

# Drugs of Abuse: Alcohol, Opioids, Cocaine, Hallucinogens, and More

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**Every physician gets in touch with addicted patients, as 5-7 % of the population is addicted to legal or illegal drugs. But studies have revealed that primary care physicians only identify every 10th patient suffering from dependency syndrome. This article helps you recognize the typical symptoms of drug abuse, withdrawal symptoms, and more.**



## Dependence Syndrome

### Definition of dependence syndrome

The World Health Organization (WHO) defines addiction, when referring to drugs and alcohol, as “repeated use of a psychoactive substance or substances,” to the extent that the individual affected is “periodically or chronically intoxicated and shows a “compulsion to take the preferred substance or substances,” and has a hard time voluntarily stopping or modifying the substance use. Misuse refers to using a substance or substances inconsistently with legal or medical guidelines. Repeated ingestion leads to greater dependence, tolerance, and ultimately the development of substance use disorder.

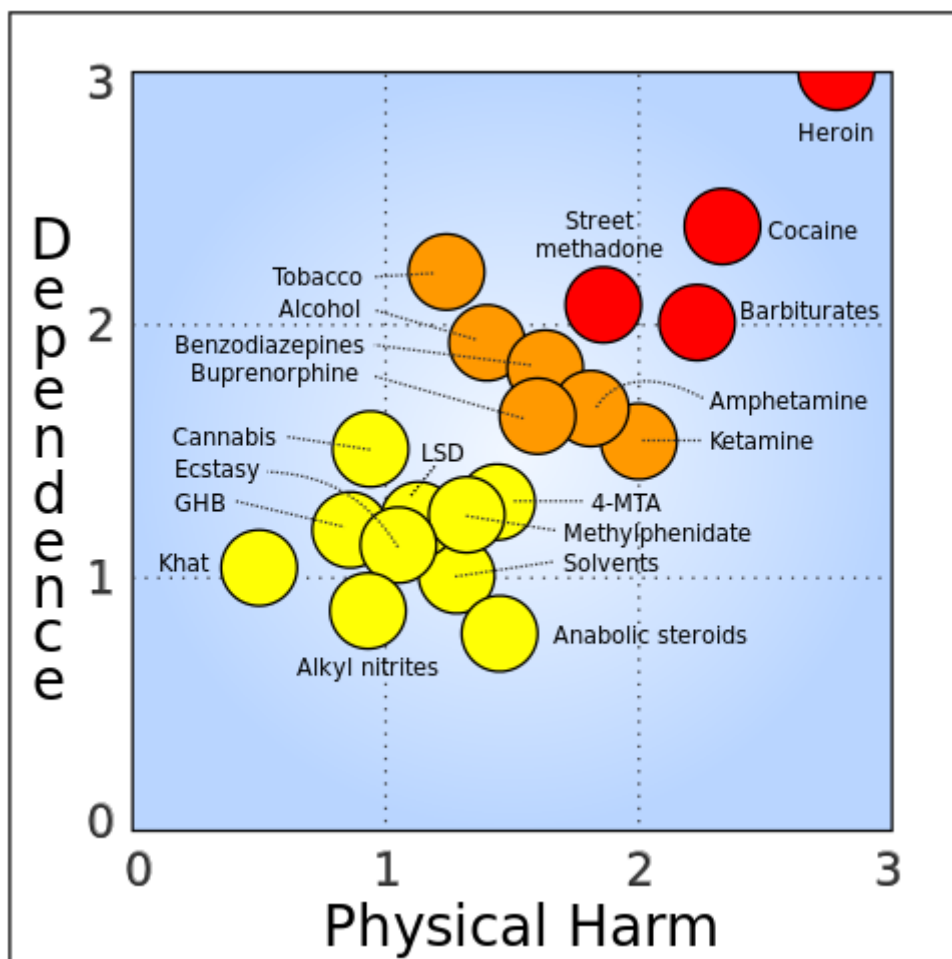


Image: "A rational scale to assess the harm of drugs." By Apartmento2. License: Public domain.

**Mental addiction** refers to the repeated desire to ingest a substance to obtain a perceived positive feeling or to avoid a negative feeling. **Physical addiction** is characterized by drug tolerance with the necessity of increasing doses to avoid withdrawal symptoms.

Addiction involves the vicious cycle of an **uncontrollable desire for the addictive substance** with an inability to stop **the addiction**. Gambling and compulsive disorders are examples of substance-free addictions.

**Note:** For the definition of addiction according to ICD-10 **at least three** of the following criteria have to apply:

- Strong urge to consume the substance
- Reduced impulse control
- Physical withdrawal syndrome
- Drug tolerance
- Neglect of other interests
- Persistent indulgence despite evidence of harmful consequences

## Pathogenesis of the dependency syndrome

The development and maintenance of addiction can be attributable to three specific factors: the drug, the individual, and the environment.

Most drugs increase dopamine **levels** in the central nervous system to cause feelings of

euphoria and well-being. Most drugs also influence levels of the neurotransmitter **glutamate** to shape the addiction memory. Other decisive factors for the potential of addiction development are the accessibility of the drug, the addictive potency, and the drug's effects in terms of anxiolysis and relaxation.

Chemical tolerance, personality traits, genetic vulnerability, and neurotic development are individual risk factors potentially contributing to addiction.

Negative environmental stimuli including regular stressful **conflicts** with a spouse, peers, or coworkers can influence the likelihood of dependency syndrome.

## Symptoms of dependency syndrome

**Loss of interest, mood swings, and disturbances in the ability to handle criticism** are characteristic of dependency syndrome. Physical symptoms vary according to the type of drug of abuse. Patients experiencing polydrug use are prone to exceptionally rapid physical degeneration involving loss of body weight, worsening skin appearance, and organ lesions.

**Denial, trivialization, and concealment tendencies** are common for addiction patients. In many cases, the drug briefly boosts the lowered self-esteem of the addict, which is in part caused by feelings of guilt due to repeated lies, social failures, and even drug-related crimes.

## Alcohol Use Disorder

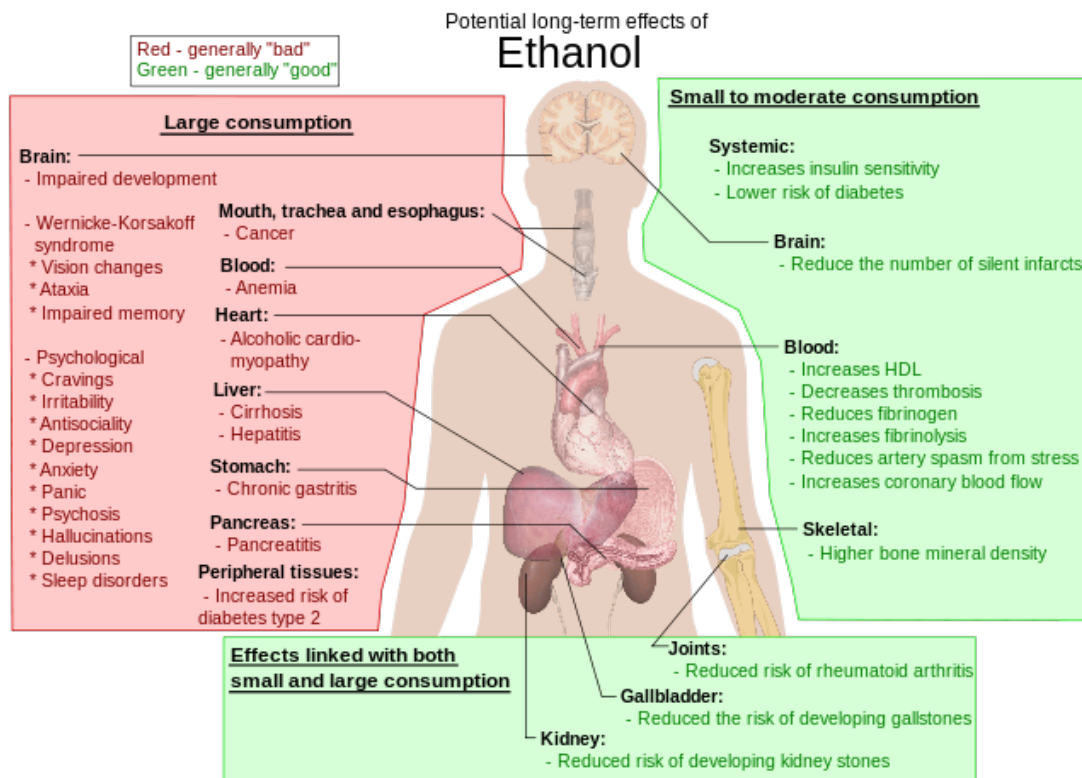


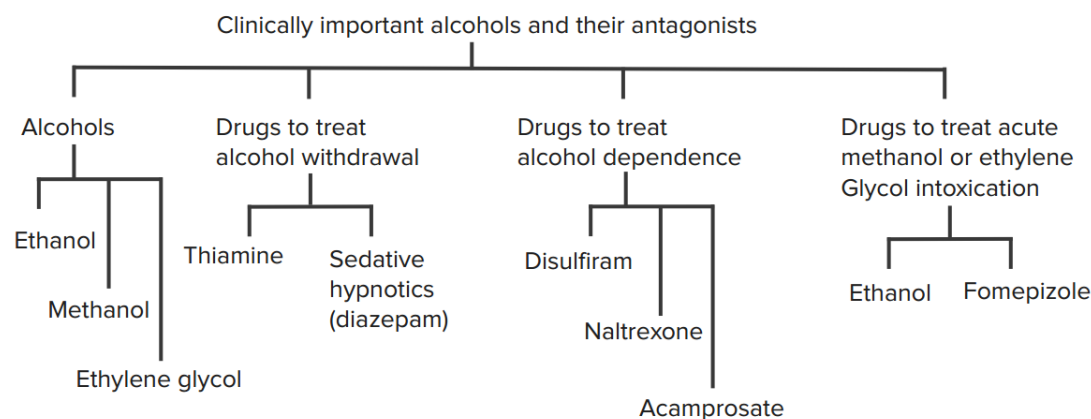
Image: "Most significant possible long-term effects of ethanol" by Mikael Häggström. License: Public Domain

Anthropologically, alcohol is one of the oldest addictive substances. The wine was considered a gift sent from the Gods in medieval Greece. During those ancient times, the link between consuming large amounts of alcohol and early death were not recognized. It

was not until 1968 that a federal social court recognized alcohol use disorder as a disease and specialized hospitals for people with this disorder were established for the first time.

## Definition of alcohol use disorder

Alcohol use disorder is defined as a level of alcohol consumption that **exceeds the socio-cultural standard**. Alcohol use disorder involves both a mental and physical addiction with an **irresistible desire for the substance**. Physical drug tolerance develops with a consecutive increase in dosage and withdrawal symptoms during abstinence.



## Epidemiology of alcohol use disorder

Males are more likely to be affected by alcohol use disorder than females. Alcohol use disorder is one of the biggest burdens to society due to work absence, alcohol-related accidents, and treatment costs.

## Classification of alcohol use disorder

Consumption of more than 20 g alcohol per day for women and more than 40 g alcohol per day for men is considered excessive consumption rate on average.

<b>1st level</b>	Prealcoholic phase	Drinking for an easement with decreased ability to cope with mental pressure
<b>2nd level</b>	Prodromal phase	Thoughts about alcohol, patient drinks alone and in secret, first memory gaps
<b>3rd level</b>	Critical phase	After starting to drink the patient loses control over drinking rate. After the loss of control: try to pause drinking, first physical withdrawal symptoms, and consequential damages
<b>4th level</b>	Chronic phase	Drinking in the morning, state of intoxication lasting for days, tolerability for alcohol is decreased, mental and physical breakdowns leading to death

The 5 types of alcohol use disorder were staged by **Jellinek: alpha, beta, gamma, delta, and epsilon**. Alpha and beta stages are not considered as a disease since these people still have control, but the **gamma type** is the first to be considered as a disease and it represents 65% of alcoholics. This one is the addicted alcoholic suffering from loss of control and having an observable drug tolerance. This type is able to stay abstinent at times. The second most common type is the **delta or habitual drinker**. He has a continuous consumption of alcohol without the ability to abstain.

**Notice:** Carbohydrate-deficient-transferrin (CDT) is used as a biomarker for constant consumption of alcohol. CDT level rises in the serum of an alcoholic due to a changed glycosylation pattern. However, this figure is susceptible and normal in 30% of all alcoholics.

## Opioids



Image: "Opium poppy *Papaver somniferum* Field in Turkey, near Afyon, c. 1988 Credit: Mark Nesbitt and Delwen Samuel" by Marknesbitt. License: Public Domain

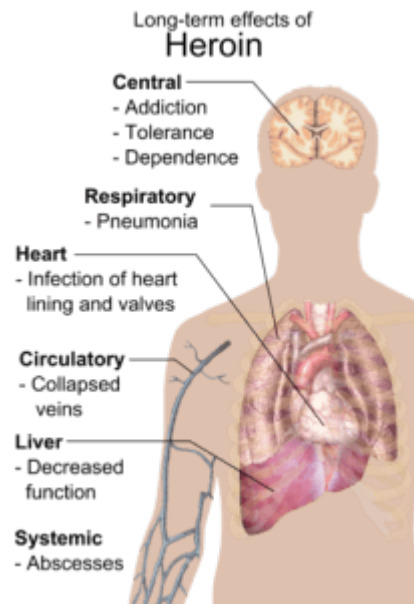
Opium, concentrate from the **opium poppy's** seed capsule, is one of the oldest and most widespread drugs. The Swiss physician from the 16th century, Paracelsus, used opium treatment as a therapy for depression. Opioids have the highest dependency potential of all drugs. Single opioid experience can lead to a strong mental and physical addiction.

### Dosage forms of opioids

The most common form of **heroin** consumed in Germany is **diacetylmorphine** or diamorphine. It is white to brown powder that is synthesized from acetic acid and morphine. It is often smoked in the beginning. It is heated in a spoon or aluminum sheet and inhaled. Heroin is often colloquially termed 'chasing the dragon' because of the oily ingredients of the heroin shimmer purple to gold. However, the most common route of administration is **intravenous**, because this is active within just 10–20 seconds and none of the expensive heroin is wasted.

Codeine, methadone, and tilidine are misused less often.

### Effect of opioids



**Image:** "Main long-term effects of heroine, including the effects of the contaminants common in illegal heroin" by Mikael Haggström. License: Public Domain

Heroin is very lipophilic and therefore easily traverses the blood-brain barrier accumulating in the **central nervous system** fast where it is metabolized to 6-monoacetylmorphine. This and another inactive metabolite are hydrolyzed to morphine within 10–30 minutes leading to an opioid-induced euphoria. The metabolite 6-monoacetylmorphine attaches to the  **$\mu$ -opioid receptor** with a higher affinity than morphine. Other effects include **feelings of happiness, warmth, somnolence, affective lability, and additional behavioral changes**. Physical symptoms involve bradycardia, loss of appetite, spastic obstipation, tremor, and dry pale skin.

## Danger of opioids

Illegal heroin has a purity of approximately just 3% in Europe. Thus it is often filled with additives like strychnine, lime, or other substances that can contribute to physical degeneration. **Injection sites commonly become infected**. The nasal septum can be damaged by perforation when heroin is sniffed. Many people with heroin addiction become infected with [HIV](#) and hepatitis due to the use of contaminated shared needles.

Overdose is the most serious danger when using opioids. People with opioid addiction often develop drug tolerance. Then they need 10 to 20 times as much of the substance as they needed with their first experience to feel a kick or suppress withdrawal symptoms. These effects are increased when practicing polydrug use with alcohol or amphetamines. Intoxication develops typically 2–5 minutes after intravenous application. It is characterized by **coma, respiratory depression, and pupil miosis**.

## Special type: 'crocodile'

'Crocodile' is a rather new drug. As a lot of Russians can no longer afford the consumption of heroin, they found a way to produce a **heroin-like substance** only from over-the-counter pharmaceuticals (inter alia codeine, iodine, red phosphorus and eye drops), which, in contrast to the quite expensive heroin (about 40–80 Euros per gram), just costs 3–5 Euros per shot.

Individuals consuming crocodile experience rapid physical degeneration with the

formation of **syringe abscesses with distinct** necrosis. Most crocodile consumers live for roughly one year after initiation. A green discoloration often emerges on the injection site, which gave the drug its “crocodile” name, as it reminds of a crocodile’s skin.

## Addictive Sedatives and Hypnotics

Sedatives that are often misused include **benzodiazepines, barbiturates,** meprobamate, clomethiazole, and diphenhydramine. These substances possess a huge addictive potential with toxicity. For example, diphenhydramine is often used for suicide attempts. Barbiturates are obsolete as hypnotics, but they are still used in veterinary medicine as anticonvulsant drugs.

### Hypnotics and sedatives

Hypnotics and sedatives can cause **euphoria, sedation, affective lability, dysphoria, memory gaps** when being misused. Sometimes benzodiazepines cause paradoxical activation, resulting in the opposite of the desired effect, with anxiety symptoms. Physical symptoms may include **dysarthria, ataxia, and exanthemata**. Extended consumption of benzodiazepines can cause **dysphoric resentment, indifference, and reduction in mental performance**. High states of arousal with agitation and insomnia are referred to as a **paradoxical reaction** to benzodiazepines.

### Withdrawal symptoms of sedatives and hypnotics

The barbiturate abstinence syndrome appears with overall weakness, tremor, myoclonus, nausea, orthostatic deregulation, and nightmares. **Delirious states** with anxious unrest and **cerebral seizures** have been reported after sudden weaning following longer use of higher doses.

Sudden weaning of barbiturates causes a **rebound phenomenon** with anxiety and sleep disturbances. Withdrawal symptoms involve vegetative deregulation, sleep disturbances, tremor, tachycardia, and/or disorientation. Also, typical presentations include **perceptual disturbances** like **visual perception distortions** and **kinaesthetic failures** similar to the feeling of being on a moving elevator.

### Treatment of sedatives and hypnotics addiction

Women with anxious personality traits are in many cases affected by benzodiazepine addiction. They may have the substance prescribed by their primary physician to address panic attacks, but then their prescribed dose is increased as they experience drug tolerance.

Patients addicted to benzodiazepines for years may be hospitalized because of withdrawal symptoms after they are refused another prescription of the medication. Treatment can be carried out with a **sedative antidepressant-like doxepin** until withdrawal symptoms abate and beyond. **Behavioral treatment** is important.

## Cannabinoids

Cannabis is the most commonly used illegal drug. Napoleon’s soldiers brought hashish from the Arabic-Asiatic area to Europe at the beginning of the 19th century.



## Dosage forms of cannabinoids

**Resin of the cannabis plant blossom** can be bought as clay brown or black lumps, whereas the **dried blossoms** and leaves of the female flowers of the Indian hemp are referred to as **marijuana** or weed. Smoking has been the most common route of administration. However, vaporizers are increasingly popular and edibles are common as well.

## Effect of cannabinoids

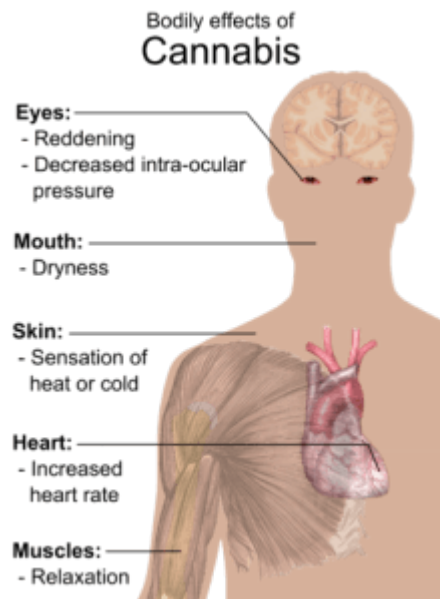


Image: "Main short-term somatic (bodily) effects of cannabis" by Mikael Häggström. License: Public Domain

The symptoms of a cannabinoid intoxication include **euphoria, relaxation, psychomotor slowdown, elongation of the time experience, and concentration disorders**. Intoxication abates after about 3–5 hours. Physical symptoms are reddening of the conjunctive, tachycardia, disturbances of the fine motor skills and, after long-lasting consumption, and [bronchitis](#).

Chronic consumption can trigger a **cannabis psychosis with schizophrenic symptoms**. The risk of suffering from a schizophrenic psychosis is increased at least three times. A motivational syndrome with lethargy, passivity, and indifference can occur as well with excessive cannabis use.

## Withdrawal symptoms of cannabinoids

As a consequence of regular consumption, a mild withdrawal syndrome with physical addictions including **craving, sleeping disturbances, inner unrest, hyperalgesia, and dysphoria** can occur about 10 hours after the last ingestion of the substance. These withdrawal symptoms are characteristic of synthetically produced THC.

## Cannabinoids as medicaments

**Dronabinol** is a semi-synthetic THC that is used for the treatment of the **anorexia-cachexia-syndrome** of tumor- and AIDS-patients in Germany. Fully synthetic THC



**Nabilon** is used for the treatment of the symptoms of [multiple sclerosis](#), chronic [inflammatory bowel disease](#), and tic diseases.

**Notice:** THC is detectable for 2–35 days *in the urine* and 12 hours *in the [blood](#)*.

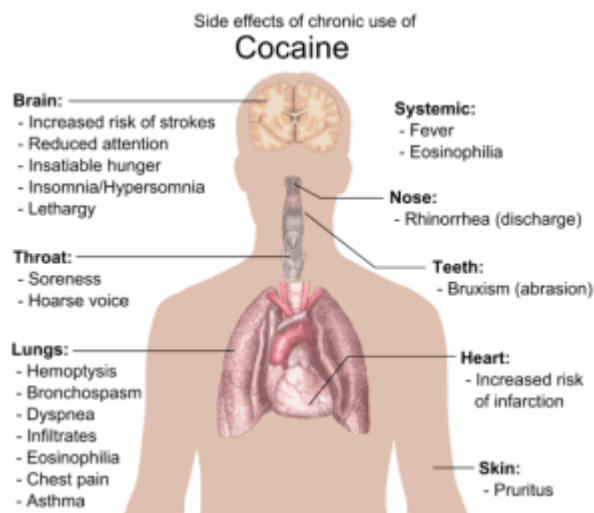
## Cocaine

In the 1920s cocaine was said to be a fashion drug of an avant-garde subculture and cocaine consumption was celebrated in secret meetings. Today, cocaine is still often abused by affluent people under pressure to succeed because of the drug's price and self-confidence boosting effect.

## Dosage forms of cocaine

Cocaine is a white powder obtained from processing the coca shrub's leaves. Administration is typically intranasal, intravenous, or by smoking. It is called **speedball** when used in combination with opioids.

## Effects of cocaine



[Image:](#) "Main side effects of chronic use of cocaine." by Mikael Haggström. License: Public Domain

The early effect of cocaine is to achieve a euphoric state with **lifted mood, happiness, increased desire to speak, loss of restraint, increased libido, improved performance, and creativity**. The necessity to sleep decreases as well as the necessity to eat and drink. This is followed by a **state of intoxication** with tactile, visual, and acoustical hallucinations. Paranoid thoughts also become common. A **depressive state** follows after the euphoric state. Anxiety and depression are paramount in the A **depressive state** leading to a great desire to consume the drug again to end this state.

Hallucinations can persist when consumption becomes chronic. This can develop into a **paranoid hallucinatory psychoses**. Cognitive performance is impaired in the long run. The physical body suffers from chronic misuse including cardiomyopathy and impotence as well as destruction of the nasal septum and the nasal mucosa as a consequence of nasal application.

## Intoxication with cocaine

Symptoms of cocaine intoxication include ataxia, tachyarrhythmia up to cardiac failure, hyperthermia, mydriasis, and epileptic seizures. Intoxication can be with **diazepam**.

## Withdrawal symptoms of cocaine

Dysphoria and hangovers are typical symptoms of cocaine withdrawal.

## Hallucinogens

Hallucinogens of mushrooms and cacti have been used for religious-ritual methods and magical rituals, especially in the area of Middle and South America for a long time. Repeated hallucinogen activity is only possible when used after abstinence for several days to weeks. For these reasons they only have a small potential for addiction. However, the risk of triggering a psychosis is extraordinarily high.

## Dosage forms of hallucinogens

The hallucinogens are a heterogeneous group of psychedelic drugs. Most hallucinogens are derived from plants, but some are synthetic, like 'acid'. Hallucinogens that classically trigger vivid perceptual alterations include:

- **Lysergic acid amide** from Woodrose seeds
- **Mescaline** from the peyote cactus
- **Psilocybin** from mushrooms like the liberty cap
- **Atropine and scopolamine** from flowers like the angel trumpet and the thorn apple

## Effect of hallucinogens

Intoxication with hallucinogens present with **ecstatic emotion intensification, psychedelic effects, and racing thoughts**. It is possible to experience distortion of perception, misjudgment, and hallucinations as well as changes in the ergo-experience, body sensation, and the space-time experience. Physical symptoms may include **an increase in the heart rate, hyperreflexia, mydriasis**, and initial nausea. The intoxication is divided up into 4 phases:

- **The initial phase** with inner unrest, tachycardia, and vertigo
- **The delirious phase** with psychedelic effects, for example, the feeling of being able to fly
- **The relaxation phase**
- **The after-effect phase** with exhaustion, anxiety, and a depressive state

The experience is extremely dependent on the initial situation. **Horror trip** will possibly be triggered if the consumer is anxious or depressive. This manifests itself with panic, paranoid anxiety and distortions of perception including negative images.

**Flashbacks** can occur with recall of drug-induced pictures, even a long time after the last ingestion of hallucinogens.

**Notice:** Intensity and length of intoxication can be reduced by ingestin of vitamin C, which can be given to patients directly or in the form of fruit juices.

## Intoxications with hallucinogens

Intoxications with hallucinogens are quite rare, as they cause strong nausea. However, instances are regularly reported in which teenagers use the ornamental plant **angel trumpet** as a hallucinogenic drug, which contains atropine and scopolamine. Symptoms arise within 30–60 minutes. Mydriasis, disorientation, and delirium also occur with the ingestion of atropine and scopolamine. **Physostigmine** can be used therapeutically to address atropine poisoning.

## Amphetamines

Fully synthetically produced drugs like **methamphetamine** (crystal meth), **amphetamine** (speed), **phencyclidine** and **ephedrine** belong to the amphetamines. Amphetamines are consumed in the form of pills, powder, or they are smoked.

## Effects of amphetamines

Amphetamine abuse leads to **increased stimulation and the subjective feeling of improved performance**. Appetite is suppressed. Mental symptoms include unrest, nervousness, disinhibition, lack of discrimination, euphoria, racing thoughts, visual and acoustic illusions, paranoid symptoms and anxiety.

Amphetamines will cause dangerous increases in blood pressure with the potential for cardiac failure. **Paranoid hallucinatory psychosis** can manifest after long-term consumption. Some amphetamines directly affect central temperature regulation, leading to hyperthermia with dehydration, rhabdomyolysis, and intranasal coagulopathy. Intoxication is treated with **diazepam and haloperidol**.

### Ecstasy

Ecstasy, or XTC, is a collective term for different methylenedioxyamphetamine (MDMA). These elicit both **amphetamine-like and hallucinatory effects**. MDMA is considered to be an **empathogen**, the substances, which enable a greater sense of emotional communion or oneness.

### Crystal meth

Crystal meth, also ice, wint, tick or yaaba, is an extremely potent form of methamphetamine that evokes a strong mental addiction with exceptionally fast physical deterioration. Loss of teeth is especially common due to reduced salivation, teeth grinding, and increased caries. This is referred to as **meth-mouth**.

## Withdrawal symptoms of amphetamines

Withdrawal patients suffer from **depressive mood, anxiety, and trepidation**. People with addiction to amphetamines are only able to complete normal everyday tasks under the influence of the drug due to the physical weakening and the repealed sleep-wake rhythm.

## Amphetamines as medication

Methylphenidate is an amphetamine, which is authorized for the treatment of narcolepsy and the attention-deficit-hyperactivity disorder. It appears to be paradoxical to prescribe an amphetamine for a child with hyperactivity at first, but it is assumed that the children

try to compensate for a decreased brain activity with hyperactivity. Methylphenidate, better known under its market name Ritalin, can have very positive effects on the patients.

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Notes