

OTHER DRUGS OF ABUSE

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ASAM Disclosure of
Relevant Financial Relationships
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Name	Commercial Interests	Relevant Financial Relationships: What Was Received	Relevant Financial Relationships: For What Role	No Relevant Financial Relationships with Any Commercial Interests
Abigail Herron				X



Hallucinogens



Definition

- Produce alterations in thought, mood and perception
- Produce minimal autonomic side effects or craving
- Fail to produce excessive stupor or central stimulation



“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



Question #1

Classical Hallucinogens increase the activity of which of the following neurotransmitter systems?

- A. Dopamine
- B. Serotonin
- C. Acetylcholine
- D. Gamma-amino-butyric acid (GABA)
- E. Glutamate



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Classical Hallucinogens

- 5HT_{2A} agonists or partial agonists → Serotonergic Hallucinogens
- 2 subclasses of arylalkylamines
 - Indolealkylamines
 - Bind at multiple receptors (5HT_{2A}, 5HT_{2B}, 5HT_{2C}, 5HT_{1A})
 - Phenylalkylamines
 - Fairly selective for 5HT_{2A}
- Not all arylalkylamines are hallucinogenic
 - Stimulants
 - Empathogens



Effects of Hallucinogens



- Somatic
 - Dizziness
 - Weakness
 - Tremors
 - Nausea
 - Drowsiness
 - Paresthesias
 - Blurred Vision
- Perceptual
 - Altered shapes and colors
 - Difficulty focusing on objects
 - Heightened sense of hearing
 - Synesthesias
 - Stimulation of one sensory pathway leads to experiences in a second pathway (tasting colors, seeing music)



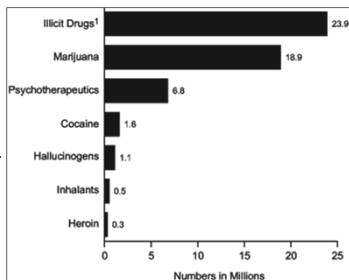
Effects of Hallucinogens

- Alterations in mood
- Tension and anxiety
- Distorted sense of time
- Difficulty expressing thoughts
- Depersonalization
- Dreamlike feeling
- Visual hallucinations or illusions



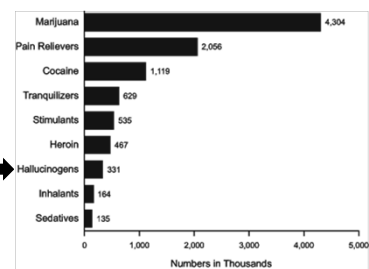
Epidemiology

Past Month Use Among Persons Age 12 or older (2012 NSDUH)



Epidemiology

Specific Illicit Drug Dependence or Abuse in the Past Year Among Persons Aged 12 or Older (2012 NSDUH)



Idolealkylamines

- DMT (N,N-Dimethyltryptamine)
 - Prototype of this subclass
 - Naturally occurring (plants, toad)
 - Rapid onset (<5 min), short duration of action (30 min)
 - Characteristically unpleasant odor
 - Routes of administration include inhalation (smoking) and injection (rare)
 - Can be taken orally (component of ayahuasca)



Ayahuasca

- Brew containing DMT, MAOis, and other hallucinogens
- Used ceremonially in parts of the Amazon and in some Native American religions
 - Legalized for religious use among Native Americans in the US



Idolealkylamines

- Psilocybin, Psilocin
 - Found as naturally occurring tryptamine in certain varieties of mushrooms (shrooms, shrooming)
 - Detachment from reality
 - Inability to discern fantasy from reality
 - Can lead to panic attacks, psychosis
 - Rapid tolerance to effects
 - Cross tolerance with LSD



Idolealkylamines

- Psilocybin, Psilocin
 - Reported mystical-like experiences
 - Inner peace, patience, optimism, self-confidence
 - Adverse Effects
 - Nausea, vomiting, anxiety
 - May interact with MAOI
 - Duration: 4-6 hours



Idolealkylamines

- LSD (lysergic acid diethylamide) aka acid
 - Highly potent
 - Not naturally occurring
 - Schedule I
 - Water soluble, clear white odorless crystals
 - Distributed on sheets of thin blotter paper with dried solution of LSD (most common)
 - Breath mints, sugar cubes (dropping acid)
 - Pressed into pills (microdots) or thin gelatin squares (window panes)



LSD

- Onset: 30-60 min, Peak: 2-4 hours, Duration: 8-12 hours
- Effects
 - Perceptual
 - Altered shapes and colors, heightened sense of hearing
 - Somatic
 - Nausea, blurred vision, dizziness
 - Psychic
 - Depersonalization, visual hallucinations, alterations in mood



Idolealkylamines

- Beta-carbolines
 - Harmaline, Harmine
 - Not technically classical hallucinogens
 - Lack 5-HT_{2A} agonist effects although they do bind at receptor
 - Act as MAOI
 - Poorly studied
 - Naturally occurring (South American plants)
 - Can be component of ayahuasca



Phenylalkylamines

- Largest group of classical hallucinogens
 - Mescaline, Peyote
 - DOM, DOB, DMA, MDA, Nexus (2-CB)
 - Modifications of mescaline-like substances



Mescaline/Peyote

- Buttons from top (crown) of peyote cactus
 - Buttons are removed & dried, then chewed or soaked in water
 - 6-10 buttons for intoxication
 - Use legalized within Native American Church
- Slow onset (30-60 min)
 - First hour
 - Minor perceptual changes, increased resp rate, nausea
 - Next several hours (5-10)
 - Visual illusions/hallucinations
 - Synesthesias



DOM

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

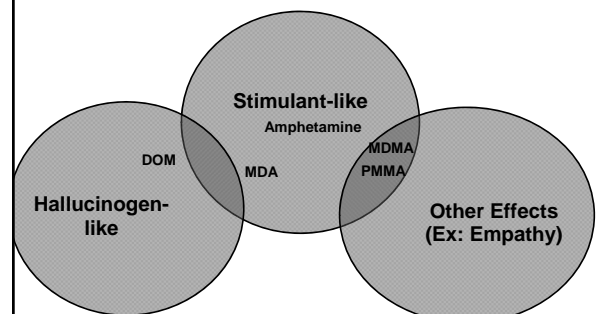


MDA

- 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



Classification by Effect



Salvia



- Herb found in southern Mexico and South America used in healing rituals
 - Traditionally ingested by chewing fresh leaves or by drinking extracted juices
 - Sometimes smoked when used as drug of abuse
- Active ingredient in Salvia is salvinorin A, a kappa opioid agonist



Salvia

- Not currently regulated by Controlled Substances Act or scheduled by the DEA
 - DEA has listed Salvia as a drug of concern
 - Several states and countries have passed legislation to regulate its use
 - May be classified as Schedule I



Salvia Effects

- Intense and short-lived
 - Onset < 1 minute
 - Duration < 30 minutes
- Changes in visual perception
- Increased sense of well-being
- Feelings of detachment
- Modified perception of external reality and the self
 - decreased ability to interact with surroundings



Hallucinogen Intoxication

- Clear Sensorium
- Intact Memory
- Hyperalert
 - EEG = arousal
- 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
- Unrelated to dose or number of exposures
- Usually resolves within 1-2 years of last use
- Can be triggered by other substance use



Dissociatives



Definition

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

Members of the Class

- Arlcyclohexylamines
 - PCP
 - Ketamine
- Dextromethorphan
- Nitrous Oxide

Effects

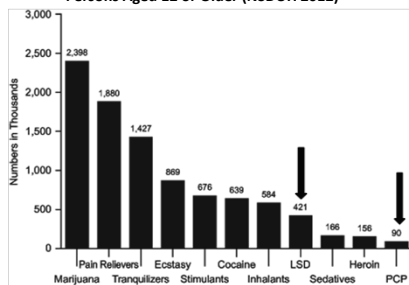
- Dissociation
- Sensory isolation
- Mental Distortions
- Increased HR, BP, Temp

Epidemiology

- Men > Women
- More common in large urban areas
- Often used in combination with alcohol or other illicit substances

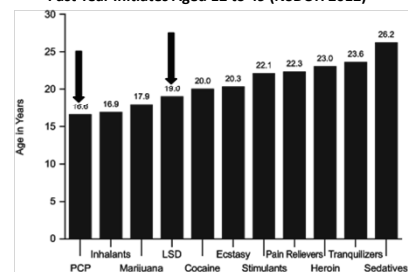
Epidemiology

Past Year Initiates of Specific Illicit Drugs among Persons Aged 12 or Older (NSDUH 2012)



Epidemiology

Mean Age at First Use for Specific Illicit Drugs among Past Year Initiates Aged 12 to 49 (NSDUH 2012)



Phencyclidine (PCP, angel dust)

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



PCP

- Psychotomimetic = Models psychosis
 - Positive Symptoms
 - Delusions, hallucinations
 - Negative Symptoms
 - Blunted affect, asociality
 - Individuals with schizophrenia are more susceptible to prolonged psychosis after use



PCP Intoxication

- Nystagmus (rotary, vertical, horizontal)
- Hyperreflexia
- HTN
- Feelings of invulnerability
 - Agitation, violence



Management of PCP Intoxication

- Low stimulus environment
- Check serial CPKs
 - Risk of rhabdomyolysis
 - Can progress to renal failure
- Acidification of urine
 - Increases renal clearance, but not advised bc inc. urinary myoglobin
- Benzos, Antipsychotics as needed



PCP Effects

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



Ketamine (K, Special K)

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



Ketamine

- Clinical Effects
 - Analgesia
 - Dissociation
 - Amnesia
 - Delirium (higher doses)
 - Long term
 - Dysphoria, memory impairment, apathy, irritability



Intoxication and Overdose

- Nystagmus (vertical and/or horizontal)
- Cardiovascular and renal complications
- Numbness of entire body
- Spacey feeling
- Rare visual hallucinations



Dextromethorphan (DXM)

- Widely available in over-the-counter cough medicines
 - Capsules, tablets, lozenges, syrup
 - Anti-tussive dose <120mg Daily
 - 300-1800mg produce PCP-like effects



Dextrorphan (DXO)

- DXM is metabolized to dextrorphan (DXO), an NMDA antagonist
 - Weaker sigma opioid agonist and stronger NMDA antagonist than DXM
 - Relatively inactive at mu, kappa and delta opioid receptors
 - Lacks conventional opioid properties
 - Respiratory depression at massive doses



Effects of Dextromethorphan

- Drowsiness, Dizziness, Blurred Vision, Slurred Speech
- Euphoria and Hallucinations
- N/V, Hypertension, Diaphoresis
- Significant Serotonergic Properties
 - Increase synthesis & release
 - Inhibit reuptake
 - Risk of serotonin syndrome



Dextromethorphan (DXM)

- Significant serotonergic properties
 - Increase synthesis and release of serotonin
 - Inhibit reuptake
 - Risk of serotonin syndrome



Dextromethorphan (DXM)

- Popular with children and adolescents
- Perceived as “SMART” choice
 - Stigma
 - Money
 - Access
 - Risks
 - Testing



DXM Overdose

- Deaths have been reported with large doses (reports of 200x recommended dose)
 - CNS & Respiratory Depression, Seizure, Arrhythmias
- Additional ingredients in cough medicine increase hazards
 - Pseudoephedrine
 - Antihistamines
 - Acetaminophen



Dissociative Intoxication & Overdose

- PCP included on most screening panels, but need special testing (GCMS) for ketamine, DXM
- Increased serum CPK & urine myoglobin
- Rarely see dilated pupils
 - Different from stimulants, hallucinogens, opioid withdrawal
- Visual hallucinations relatively rare



Inhalants



Question #2

All of the following are true regarding inhalant use except:

- Many inhalants are legally available.
- Inhalants cause short and long term damage to multiple organ systems.
- Inhalant use increases with age.
- Onset of action is rapid and duration is short.
- Sniffing, huffing and bagging are methods of abusing inhalants.



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Inhalants

- Breathable chemicals that can be self-administered
- Deliberately inhaled to cause a high
- Also known as
 - Whippets
 - Poppers
 - Huff
 - Bang
 - Kick
 - 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



Types of Inhalants

Volatile Solvents

- Adhesives
- Aerosols
- Solvents
- Cleaning agents
- Aromatic Hydrocarbons (Toluene, Xylene)
 - Highly abused due to intense euphoric effects



Types of Inhalants

Anesthetics

- Ethyl ether
- Chloroform
- Methyl chloride
- Trichloroethylene
- Chloral hydrate



Types of Inhalants

Nitrous oxide

- Dissociative Anesthetic Gas
- Widely available
- Directly depresses ventilation and myocardial function
 - Use of nitrous can result in:
 - Hypoxia (displacement of O₂)
 - Hypotension & arrhythmias
 - Depression, psychosis, memory loss
 - Peripheral neuropathy
 - Bone marrow suppression



Types of Inhalants



Amyl-, Butyl-, Cyclohexyl- and Isobutyl- Nitrites

- Amyl nitrite was originally used as a vasodilator to relieve angina
- Sold in ampules (bulbs) that can be broken to release the vapors → the sound that resulted caused them to be referred as poppers
- Reputed to act as a sexual enhancer (causes smooth muscle relaxation)



Sources of Inhalants

PRODUCT

- 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

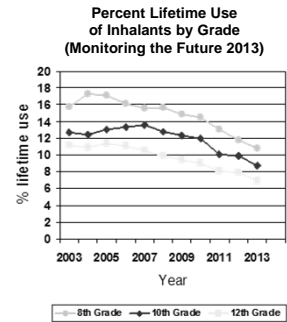
POSSIBLE CONTENTS

- Amyl, butyl, cyclohexyl nitrite; butane
- Butane
- n-Hexane, tetrachloroethylene, xylene
- Benzene, toluene, xylene, (lead)
- Butane, propane
- Naphthalene, paradichlorobenzene
- Acetone, toluene
- Toluene, trichloroethylene, xylene
- Xylene
- Freon
- Acetone, benzene, n-Hexane, toluene
- Butane, propane, toluene
- Amyl, butyl, cyclohexyl nitrite
- Nitrous oxide



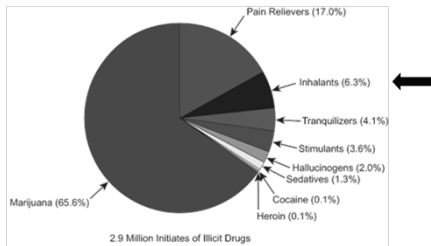
Epidemiology

- Most prevalent among adolescents
- Use decreases with age



Epidemiology

First Specific Drug Associated with Initiation of Illicit Drug Use among Past Year Illicit Drug Initiates Aged 12 or Older (NSDUH 2012)



Inhalant Pharmacology

- Highly lipophilic
 - Rapidly absorbed through the lungs
 - Cross the blood-brain barrier
 - Accumulate in the brain, liver and fatty tissue
- Some undergo hepatic metabolism while others are excreted largely unchanged
- Onset of action is rapid and duration is short
- Effects are potentiated by alcohol & benzodiazepines



Abuse Liability

- Quick acting
- Short duration
- Free or low cost
- Easily available
- Generally not prosecuted
- Difficult to test for
- Not perceived as dangerous



Inhalant Presentation

- Prototypical patient
 - Adolescent male
 - Odor of paint or solvents
 - “Glue Sniffer’s Rash” around nose & mouth
 - Conjunctival irritation
 - Cough, nasal discharge, dyspnea, rales, rhonchi



Acute Effects of Inhalants

- Euphoria
- Disinhibition
- Dizziness / lightheadedness
- Slurred speech
- Ataxia
- Drowsiness
- Increased incidence of accidents and injuries



Toxic Effects & Overdose

- Respiratory depression
- Arrhythmias
- Chest pain
- Vague muscle & joint pains
- Asphyxia, cardiac arrest and death can occur



Sudden Sniffing Death

- Acute cardiotoxicity in otherwise healthy users
- Occurs when intoxicated individual engages in strenuous activity
- Increased sensitivity of myocardium to norepinephrine
- Most common with butane or CFCs



Chronic Effects of Inhalants

- Cardiac
 - arrhythmia
 - cardiomyopathy
 - heart block
- Pulmonary
 - pneumonitis
 - emphysema
 - hypoxia
 - aspiration pneumonia
- Dermatological
 - burns
 - perioral infection
 - rash
- Gastrointestinal
 - hepatitis
 - hepatorenal failure
 - anorexia
- Genitourinary
 - glomerulonephritis
 - Goodpasture's syndrome
 - hypokalemia
- Hematopoietic
 - aplastic anemia
 - leukemia
 - bone marrow suppression
- Musculoskeletal
 - rhabdomyolysis



Neurological Effects of Inhalants

- Peripheral neuropathy
- Trigeminal neuralgia
- Optic neuritis
- Delirium
- Dementia
 - Decreased attention
 - Impaired learning and information processing
 - Apathy
 - Poor memory
- Impairment in working memory and executive functioning
- Cerebellar atrophy
 - Tremors
 - Ataxia
 - Gait abnormalities
- Irreversible white matter changes
 - Most common with toluene (aromatic hydrocarbon)
 - Correlate with lower performance IQ scores



Fetal Effects of Inhalants

- Inhalants cross the placenta
- Low birth weight
- Facial and limb abnormalities
- Microcephaly
- Developmental delays



Treatment Considerations

- User may experience prolonged residual effects because chemicals are stored in fatty tissue
- Neurological impairment is often present and cognition should be continually assessed
- Talk therapy may not be appropriate for patients with neurological or cognitive dysfunction
- Short attention span, poor impulse control, and poor social skills may not be appropriate for group therapy



Steroids



Question #3

- Which of the following is incorrect regarding steroid use:
 - A. The term anabolic refers to the smooth muscle building properties of steroids.
 - B. The term androgenic refers to the masculinizing properties of steroids.
 - C. Anabolic-androgenic steroids can be legally prescribed.
 - D. Cycling, stacking and pyramiding are terms used to describe illicit steroid use.
 - E. Liver damage is a known complication of steroid use.



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Anabolic - Androgenic Steroids

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



History

- 1935: researchers discovered that testosterone increased muscle mass
- 1940s – 1950s: used to improve performance in sports
- 1950s: brought to US for use in weightlifting
- 1975: banned in Olympics
- 1990: U. S. Federal Law reclassified all anabolic steroids as controlled substances, schedule III



Intended Use

- Can be legally prescribed
 - Steroid hormone deficiency
 - Delayed puberty
 - Loss of lean muscle mass
 - Cancer
 - HIV
 - Can lead to generalized muscle hypertrophy
 - Especially in arms, shoulders, neck and chest



Misuse

- AAS are abused in an attempt to enhance performance and/or improve physical appearance
 - May be taken at 10-100 times the intended dose
- Routes of Administration
 - Oral
 - Anadrol (oxymetholone), Oxandrin (oxandrolone), Dianabol (methandrostenolone), Winstrol (stanozolol)
 - IM
 - Deca-Durabolin (nandrolone decanoate), Durabolin (nandrolone phenpropionate), Depo-Testosterone (testosterone cypionate), Equipoise (boldenone undecylenate)



Terminology

- Cycling
 - Steroids taken for weeks or months alternating with rest periods
- Stacking
 - Combination of several different types of steroids and/or routes of administration
- Pyramiding
 - Slow escalation of steroid use (increasing the number, dose and/or frequency), with peak amount at mid-cycle and tapering toward the end of the cycle



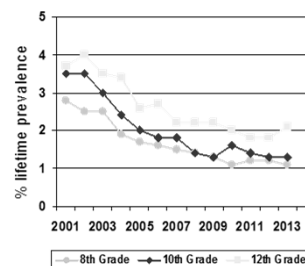
Sources of Illicit Steroids

- Often sold at gyms, competitions, and through mail order operations
 - Most illegal steroids are smuggled from countries that do not require a prescription for the purchase of steroids
 - These “steroids” may actually contain inactive products that do not have anabolic properties
- Illegally diverted from U.S. pharmacies or synthesized in amateur laboratories
- Obtained by Rx under false pretenses



Epidemiology

Lifetime Prevalence of Steroid Use by Grade (Monitoring the Future 2013)



Epidemiology

- 3 most common populations
 - Athletes
 - Used for performance enhancement
 - Aesthetes
 - Used to improve physical appearance
 - Most common among adolescents
 - Fighting Elite
 - Used to increase aggression and/or job performance (security, law enforcement)



Medical Side Effects

- Acne
 - Especially on face, shoulders and back
- Liver damage
 - Jaundice
 - Hepatomegaly
 - Liver cysts
- Fluid Retention
- Joint Pain
- Increased LDL, decreased HDL
- Injectable
 - Risk of infection, abscess, HIV, Hep C, endocarditis



Gender-Specific 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 of AAS use in psychiatrically healthy individuals



Withdrawal Syndrome

- Steroid Withdrawal Associated Depression
 - Depressed mood
 - Fatigue
 - Restlessness
 - Anorexia
 - Insomnia
 - Decreased libido
 - Rarely, suicidal ideation
- Can be responsive to SSRIs



Associated Syndromes

- Comorbid substance abuse, especially opioid abuse/dependence
 - Opioids used to counteract insomnia and irritability resulting from the steroids and pain from excessive exercise
- Body Dysmorphic Disorder / Muscle Dysmorphia
 - Perception of self as small and frail
 - Compulsive weight-lifting / body building
 - Avoidance of beach, locker room, showers



Treatment

- Rarely seek treatment
 - Steroids are not euphorogenic
 - No immediate high
 - Goal is long-term reward associated with physical changes
 - May be seen as socially acceptable or positive
 - Help to achieve idealized male form
 - Some have little respect for doctors
 - Feel they have no understanding of bodybuilding



Summary

- Hallucinogens
 - DMT, Ayahuasca, Psilocybin, LSD, Harmaline, Mescaline, DOM, MDA, Salvia
- Dissociatives
 - PCP, Ketamine, Dextromethorphan, Nitrous Oxide
- Inhalants
 - Volatile Solvents, Anesthetics, Nitrous Oxide, Nitrites
- Steroids



References

- Principles of Addiction Medicine: The Essentials
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 - <http://www.monitoringthefuture.org>
- National Survey of Drug Use and Health
 - <https://nsduhweb.rti.org/>

