

Cocaine

Medically reviewed by L. Anderson, PharmD. Last updated on Oct 5, 2018.

Common or street names: coke, C, blow, snow, flake; the base form is called freebase or crack

What is cocaine?

Cocaine (C₁₇H₂₁NO₄) is a powerfully addictive, psychoactive, stimulant drug. On the street it is usually sold as a fine, white powder. The powdered, hydrochloride salt form can be snorted or dissolved in water and injected. Use in any form is illegal in the U.S. when used as recreational drug.

Freebase is cocaine hydrochloride that is processed with ammonia and heated to remove the hydrochloride salt. This 'freebase' form is not water-soluble; the powder can be heated and its vapors smoked due to the lower melting point. Diethyl ether is used to process freebase and is highly flammable and volatile, often leading to lab explosions and bodily injury such as burns. It produces a much more intense "rush" than snorting the drug and can be extremely addictive due to the quick high and repeated use. People who use this drug in any form may "binge" -- taking the drug repeatedly within a short time and at increasingly higher doses -- to maintain their high.

Crack cocaine ("crack") is another form that is processed into a rock form using baking soda and may contain a high percentage of impurities. The term "crack" refers to the crackling sound heard when it is heated prior to smoking. Crack abuse in the U.S. rose in the mid-1980's and is considered the most addictive form of the drug.

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Where does cocaine come from?

Cocaine originates from coca leaves, and has been used for centuries in a variety of cultural applications. The pure drug is extracted from the *Erythroxylon* coca bush, found primarily in the South American countries of Peru, Bolivia, and Colombia. Coca-leaf infusions or teas have been used to combat altitude sickness and boost energy in many native tribes of South America.

The early use was not just limited to South American countries. In the U.S., it was found as an active ingredient in many elixirs and tonics used in the early 1900's and was even found as in Coca-Cola products at that time.

How is cocaine used medically?

It is available in the U.S. as a prescription **solution for local mucosal anesthesia**, and for some eye, ear, and throat surgeries, but is infrequently used because of safer alternatives, such as lidocaine or benzocaine. A nasal solution is used for the induction of local anesthesia of the mucous membranes when performing diagnostic procedures and surgeries on or through the nasal cavities in adults.

In the U.S. cocaine is classified as a **Schedule II controlled substance**, meaning it has a high potential for abuse but can be administered by a physician for legitimate medical uses.

Methods of cocaine abuse

Most commonly abused by:

- snorting up the nose
- smoking
- injection
- rubbing onto the mucous membranes.

Cocaine hydrochloride (HCL) is water soluble due to the HCL salt and can be injected; it is also snorted in powder form. When purchased on the street, is usually 'cut' with adulterants such as baking soda, talcum powder, lactose sugar, or other local anesthetics such as lidocaine or benzocaine. This increases the weight and allows the seller to make more profit on the street. Other more dangerous adulterants, such as methamphetamine or synthetic opioids, including **fentanyl**, may also be used to cut the drug. Cutting cocaine with other illicit drugs can be especially harmful as the user is not aware of the added drug and an accidental overdose can occur.

Most often the powder is snorted, and the drug is laid out on a mirror, plate or other flat surface, separated into 'lines' and snorted nasally through a straw, rolled-up dollar bill or other inhaling device. The cocaine is absorbed into the bloodstream through the nasal tissues. The effect, or 'high' with snorting may last 15 to 30 minutes, but does not occur as quickly as smoking or injecting it. Alternatively, smoking crack or injecting cocaine may have a rapid and more intense effect, but the 'high' only lasts 5 to 10 minutes, often with an intense "crash", which leads to repeated use to sustain the high, an action called 'binging'.

Effects of cocaine use

The effect is described as euphoric with increased energy, reduced fatigue, and heightened mental alertness. Users may be talkative, extraverted, and have a loss of appetite or need for sleep. The psychoactive and pleasurable effects are short-lived without continued administration.

Biologically, the effect occurs in the midbrain region called the ventral tegmental area (VTA). Neuronal fibers from the VTA connect to the nucleus accumbens, an area of the brain responsible for rewards. Animal studies show that levels of a brain chemical (neurotransmitter) known as dopamine are increased in this area during rewards. Normally, dopamine is released and recycled in response to these rewards. The use of cocaine can interfere with this process, allowing dopamine to accumulate and send an amplified 'reward' signal to the brain, resulting in the euphoria described by users.

Some users report feelings of restlessness, irritability, and anxiety. A tolerance to the high may develop - many addicts report that they seek but fail to achieve as much pleasure as they did from their first exposure. Some users will increase their doses to intensify and prolong the euphoric effects. While tolerance to the high can occur, users can also become more sensitive

to the anesthetic and convulsant effects without increasing the dose taken. This increased sensitivity may explain some deaths occurring after apparently low doses.

Use in a binge, during which the drug is taken repeatedly and at increasingly high doses, may lead to a state of increasing irritability, restlessness, and paranoia. This can result in a period of paranoid psychosis, in which the user loses touch with reality and experiences auditory hallucinations.

Metabolism of cocaine

Cocaine is metabolized primarily in the liver, with less than 1% of the parent drug being excreted in the urine. The primary metabolite is benzoylecgonine and it is detectable in the urine for up to eight days after consumption.

Health hazards

The immediate physical effects of cocaine use include constricted blood vessels, dilated pupils, and increased temperature, heart rate, and blood pressure. Health complications include:

- disturbances in heart rhythm
- headaches,
- chest pain
- respiratory failure
- strokes
- stomach pain and nausea
- heart attacks
- seizures

The various means of using this illicit drug can produce different adverse reactions:

- Snorting the powder can lead to loss of the sense of smell, nosebleeds, problems with swallowing, hoarseness, and a chronically runny nose.
- Ingesting it can cause severe bowel gangrene (tissue death) due to reduced blood flow.
- Injecting the drug can lead to severe allergic reactions and, as with all IV drug users, an increased risk for contracting HIV, viral **hepatitis** and other blood-borne diseases.

Cocaine is a strongly addictive drug. Long-term effects of use can lead to tolerance, high doses and/or more frequent use is needed to attain the same level of pleasure during the initial period of use. Because it has a tendency to decrease appetite, many chronic users can become malnourished. If used in a binge fashion, with frequent, repeated use over a short period of time, panic and paranoia may set in, with psychosis and auditory hallucinations possible.

Heart risk

Cocaine abuse can lead to acute cardiovascular or cerebrovascular emergencies, such as an irregular heart rhythm, **heart attack** or **stroke**, which may result in sudden death. Deaths are

often a result of cardiac arrest or seizure followed by respiratory arrest.

Other symptoms of cocaine overdose include difficulty breathing, high blood pressure, high body temperature, hallucinations, and extreme agitation or anxiety.

A particularly concerning interaction between alcohol and cocaine has been reported. The National Institute on Drug Abuse (NIDA) has found that the human liver combines cocaine and alcohol and manufactures a third substance, cocaethylene, that intensifies the drugs euphoric effects but may increase the risk of sudden death. According to the NIDA, this drug to drug interaction is the most common two-drug combination that results in drug-related deaths.

Extent of cocaine and crack abuse

The extent of cocaine use in youth is important to follow to see trends and changes in drug use -- and drug choice -- over time.

In the *Monitoring the Future Study: Trends in Prevalence of Various Drugs for 8th Graders, 10th Graders, and 12th Graders; 2014 - 2017*, cocaine use in 2017 was, based on survey results:

- 0.8% for 8th graders
- 1.4% of 10th graders
- 2.7% of 12th graders.

Compare these numbers to 2016 use:

- 0.8% of 8th graders
- 1.3% of 10th graders
- 2.3% of 12th graders.

The number differences between 2016 and 2017 do not yield statistically significant changes, although the rising use of cocaine in 2017 in 12th graders bears watching. The use of crack, popular in the 1980's, is even lower. It is interesting to compare youth numbers of cocaine use with marijuana use: past-year use of **marijuana** among 12th graders in 2017 was 37.1%.

In adults, use over the past year is greatest in ages 18 to 25 at 6.2% compared to 1.7% for adults 26 and older. Crack use is also lower: 0.3% of 18 to 25 year olds and 0.4% of those 26 and older stating crack use in the last year.

Cocaine use in pregnancy

There are about 750,000 cocaine-exposed pregnancies every year. The full extent of the effects on the unborn or newborn child are difficult to predict. Multiple factors can play into this outcome, such as use of other illegal drugs, maternal sexually-transmitted diseases, extent of prenatal care, and socioeconomic factors, among others.

In the mother, cocaine use can lead to a serious high blood pressure and spontaneous miscarriage. Pregnant women who abuse this drug may have other addictive habits, such as nicotine and alcohol use. Pregnant women with substance abuse and addiction should receive immediate medical and psychological healthcare to minimize these adverse outcomes.

Studies have shown that infants born to women who use cocaine during pregnancy may be delivered prematurely, have low birth rates, may have smaller head circumference, and be shorter in length.

Longer-term research is finding that exposure *in utero* and environmental factors may also lead to deficits in cognitive abilities, information processing, memory, and ability to complete tasks in childhood. More research is needed to understand the childhood long-term effects of exposure in pregnancy.

Treatment options for cocaine addiction

The extensive abuse of cocaine has led to efforts to develop treatment programs for this type of drug abuse. The majority of abusers seeking treatment programs smoke crack, and are likely to abuse multiple drugs. Strategies are needed to address the neurobiological, social and medical aspects of addiction. Behavioral, supportive, and pharmacologic strategies are required.

As of 2018, there were no FDA-approved medications to treat cocaine addiction. However, research is ongoing. One of the National Institute on Drug Abuse's (NIDA) top research priorities is to find a medication to block or greatly reduce its effects, to be used as one part of a comprehensive treatment program.

NIDA-funded researchers are also looking at medications that help alleviate the severe craving that people in treatment for cocaine addiction often experience. Research is focusing on dopamine, serotonin, gamma-aminobutyric acid (GABA), glutamate, and norepinephrine neurotransmitters involved in chemical messaging in the brain.

Several medications are currently being investigated for their safety and efficacy in treating cocaine addiction.

- **Lorcaserin (Belviq, Belviq XR)** - an FDA-approved weight loss medication that acts at serotonin receptors.
- **Disulfiram (Antabuse)** - an FDA-approved medication used to treat alcoholism, has shown great promise.
- **Modanafil (Provigil)** - used to treat narcolepsy, a sleep disorder.
- **Buprenorphine** - used to treat opioid addiction.
- **Cocaine vaccine** - under research; it stimulates antibodies that bind to cocaine and prevent it from getting into the brain.

In addition to treatment medications, behavioral interventions can have an additive effect on successful treatment.

- **Cognitive behavioral therapy** teaches the ability to help someone recognize the situations in which they are most likely to use this drug, and avoid these situations. It is especially used to help prevent relapse.
- **Contingency management (CM)**, also called motivational incentives, centers on a system of rewards for abstinence. It can be effective in decreasing drug use by patients in treatment for cocaine abuse.

Providing the optimal combination of treatment and services for each individual is critical to successful outcomes. Ultimately, a combination of both treatments may be the most effective option.

Who should I contact for help?

SAMHSA's National Helpline: 1-800-662-HELP (4357) (also known as the Treatment Referral Routing Service).

- An information service for people, and their families, facing mental and/or substance use disorders.
- This service is confidential, free, and open 24 hours-a-day, 365-days-a-year.
- You can receive a referral to local treatment facilities, support groups, and other organizations based in your local community.
- If you have no insurance or are underinsured, you will be referred to your state office which is responsible for state-funded treatment programs.

Cocaine Anonymous: 1- 310-559-5833, 9 AM to 5 PM PT (Mon-Fri).

- A proven, 12-step program in maintaining abstinence is used.

Related:

- [Drug Testing FAQs](#)
- [Drugs.com Support Group for Addiction](#)

See Also

- [Bath Salts](#)
- [Cannabis](#)
- [Devil's Breath](#)
- [Ecstasy](#)
- [Fentanyl \(Abuse\)](#)
- [GHB](#)
- [Gray Death](#)
- [Hashish](#)
- [Heroin](#)
- [Ketamine](#)
- [Kratom](#)
- [Krokodil](#)
- [LSD](#)

- Marijuana
- MDMA
- Mescaline
- Opium
- PCP (Phencyclidine)
- Psilocybin (Magic Mushrooms)
- Quaaludes
- Rohypnol
- Speed (methamphetamine)
- Synthetic Marijuana (Spice or K2)
- TCP (Tenocyclidine)
- U-47700 (Pink)

Sources

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Further information

Always consult your healthcare provider to ensure the information displayed on this page applies to your personal circumstances.