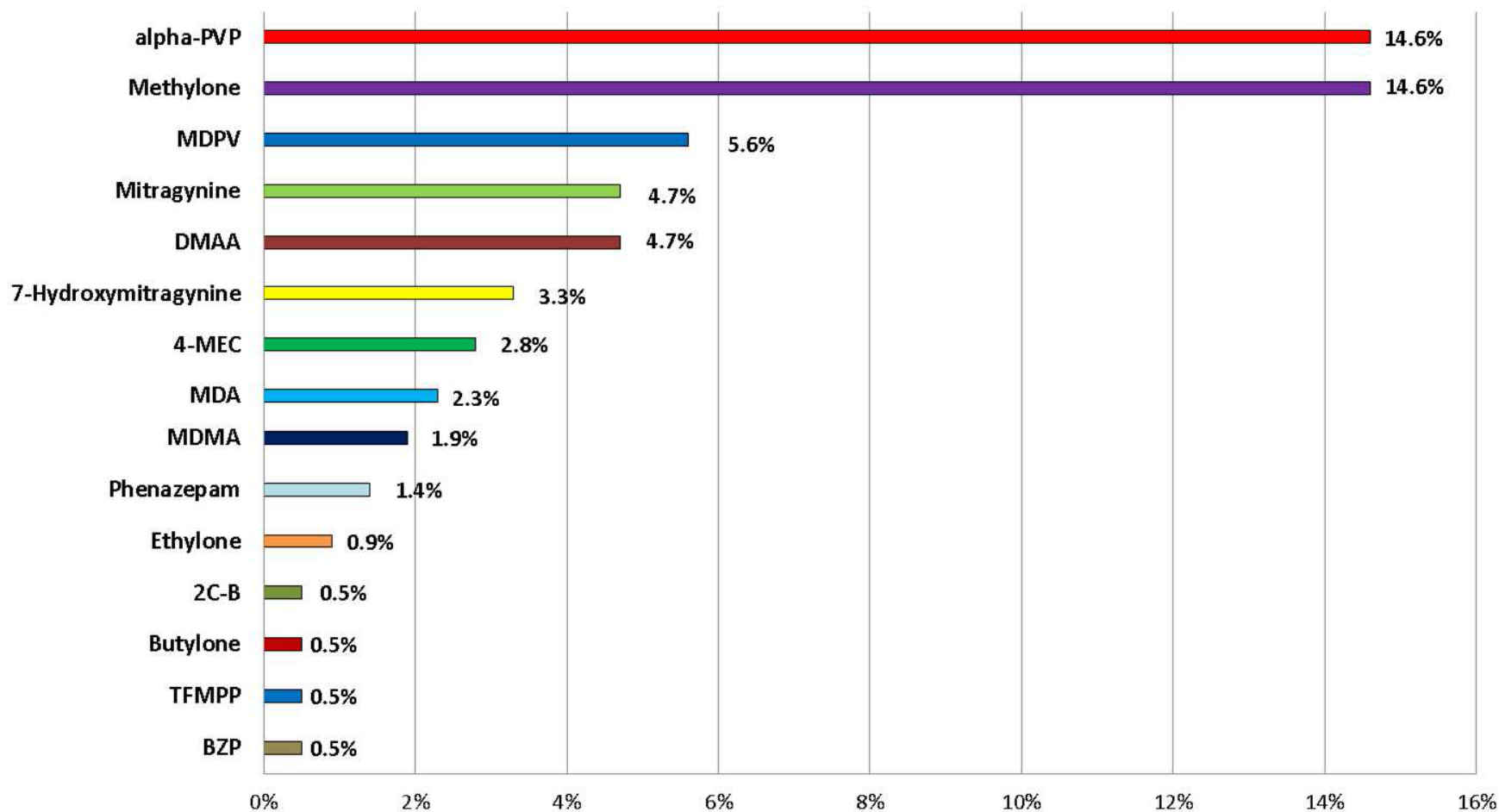
Bath Salts

- A newer form is called “Gravel” or “Flakka”.
- Simply bath salts in a more coarse form.
- Looks like small white irregular pebbles.
- An attempt to avoid law enforcement crackdowns on bath salts.

Bath Salts

- Original products were cathinone derivatives.
- Cathinone is a natural component of Khat (*Catha edulis*).
- Early products generally contained methylone, mephedrone or similar compounds.
- More recent products may contain novel compounds like 25I-NBOMe (aka 2C-I-NBOMe) and derivatives.

Bath Salts



Bath Salts

- These compounds tend to share potent hallucinogenic properties with euphoric effects through serotonin receptor agonism.
- This is much more dangerous than endogenous neurotransmitter release.
- The high tends to be unpleasant, but very addictive.

Bath Salts

- Adverse effects:
 - MI
 - Stroke
 - Cerebral Edema
 - Death
- Severe paranoia and psychosis are relatively common
- 21% of ED visits are admitted to ICU
- 12% are admitted to psychiatric facilities.

Bath Salts

- Anecdotal reports link bath salt use to psychotic reactions leading to violence.
- These reports are corroborated by police, victims and users themselves.

25I-NBOMe

- Actually a group of drugs including 25C-NBOMe and 25B-NBOMe
- AKA: Smiles N-bomb etc.
- Very potent hallucinogen.
- 25I-NBOMe is a potent 5HT 2a full agonist.
- Rapidly develop tolerance
 - up to 2 weeks after a single use.

25I-NBOMe

Adverse Effects

- Can cause severe psychotic reactions.
- Prolonged dysphoria after use
- Seizures, elevated CK, metabolic acidosis
- MI
- Death
- It is not yet known how severe the neurologic injuries may be for users who do not experience a catastrophic event.

Carfentanil

- Newer, ultrapotent opioid receptor agonist
- 10,000 times as potent as morphine
- 100 times as potent as fentanyl
- Sold as a large animal tranquilizer/pain reliever
- Brand name: Wildnil

Carfentanil



Carfentanil

- This is the drug that was used by the Russian military to subdue the kidnappers in the 2002 Moscow theater takeover
- The mass casualties plus the high potency and inexact delivery (aerosolized through ventilation system) led to the inability of first responders to save everyone
- Over 125 deaths were reported in this incident

Carfentanil

- Recently, in Cincinnati, Ohio there have been an average of 92 accidental overdoses per month.
- This has more than doubled in the last year.
- Most involved Carfentanil
- Potency is the main issue.
- Naloxone is often ineffective because of the relative potency of the dose versus Heroin.

Kratom



Kratom

- A derivative of the plant: *Mitragyna speciosa*
- Often the leaves of the plant are made into a tea, or pulverized into a powder for ingestion.
- Contains alkaloids mitragynine and 7-hydroxymitragynine among others.



Kratom

- Has mu opioid receptor agonist activity and 5HT2A antagonist activity
- Is still legal in the U.S. but is being reviewed by the DEA.
- Appears to inhibit CYP 3A4, 2D6 and 1A2

Kratom

- Adverse effects:
 - Hallucinations
 - Psychosis
 - Sedation
 - Respiratory depression
 - Seizures
 - Addiction

Kratom

- Overdose has been reported but appears to be uncommon.
- Can be treated with Naloxone, although this has inconsistent effects in animal models

Others

- Shatter – High potency THC (60-90%) resin
- Krokodil – Russian desomorphine
 - Severely adulterated in most cases
- “Superman pills”
 - Have a Superman “S” logo
 - PMMA sold as MDMA
 - Potentially lethal dose
 - Only seen in the UK so far

Questions?

