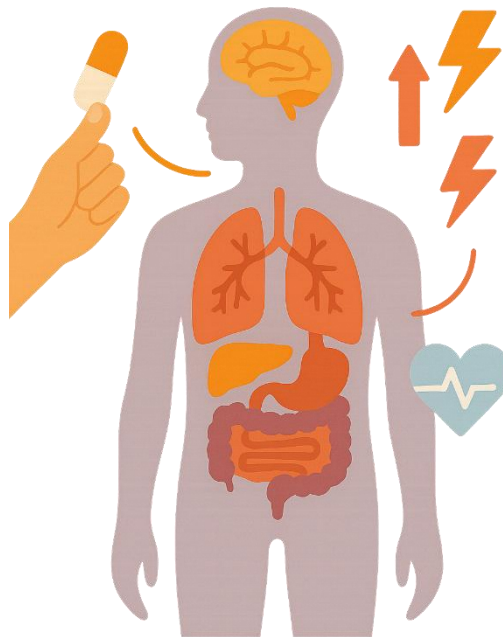


Substance abuse

CNS Stimulants: Amphetamines

Introduction

- Amphetamines are synthetic stimulants that affect the central nervous system (CNS) by increasing the levels of dopamine and norepinephrine.
- Commonly abused amphetamines include:
 - Amphetamine sulfate
 - Dextroamphetamine
 - Methamphetamine ("crystal meth")
 - MDMA (3,4-methylenedioxymethamphetamine, also known as "Ecstasy")



Mechanism of Action

- Amphetamines increase the release of monoamines (mainly dopamine and norepinephrine) from presynaptic neurons and inhibit their reuptake.
- This results in increased stimulation of postsynaptic receptors, leading to heightened alertness, euphoria, and increased energy.

Clinical Signs and Symptoms of Amphetamine Abuse

1. Acute Effects

- Euphoria and increased energy
- Heightened alertness and concentration
- Decreased appetite
- Increased heart rate (tachycardia) and blood pressure (hypertension)

- Dilated pupils (mydriasis)
- Hyperthermia
- Insomnia
- Restlessness and agitation

2. Toxic (Overdose) Effects

- Severe hypertension or hypotension
- Cardiac arrhythmias
- Chest pain, possible myocardial infarction
- Seizures
- Hyperthermia
- Rhabdomyolysis (muscle breakdown)
- Delirium or psychosis (paranoia, hallucinations)
- Stroke or intracranial hemorrhage
- Death (due to cardiovascular collapse or seizures)

3. Chronic Use / Long-term Effects

- Dependence and tolerance
- Paranoid psychosis (similar to schizophrenia)
- Severe dental problems ("meth mouth")
- Weight loss and malnutrition
- Cognitive impairment
- Cardiomyopathy and other heart diseases

Diagnosis

- **Clinical presentation:** Based on behavioral changes and physical signs.
- **Toxicology screening:** Urine drug screen can detect amphetamines.
- **Blood tests:** May be needed in severe toxicity.

Treatment of Amphetamine Dependence

Acute Overdose Management

- **Supportive care:** Maintain airway, breathing, and circulation.
- **Sedation:** Benzodiazepines (e.g., lorazepam or diazepam) for agitation, seizures, and hypertension.
- **Cooling measures:** For hyperthermia.
- **Antipsychotics:** May be needed for psychotic symptoms (e.g., haloperidol).

- **Cardiac monitoring:** Especially in cases of arrhythmia or chest pain.

Chronic Dependence Treatment

- **Behavioral therapy:** Cognitive-behavioral therapy (CBT), contingency management.
- **Support groups:** Narcotics Anonymous or stimulant-focused recovery programs.
- No specific FDA-approved pharmacotherapy yet, but some medications under investigation include:
 - Bupropion (a dopamine reuptake inhibitor)
 - Modafinil
 - Mirtazapine
- **Psychiatric management:** Address underlying depression, anxiety, or psychosis.

Opioids

Introduction

- Opioids are a class of drugs that include both natural and synthetic compounds which act on opioid receptors (mu, delta, kappa) to produce analgesia and euphoria.
- Common opioids:
 - **Natural:** Morphine, codeine
 - **Semi-synthetic:** Heroin, oxycodone, hydromorphone
 - **Synthetic:** Fentanyl, methadone, tramadol

Mechanism of Action

- Opioids bind to mu-opioid receptors in the brain and spinal cord.
- **This results in inhibition of neurotransmitter release, leading to:**
 - Analgesia (pain relief)
 - Euphoria
 - Respiratory depression
 - Sedation

Clinical Signs and Symptoms of Opioid Abuse

Acute Effects

- Euphoria and relaxation
- Sedation
- Miosis (pinpoint pupils)
- Respiratory depression (can be life-threatening)
- Bradycardia
- Hypotension
- Nausea and vomiting
- Constipation
- Itching (histamine release)

Toxic (Overdose) Effects

- Profound respiratory depression
- Coma
- Pinpoint pupils (a classic triad of opioid overdose: coma, respiratory depression, miosis)
- Cyanosis (bluish skin due to hypoxia)

- Pulmonary edema
- Death due to hypoxia and respiratory arrest

Chronic Use / Long-term Effects

- Tolerance and physical dependence
- Psychological addiction
- Constipation (chronic)
- Hormonal disturbances (hypogonadism, amenorrhea)
- Immunosuppression
- Increased risk of infections (e.g., HIV, Hepatitis B/C from IV drug use)
- Withdrawal symptoms on cessation

Opioid Withdrawal Symptoms

- Withdrawal is extremely unpleasant but not usually life-threatening (unlike alcohol or benzodiazepine withdrawal).
- **Symptoms include:**
 - Anxiety, irritability
 - Muscle and bone pain
 - Diarrhea and vomiting
 - Sweating
 - Yawning
 - Rhinorrhea (runny nose)
 - Piloerection ("goosebumps")
 - Craving

Diagnosis

- Clinical history and examination
- **Toxicology screen:** Urine opioid immunoassays, confirmatory tests using gas chromatography-mass spectrometry (GC-MS)

Treatment of Opioid Dependence

Acute Overdose Management

- Airway management and oxygen support
- **Naloxone:** An opioid antagonist that rapidly reverses respiratory depression. Can be given IV, IM, subcutaneously, or intranasally.
 - Onset within 1–2 minutes (IV)



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