



ASAM REVIEW COURSE 2023

Other Classes of Drugs: Pharmacology and Epidemiology

Annie Lévesque, MD, MSc
Assistant Professor
Mount Sinai West Hospital, Icahn School of Medicine
New York, NY





Financial Disclosure

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LEARNING OBJECTIVE

Identify other classes of drugs, their physiological impacts, and treatment considerations.

In Summary



1

Hallucinogens

2

Dissociatives

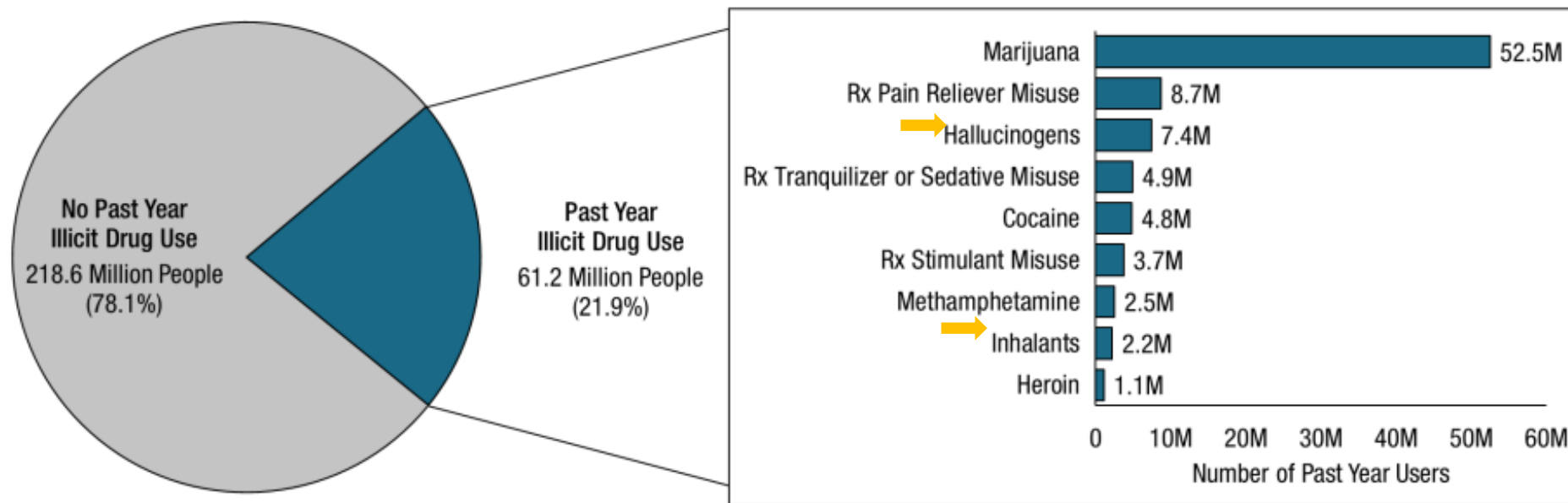
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Inhalants

4

Anabolic-Androgenic
Steroids

Past Year Illicit Drug Use: Among People Aged 12 or Older; 2021



Rx = prescription.

Note: The estimated numbers of past year users of different illicit drugs are not mutually exclusive because people could have used more than one type of illicit drug in the past year.

**Dopamine
Norepinephrine**

GABA

Stimulants

Sedatives

Serotonin

Hallucinogens

**Dissociatives
Inhalants**

**NMDA
Glutamate**

Hallucinogens



LSD and Psilocybin are:

- A. Serotonin 5HT-2A receptor agonists
- B. Dopamine transporter reuptake inhibitors
- C. NMDA receptor antagonists
- D. Opioid mu-receptor agonists

Definition of Hallucinogens

- Produce alterations in thought, mood, and perception
- Produce minimal autonomic side effects or craving



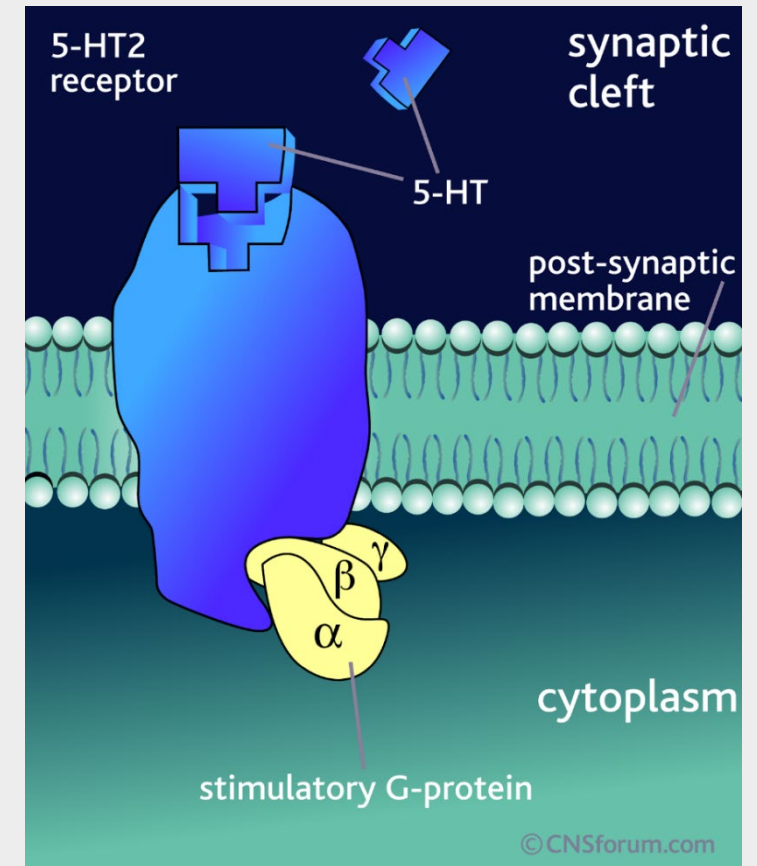
“Illusionogen”



- Illusions = alteration or enhancement of existing sensory perception
- May be more accurate term
 - Reality testing is generally intact
 - Effect varies greatly with expectations and environment

Classical Hallucinogens (Serotonergic Hallucinogens)

- 5HT-2A agonists or partial agonists
- Fall within the group of chemical compounds called arylalkylamines:
 - Not all arylalkylamines are hallucinogenic
 - Also includes some stimulants and empathogens



Effects of Hallucinogens



Altered shapes
and colors

Synesthesia

Alterations in
mood (can be
tension and
anxiety)

Distorted sense
of time

Difficulty
expressing
thoughts

Depersonalization

Dreamlike feeling

Effects of Hallucinogens

Somatic



Dizziness

Weakness

Tremors

Nausea

Drowsiness

Paresthesias

Blurred Vision

DMT

- DMT (N,N-Dimethyltryptamine)
 - Naturally occurring (plants, toad)
 - Rapid onset (<5 min), short duration of action (30 min)
 - Inhalation (smoking) or injection (rare)
 - Can be taken orally, but requires MAOI



DMT Crystals

Ayahuasca



- Brew containing DMT, MAOIs, and other hallucinogens
- Used ceremonially in parts of the Amazon and in some Native American religions
- Can cause significant vomiting



Psilocybin

- Psilocybin → psilocin
 - Found as naturally occurring tryptamine in certain varieties of mushrooms
 - Detachment from reality: inability to discern fantasy from reality
 - Can lead to panic attacks, psychosis
 - Rapid tolerance to effects
 - Cross tolerance with LSD
 - Duration: 4-6 hours



Lysergic Acid Diethylamide (LSD)

- Water soluble, clear, white, odorless crystals
 - Thin blotter paper with dried solution of LSD
 - Breath mints/sugar cubes (“dropping” acid), pressed into pills or thin gelatin squares
- Onset: 30-60 min, Peak: 2-4 hours, Duration: 8-12 hours
- Effects
 - Altered shapes and colors, heightened sense of hearing
 - Depersonalization, visual hallucinations, alterations in mood

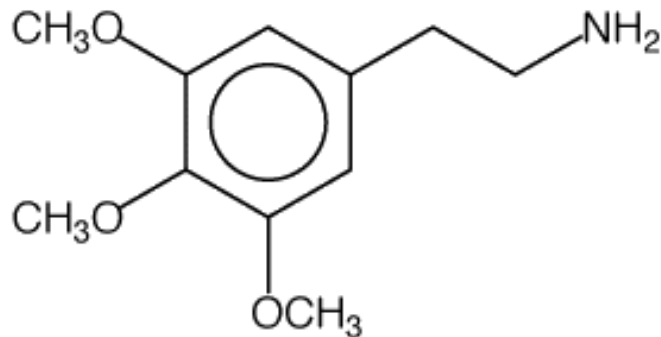


Mescaline/Peyote



Mescaline

3,4,5-trimethoxyphenethylamine



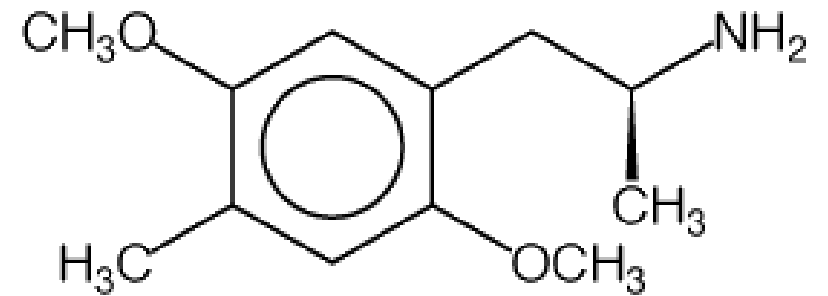
- Buttons from top (crown) of peyote cactus
 - 6-10 buttons for intoxication
- Slow onset (30-60 min)
 - First hour: minor perceptual changes, increased resp rate, nausea
 - Next several hours (5-10):
 - Visual illusions/hallucinations
 - Synesthesia

DOM

- Results from structural modification of mescaline-like substances
- Extremely potent
- Used as model hallucinogen in drug discrimination studies

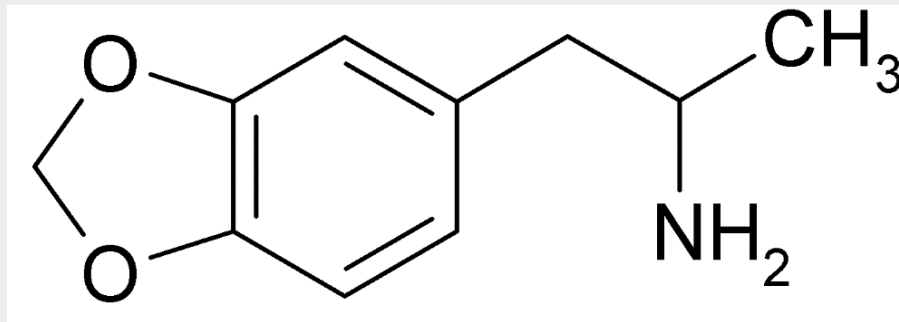
DOM

2,5-dimethoxy-4-methylamphetamine



MDA

- Produces stimulant and hallucinogenic effects
 - Similar to combined effects of cocaine and LSD
- Can be modified to MDMA (ecstasy)
 - Stimulant effects
 - Empathogenic
- Has been represented and sold as MDMA



Salvia

- Naturally grows in the US
- Traditionally ingested by chewing / drinking juice for healing rituals
- Sometimes smoked when used as drug
- Active ingredient in Salvia is salvinorin A, a kappa opioid agonist



Salvia Effects



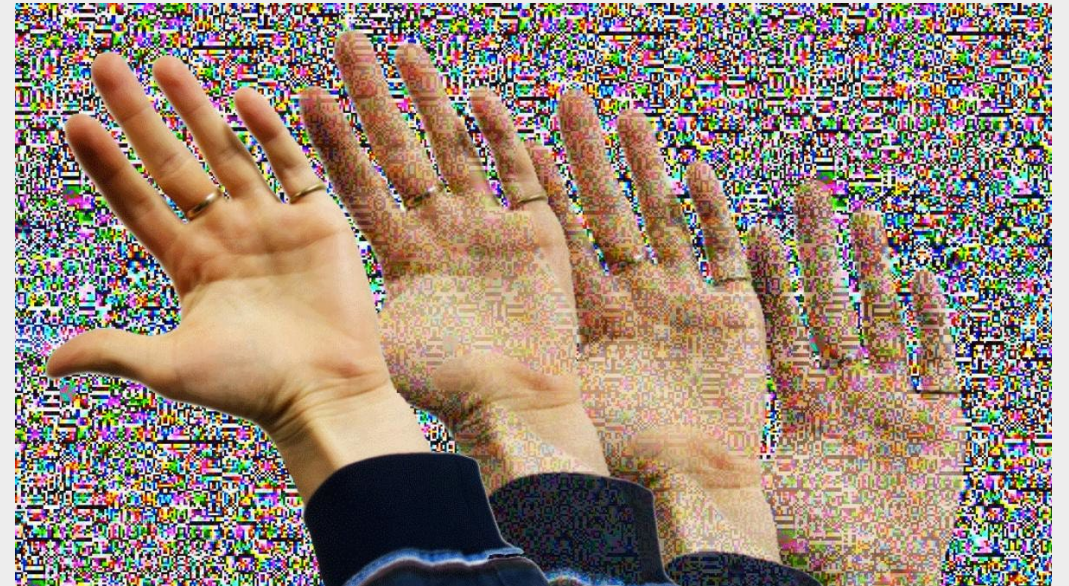
- Intense and short-lived
 - Onset < 1 minute
 - Duration < 30 minutes
- Changes in visual perception
- Decreased ability to interact with surroundings
- Increased sense of well-being (or not)

Summary: Hallucinogen Intoxication

- Clear Sensorium
- Intact Memory
- Hyperalert
- Intact reality testing
 - Can sometimes be reasoned with or calmed by talking
- Visual Hallucinations >> Auditory

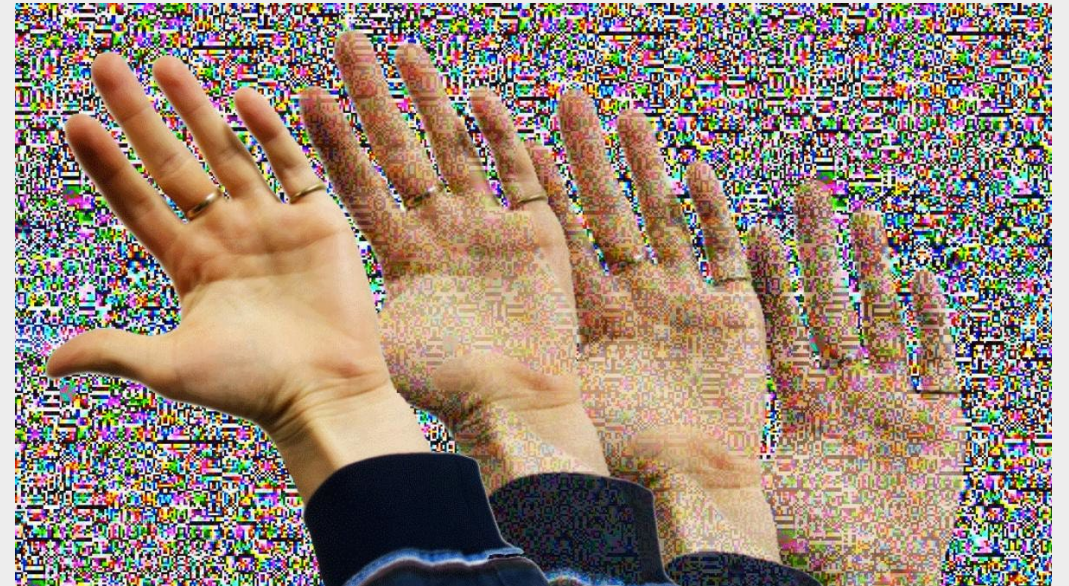
Hallucinogen Persisting Perception Disorder (HPPD)

- Re-experiencing of perceptual symptoms experienced while intoxicated following cessation of use = flashbacks



Hallucinogen Persisting Perception Disorder (HPPD)

- Unrelated to dose or number of exposures
- Usually resolves within 1-2 years of last use
- Can be triggered by other substance use



Dissociatives

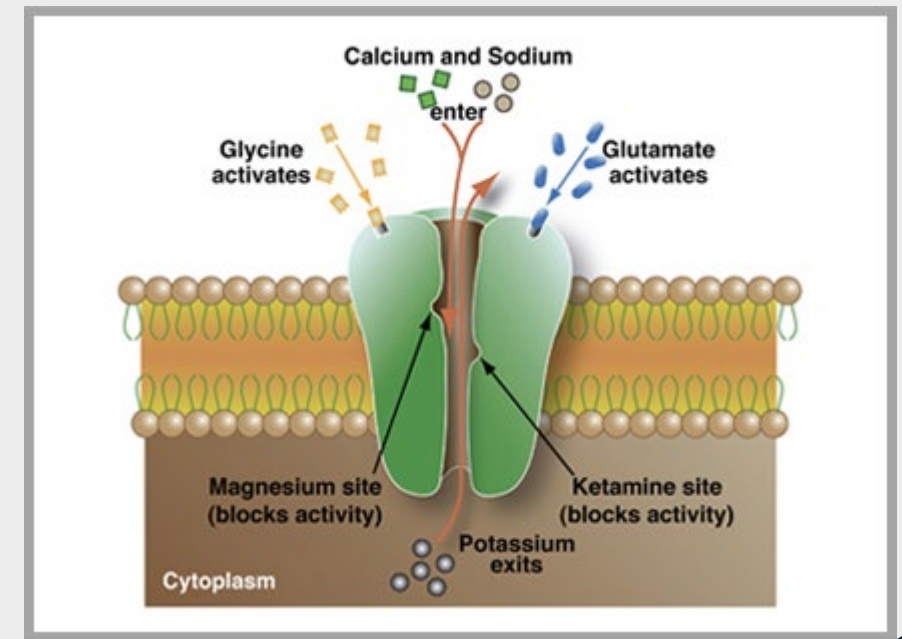


PCP and Ketamine are:

- A. Serotonin 5HT-2A receptor agonists
- B. Dopamine transporter reuptake inhibitors
- C. NMDA receptor antagonists
- D. Opioid mu-receptor agonists

Definition

- NMDA receptor antagonists
 - Glutamate activates NMDA receptors to filter sensory stimuli
 - Dissociatives noncompetitively block NMDA receptors → sensory overflow
 - Visual hallucination relatively rare



Members of the Class

- Arylcyclohexylamines
 - PCP
 - Ketamine
- Dextromethorphan (DXM)
- Nitrous Oxide



Effects



Dissociation

Sensory Isolation

Mental
Distortions



Increased HR,
BP, Temp

Phencyclidine (PCP, Angel dust)

- Developed as IV anesthetic
 - No longer FDA-approved; now Schedule I
 - Associated with prolonged delirium
- Risk of seizures or death
- Available as powder, tablets, liquid, and sprayed onto plant leaves and then smoked



PCP Effects

- Vary widely with dose
 - Confusion, delirium, psychosis
-  Semi-coma and coma (less common)
-  Coma with seizures (rare)

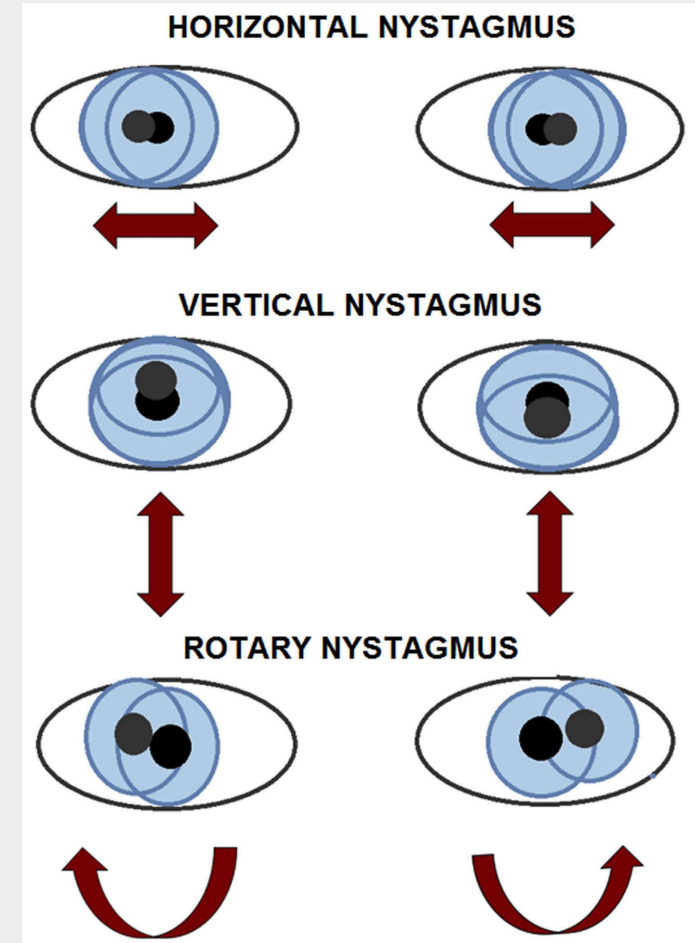
PCP

- Psychotomimetic = model of psychosis
 - Positive Symptoms (Delusions, hallucinations)
 - Negative Symptoms (Blunted affect, asociality)



PCP

- PCP Intoxication
 - Nystagmus (rotary, vertical, horizontal)
 - Hyperreflexia
 - HTN
 - Feelings of invulnerability
 - Management: low stimulus environment, benzos/antipsychotics as indicated



Ketamine (K, Special K)

- FDA-approved for general anesthesia in animals and humans
- Schedule III
- Administered as IV or IM in medical settings
- Used by inhalation, smoking, or oral administration
- Less potent, shorter-acting than PCP



Effects of Ketamine

- Analgesia / numbness
- Spacey feeling (“K-hole”)
- Amnesia
- Delirium (higher doses)
- Nystagmus (vertical and/or horizontal)
- CV + renal complications
- Long-term
- Dysphoria, memory impairment, apathy, irritability



Dextromethorphan (DXM)



- OTC cough medicines
 - Capsules, tablets, lozenges, syrup
 - AKA “skittles”
- Anti-tussive dose: <120mg daily; recommended dose 10-20mg q4hours
- 300-1800mg produces PCP-like effects

Effects of DXM

- Euphoria and hallucinations (increasing w/ higher dose)
- Drowsiness, blurred vision, slurred speech
- N/V, hypertension, diaphoresis



Effects of DXM

- Significant serotonergic properties
 - ↑ serotonin synthesis and release
 - ↓ reuptake
- Deaths have been reported with large doses (200x dose)
 - CNS & respiratory depression, seizure, arrhythmias



Inhalants



Many abused inhalants produce an intoxication that most closely resembles which of the following?

- A. Alcohol
- B. Cocaine
- C. Cannabis
- D. LSD

Inhalants



Breathable chemicals that can be self-administered, also known as:

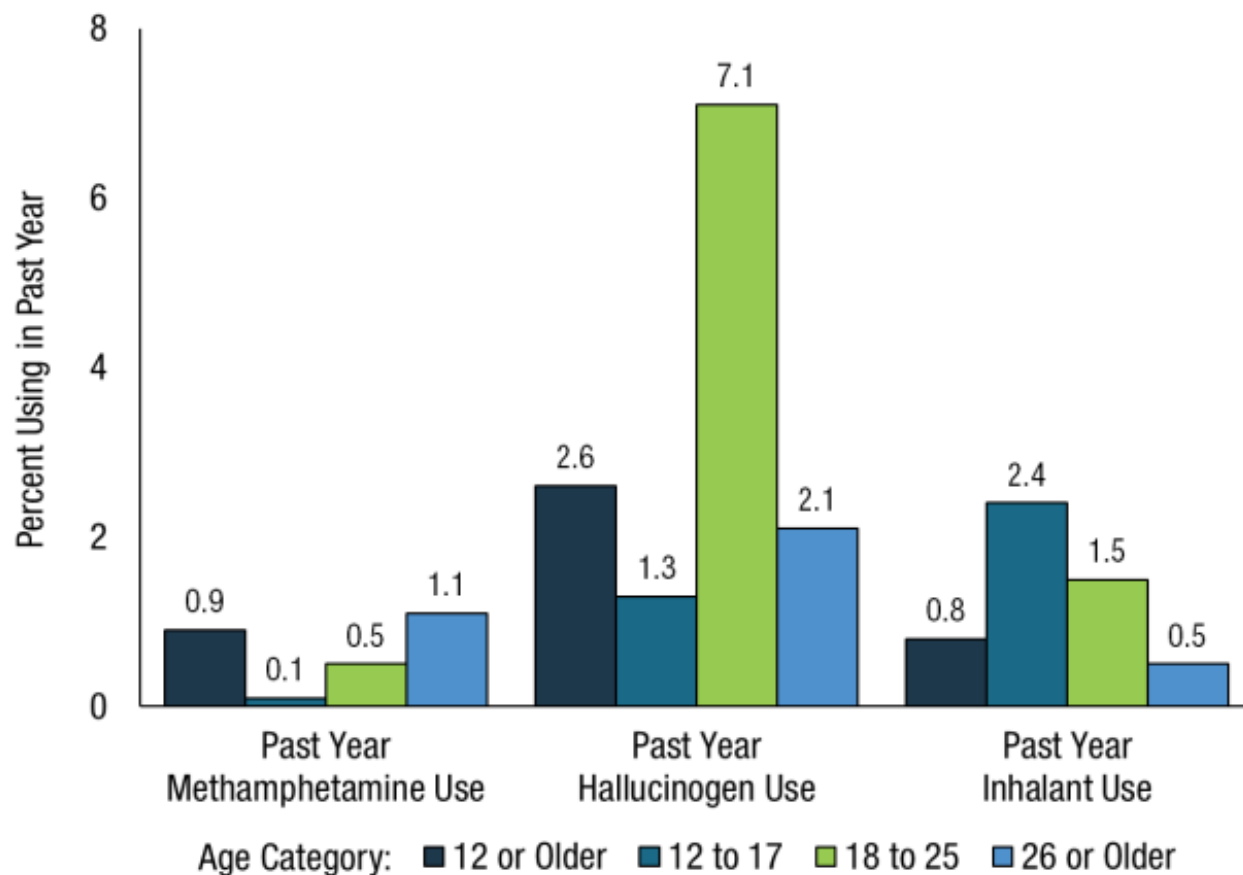
- Whippets
- Bang
- Poppers
- Kick
- Huff
- Sniff

Terminology

- Sniffing = inhaling from an open container
- Huffing = holding fabric soaked in substance to the nose or mouth and inhaling
- Bagging = concentrating vapors in a bag and inhaling



Past Year Methamphetamine Use, Past Year Hallucinogen Use, and Past Year Inhalant Use: Among People Aged 12 or Older; 2021



Source of Inhalants: Products



Air freshener

Lighter fluid

Household cleaners

Gasoline

Hair spray

Mothballs

Nail polish remover

Paint thinner

Markers

Refrigerant

Rubber cement

Spray paint

Video head cleaner

Whipped cream canisters

Abuse Liability

- Number of factors increase abuse potential
 - Free or low cost
 - Readily available
 - Difficult to test for
 - Perceived as low risk
- Inquire about inhalant use, especially when working with adolescent population
- Provide education regarding consequences of use

Inhalant Pharmacology

- Highly lipophilic
- Rapidly absorbed through the lungs
- Crosses blood-brain barrier
- Accumulates in brain, liver and fatty tissue
- Rapid onset, short duration
- Synergistic effect: alcohol, benzos

Effects of Inhalants

Acute Effects

- Euphoria
- Disinhibition
- Dizziness / lightheadedness
- Slurred speech
- Ataxia

Toxic Effects and Overdose

- Respiratory depression
- Arrhythmias
- Asphyxia, cardiac arrest and death can occur

Chronic Effects of Inhalants

CARDIAC

arrhythmia
cardiomyopathy

DERMATOLOGICAL

perioral infection
rash

GASTROINTESTINAL

hepatorenal failure

MUSCULOSKELETAL

Rhabdomyolysis

Chronic Effects of Inhalants

PULMONARY

emphysema
hypoxia
aspiration pneumonia

GENITOURINARY

glomerulonephritis
hypokalemia

HEMATOPOIETIC

aplastic anemia
leukemia
bone marrow suppression

NEUROLOGICAL

peripheral neuropathy
delirium/dementia
cerebellar atrophy
irreversible white matter changes

Treatment Considerations

- User may experience prolonged residual effects because chemicals are stored in fatty tissue
- Neurological impairment is often present
 - Cognition should be continually re-assessed
 - Talk therapy / group therapy may not be appropriate

Anabolic-androgenic Steroids

Which of the following is a side effect of anabolic steroid use?

- A. Mania
- B. ↓LDL, ↑HDL
- C. Hypersomnia
- D. Weight loss

Anabolic - Androgenic Steroids (AAS)



- Anabolic = skeletal muscle-building
- Androgenic = masculinizing
- Includes testosterone and >100 related synthetic substances

Misuse

- Enhance performance and/or improve physical appearance
 - May be taken at 10-100x the intended dose



Epidemiology

- 3 most common populations:
 - Athletes
 - Performance enhancement
 - Aesthetes
 - Improve physical appearance (often adolescents)
 - Fighting Elite
 - Increase aggression and/or job performance (security, law enforcement)

Steroid Side Effects

Acne

Liver damage

↑LDL, ↓HDL

Complications of
Injections

Aggressive /
violent behavior
("Roid Rage")

Hypomania or
Mania

Paranoia

Extreme
irritability

Steroid Side Effects

Women

- Deepening of voice
- Facial hair
- Menstrual changes
- Male-pattern baldness
- Genital hypertrophy

Men

- Testicular atrophy
- Prostatic hypertrophy
- Gynecomastia
- Baldness
- Infertility

Psychiatric Side Effects

- Aggressive / violent behavior
 - “Roid Rage”
- Hypomania or Mania (high doses)
- Paranoia
- Extreme irritability
- Impaired judgment
- Delusions
- Treatment
- Remove AAS
- Use mood stabilizers or anti-psychotics as needed
- Generally, resolves within 1-2 weeks after cessation

Other Associated Syndromes & Treatment

- Steroid Withdrawal-Associated Depression
 - Can be responsive to SSRIs
- Comorbid SUD, especially opioid
- Body Dysmorphic Disorder / Muscle Dysmorphia
 - Rarely seek treatment
 - Not euphorigenic; no immediate high
 - Goal is long-term reward associated with physical changes
 - May be seen as socially acceptable or positive

In Summary



1


Diverse group of substances with relatively low prevalence, but high abuse liability

2

Varied but significant effects from use and misuse, including long-term consequences



Get in Touch

 301.656.3920

 education@asam.org

 www.asam.org