Monoamine Agonists of Abuse:
Stimulants, Hallucinogens, and Club Drugs

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Overview

• How to categorize intoxicants by action
  • What is a “club drug”?  
• How are stimulants and hallucinogens related and different; what is an empathogen?
• How to manage acute intoxication on hallucinogens (and ketamine)
• What is GHB?
Categories and Examples of Addictive Drugs

• Sedatives
  • Benzos, Barbs, Alcohol, GHB
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• **Sedatives**
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• **Dissociatives**
  • Ketamine (arylcycloalkylamine), PCP (phencyclidine), DXM (dextromethorphan)
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- **Empathogens**
  - MDMA (3,4-methylenedioxymethamphetamine), et c
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Which are “club drugs”?

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The problem with the term “Club Drug”

It defines a drug by where it is used and who uses it.

Define drugs of abuse like an Internist: by their mechanism of action.
Categorize Addictive Drugs by Receptor Action

• Sedatives
  • Gaba agonists

• Dissociatives
  • NMDA antagonists

• Cannabinoids
  • CB1 agonists

• Opioids
  • Mu opioid receptor agonists

• Stimulants
  • Norepi, Dopamine and 5HT agonists

• Empathogens
  • 5HT and Norepi, Dopamine agonists

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Each actives monoamine systems
Monoamine Spectrum

Stimulant:
- Dopaminergic
- Adrenergic
- Addictive
- CV/SZ/SI risks

Hallucinogen:
- Serotonergic
- Mild N.epi
- Nonaddictive
- Psychiatric risk

Empathogen:
- Balanced effects
- Addictive?
- Harmful?
Monoamine Spectrum

(e.g. phenethylamine)

Amphetamine

MDMA (3,4-methylenedioxymethamphetamine)

Mescaline
Sasha Shulgin invented 230 Phenethylamine and Tryptamine intoxicants
Middle Spectrum Monoamine Agonist

Actions & Names

Empathogen

Love

Closeness to & Understanding of others

Enhanced or altered tactile sensations

Body Buzz

Religious experience or cosmic awareness

Entactogen

Religiosity

Entheogen

Love

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Cathinones: another base structure from which to make novel monoamine agonists

Synthetic Cathinones ("Bath Salts")

What are synthetic cathinones?

Synthetic cathinones, more commonly known as "bath salts," are human-made stimulants chemically related to cathinone, a substance found in the khat plant. Khat is a shrub grown in East Africa and southern Arabia, where some people chew its leaves for their mild stimulant effects. Human-made versions of cathinone can be much stronger than the natural product and, in some cases, very dangerous.¹

In Name Only

Synthetic cathinone products marketed as "bath salts" should not be confused with...
Monoamine agonists

• Phenethylamines
  • Amphetamines, mescaline, Molly

• Cathinones
  • Khat, bath salts, mephedrone

• Tryptamines
  • DMT, psilocybin, foxy methoxy
Overdose Leaves Minnesota Teen Dead, 10 Hospitalized

BLAINE, Minnesota -- One teen died and 10 teenagers and young adults were hospitalized Thursday after an apparent mass overdose on a designer hallucinogen at a suburban Minneapolis home, authorities said.

Investigators said the state Bureau of Criminal Apprehension has identified the drug as 2C-E. It appeared the hallucinogen, which is sometimes known on the street as "Europa" and has no approved medical use, was legally ordered over the Internet for a spring break party, said Paul Sommer, a sheriff's office commander.

A 19-year-old man whose name was not immediately released died hours after officers responded to reports of an overdose at the house, investigators said. Officers found several people there who were ill shortly after midnight. Others who fled the house were later found to also be suffering the effects of an overdose.
Two 30-year-old Oregonian men attempted to purchase 2CE online from China and received Aniline instead. They had severe methemoglobinemia.

In Oklahoma two youth died after ordering 2CE and instead receiving “Bromo Dragonfly,” a more potent substance.
Methamphetamines used to make ersatz “pills”

All club drugs should be assumed to be methamphetamines

Emerging Trend: Methamphetamine in Pill Form

Methamphetamine in pill form has appeared in several states in 2018 and into 2019. Many incidents have involved pill forms that resemble MDMA tablets, while others have been counterfeit pharmaceuticals with methamphetamine present or as the primary substance. Several seizures in Illinois, New Jersey, Ohio, Virginia, and South Carolina have yielded supposed MDMA tablets containing methamphetamine.

Counterfeit Adderall pills containing methamphetamine were seized in Michigan in 2019. The pills were of the same color and markings as legitimate prescription Adderall, but contained methamphetamine, caffeine, and acetaminophen (see Figure 49). This may indicate that methamphetamine traffickers are targeting prescription stimulant users, similar to the counterfeit MDMA tablets, in order to gain access to a larger user market.

In April 2019, the Pinellas County, FL Forensic Lab shared information with DEA’s Southeast Laboratory about a
Imagine hundreds of novel synthetic drugs in each category

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- Empathogens
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- Hallucinogens
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The future of addictive drugs is synthetic compounds cooked in clandestine labs.
A good source for info about novel drugs.

I gave up learning the new drug names.

I know the classes of drugs and their presentation and syndromes.

Erowid: The Wikipedia of drugs

https://www.erowid.org/
How are dissociatives (ketamine) different from hallucinogens (LSD)?

• Ketamine (NMDA antagonist) creates a dissociative state— the cognition and perception are dissociated from each other
  • Users may lack insight and become frightened
  • Offering reassurance interpreted as more confusing and threatening perceptual input
  • Keep stimulus low (light, noise, vitals) & fingers crossed

• LSD (serotonin agonist) alters perceptual experience without dissociating it from cognition
  • Retained insight their experience is the result of LSD
  • Healthcare workers should offer calm reassurance
  • Those with underlying psychosis may become unstable
What is GHB or “G”? 

- Gaba agonist (like benzos, barbs) 
- Sedative properties: amnesia, anxiolysis, disinhibition, muscle relaxation, ataxia, soporific 
- FDA approved (Xyrem) for narcolepsy 
- Many illicit uses: 
  - Come down from stimulant use 
  - Properly dosed, G causes mellowing 
  - Date rape drug (colorless/flavorless undetectable by tox) 
  - Stimulates IGF- body builders use for anabolic effects 
- Classic overdose: 
  Young individual presentsunarousable, intubated, and 24 hours later abruptly awakes and self-extubates
Summary

• Stimulants, empathogens and hallucinogens exist on a spectrum of activity and effects
• Phenethylamines, tryptamines, and cathinones can be chemically modified into many novel intoxicants
• Many poorly characterized agents on this spectrum
• Purity concerns, unknown actions of designer drugs
• Other club drugs (G, K) should be understood by their receptor action
Thank you!
Questions?