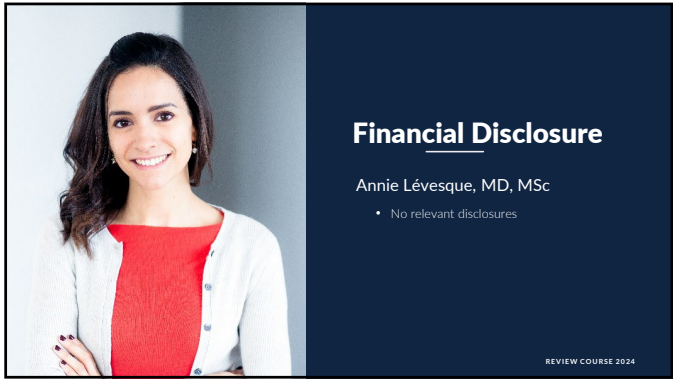


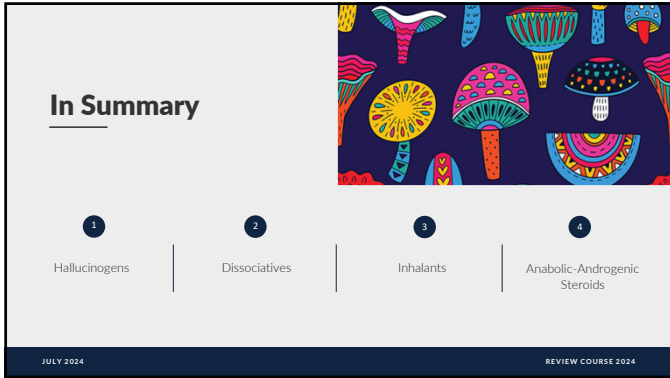
1



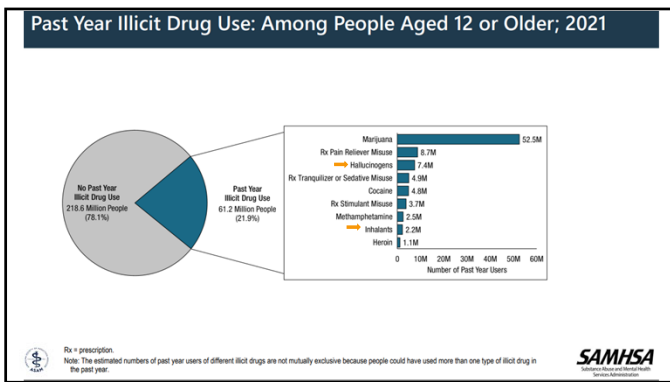
2



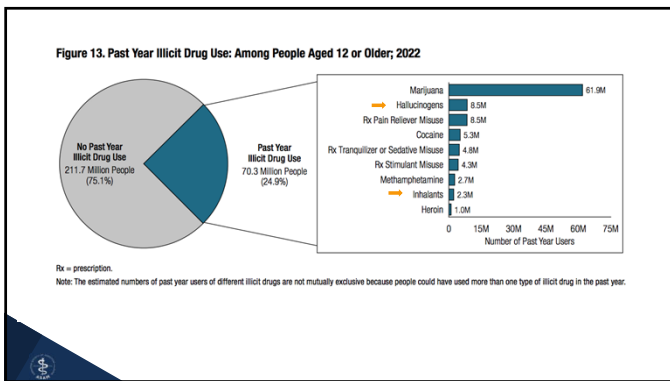
3



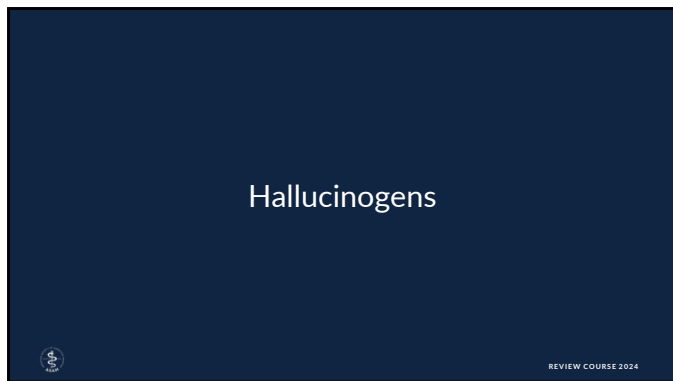
4



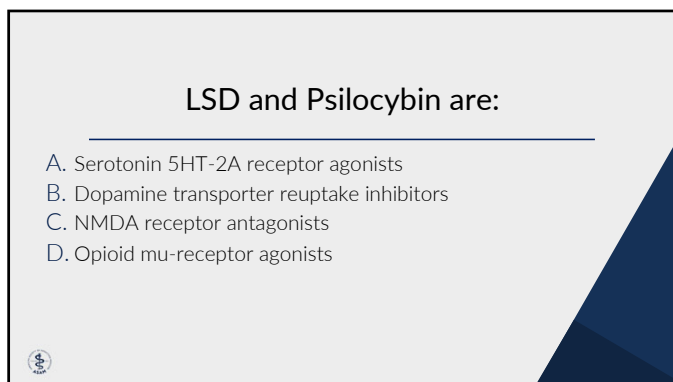
5



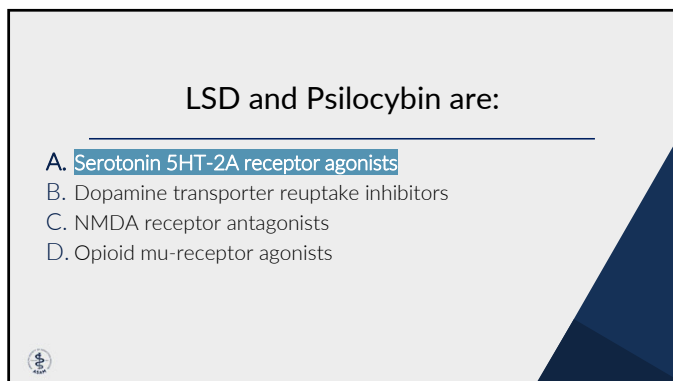
6



10



11



12

Hallucinogens

- Alterations in cognition, perception, and emotion
- Minimal autonomic side effects or craving



13

“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

14

Hallucinogens

Classical Hallucinogens:

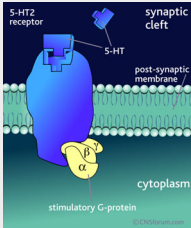
- 5HT-2A agonists or partial agonists
- LSD, DMT, psilocybin, mescaline

Empathogens:

- Creates a sense of connection to others
- MDMA and related substances


Others:

- Salvia, Ibogaine



15


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 | |

16

Effects of Hallucinogens *Somatic*



| | | | |
|------------|--------------|----------------|--------|
| Dizziness | Weakness | Tremors | Nausea |
| Drowsiness | Paresthesias | Blurred Vision | |


Most hallucinogens induce rapid tolerance

17

DMT

Naturally occurring (plants, toad)


- Inhalation (smoking) or injection (rare)
- Can be taken orally, but requires MAOI
- Rapid onset (<5 min), short duration of action (30 min)



In contrast to other classical hallucinogens, DMT does not induce tolerance in humans.

18

Ayahuasca




- Brew containing DMT, MAOIs, and other hallucinogens
- Used ceremonially in some traditional religious ceremonies
- Can cause significant vomiting
- High dose may lead to seizure

19

Psilocybin

Pro-drug: Psilocybin → psilocin

- Found as naturally occurring tryptamine in certain varieties of mushrooms
- Inability to discern fantasy from reality
 - Can lead to panic attacks, psychosis
- Duration: 4-6 hours



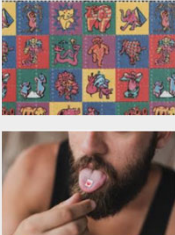
20

Lysergic Acid Diethylamide (LSD)

- First hallucinogen to be synthesized
- Blotter paper with dried solution of LSD
- Breath mints, sugar cubes, 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



21

Mescaline/Peyote

Buttons from top of peyote cactus

- 6-10 buttons for intoxication


Slow onset (30-60 min)

First hour:

- Minor perceptual changes
- Increased respiratory rate,
- Nausea

Next several hours (5-10):

- Visual illusions/hallucinations
- Synesthesia

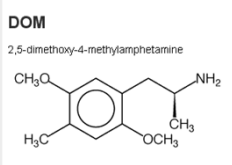


22

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

CN(C)Cc1cc(OC)c(C)c(OC)c1

23

MDA (*Sass*)

- Powder or pill – swallowed or sniffed
- Produces stimulant, empathogen and hallucinogenic effects
- Increases release of serotonin, norepinephrine and dopamine
- Closely related to MDMA (Ecstasy)
- Is sometimes used as an adulterant and falsely sold as MDMA



24

Salvia

- Naturally grows in the US
- Can be ingested or smoked
- Active ingredient: salvinorin A (kappa opioid agonist)
- Changes in visual perception
- Decreased ability to interact with surroundings
- Intense and short-lived
 - Onset < 1 minute, Duration < 30 minutes



25

Hallucinogen Intoxication

- Anxiety, "Bad Trip"
- Usually self-limited and returns to baseline without treatment
- Treatment
 - First line: Low stimulus environment, reassurance
 - Second line: Benzo
 - Third line: Antipsychotic

26



Summary: Hallucinogen Intoxication

- Clear Sensorium
- Intact Memory
- Hyperalert
- Tolerance
- Intact reality testing
- Visual Hallucinations >> Auditory

27

Hallucinogen Persisting Perception Disorder (HPPD)



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



28


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



29

Dissociatives




REVIEW COURSE 2024

30

PCP and Ketamine are:


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



31

PCP and Ketamine are:

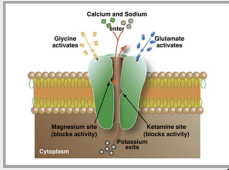
- A. Serotonin 5HT-2A receptor agonists
- B. Dopamine transporter reuptake inhibitors
- C. NMDA receptor antagonists
- D. Opioid mu-receptor agonists



32

Definition

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



33

Effects


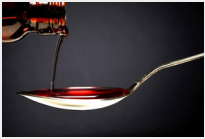


| | |
|--------------------|------------------------|
| Dissociation | Sensory Isolation |
| Mental Distortions | Increased HR, BP, Temp |

34

Members of the Class


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



35

Phencyclidine (PCP, Angel dust)

- Developed as IV anesthetic
- No longer FDA-approved
- Associated with prolonged delirium
- Risk of seizures or death



- Available as powder, tablets, liquid, and sprayed onto plant leaves and then smoked

36

PCP Effects

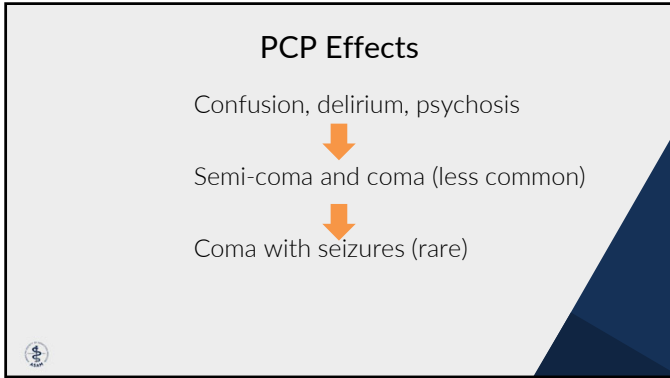
Confusion, delirium, psychosis

↓

Semi-coma and coma (less common)

↓

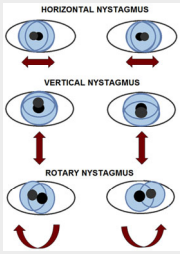
Coma with seizures (rare)



37

PCP

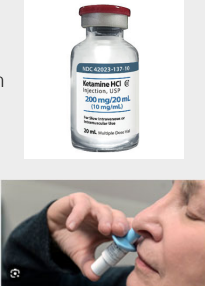
- PCP Intoxication
 - Nystagmus (rotary, vertical, horizontal)
 - Hyperreflexia
 - HTN
 - Feelings of invulnerability
 - Management of intoxication: low stimulus environment, benzos/antipsychotics as indicated



38

Ketamine (K, Special K)


- FDA-approved for general anesthesia and treatment-resistant depression
- Administered as IV, IM or as nasal spray in medical settings
- Misused by inhalation, smoking, or oral administration
- Less potent, shorter-acting than PCP



39

Effects of Ketamine

- Analgesia / numbness
- Spacey feeling ("K-hole")
- Amnesia
- Delirium (higher doses)
- Nystagmus (vertical and/or horizontal)
- Urinary complications




40

Dextromethorphan (DXM)




- OTC cough medicines
- FDA-approved for the treatment of depression (combo drug with bupropion)
- Anti-tussive dose: <120mg daily; recommended dose 10-20mg q4hours
- 300-1800mg produces PCP-like effects
 - Euphoria and hallucinations
 - Drowsiness, blurred vision, slurred speech
 - N/V, hypertension, diaphoresis



41

Effects of DXM

- In addition to antagonism at NMDA receptor, DXM has significant serotonergic properties
 - ↑ serotonin synthesis and release
 - ↓ reuptake
- Deaths have been reported with large doses (200x dose)
 - CNS & respiratory depression, seizure, arrhythmias



42

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

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

46

Inhalants




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

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

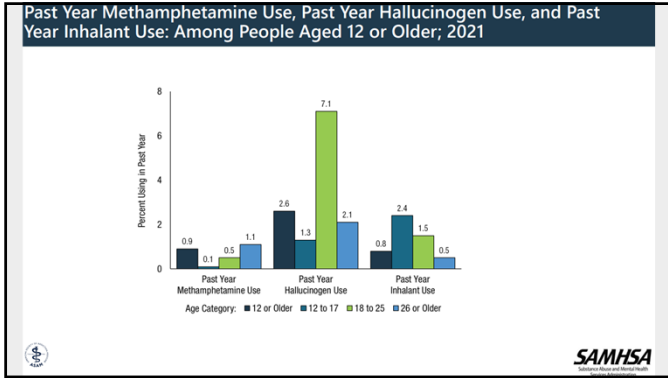
47

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



48



49

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 | |

50

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

51

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

52

Effects of Inhalants

| | |
|---|---|
| <h4>Acute Effects</h4> <ul style="list-style-type: none">• Euphoria• Disinhibition• Dizziness / lightheadedness• Slurred speech• Ataxia | <h4>Toxic Effects and Overdose</h4> <ul style="list-style-type: none">• Respiratory depression• Arrhythmias• Asphyxia, cardiac arrest and death can occur |
|---|---|

53

Chronic Effects of Inhalants

| | |
|--|---|
| CARDIAC arrhythmia cardiomyopathy | DERMATOLOGICAL perioral infection rash |
| GASTROINTESTINAL hepatorenal failure | MUSCULOSKELETAL Rhabdomyolysis |

54

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 |

55

Treatment Considerations

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

56


Anabolic-androgenic Steroids

REVIEW COURSE 2024

57

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


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



58

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

A. **Mania**
B. Depression
C. Hypersomnia
D. Weight loss



59

Anabolic - Androgenic Steroids (AAS)




- Anabolic = skeletal muscle-building
- Androgenic = masculinizing
- Includes testosterone and related synthetic substances
- Enhance performance and/or improve physical appearance
- May be taken at 10-100x the intended dose



60

Addiction Liability


- Rarely seek treatment
- Not euphorogenic; no immediate high
- Goal is long-term reward associated with physical changes
- May be seen as socially acceptable or positive
- Often missed by clinicians



61

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)




62

Terminology

Stacking: use of combinations of multiple drugs at the same time

Cycling: use of steroid combinations for weeks to months with abstinent rest periods before resumption of different steroid or combinations in order to avoid tolerance


Pyramiding: starting with a low dose and gradually increasing the dose until peak levels are achieved a number of weeks before a competition and then tapering so the individual will be drug free when tested



63

Medical Indications for AAS

- Hypogonadism
- Hereditary angioedema prophylaxis
- Acquired aplastic anemia and myelofibrosis treatment
- Muscle wasting secondary to starvation, weight loss following extensive surgery, chronic infections (advanced HIV), or severe trauma
- Secondary treatment of bone metastases from breast cancer in postmenopausal women
- Menopause with methyltestosterone combined with estrogen to alleviate symptoms
- Patients on dialysis to increase lean body mass
- Female-to-male gender change



64

Steroid Side Effects

| Women | Men |
|--|--|
| <ul style="list-style-type: none">• Deepening of voice• Facial hair• Menstrual changes• Male-pattern baldness• Genital hypertrophy | <ul style="list-style-type: none">• Testicular atrophy• Prostatic hypertrophy• Gynecomastia• Baldness• Infertility |

65

Steroid Side Effects


| | | | |
|----------------|-----------------------|--------------------|-----------------------------|
| Acne | Liver damage | ↑LDL, ↓HDL | Complications of Injections |
| Tendon rupture | Cardiac complications | Sexual dysfunction | Polycythemia |

66

Psychiatric Side Effects

- Aggressive / violent behavior
- Hypomania or Mania (high doses)
- Paranoia
- Extreme irritability
- Impaired judgment
- Delusions

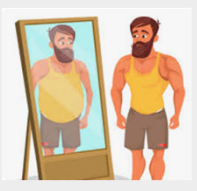

- Treatment:
- Remove AAS
- Use mood stabilizers or anti-psychotics as needed
- Generally, resolves within 1-2 weeks after cessation



67

Other Associated Syndromes & Treatment

- Steroid Withdrawal-Associated Depression
 - Can be responsive to SSRIs
- Comorbid SUD, especially opioid
- Body Dysmorphic Disorder / Muscle Dysmorphia

68


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



JULY 2023 REVIEW COURSE 2023

69

Get in Touch

301.656.3920
education@asam.org
www.asam.org

JULY 2024 REVIEW COURSE 2024

70