

Cocaine / Crack

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What is Cocaine?

Cocaine is a powerfully addictive stimulant that directly affects the brain. Cocaine has been labelled the drug of the 1980s and '90s, because of its extensive popularity and use during this period. However, cocaine is not a new drug. In fact, it is one of the oldest known drugs. The pure chemical, cocaine hydrochloride, has been an abused substance for more than 100 years, and coca leaves, the source of cocaine, have been ingested for thousands of years.

Pure cocaine was first extracted from the leaf of the *Erythroxylon coca* bush, which grows primarily in Peru and Bolivia, in the mid-19th century. In the early 1900s, it became the main stimulant drug used in most of the tonics/elixirs that were developed to treat a wide variety of illnesses. Today, cocaine is a Schedule II drug, meaning that it has high potential for abuse, but can be administered by a doctor for legitimate medical uses, such as a local anaesthetic for some eye, ear, and throat surgeries.

There are basically two chemical forms of cocaine: the hydrochloride salt and the "freebase." The hydrochloride salt, or powdered form of cocaine, dissolves in water and, when abused, can be taken intravenously (by vein) or intranasally. Freebase refers to a compound that has not been neutralized by an acid to make the hydrochloride salt. The freebase form of cocaine is smokable.

Cocaine is generally sold on the street as a fine, white, crystalline powder, known as "coke," "C," "snow," "flake," or "blow." Street dealers generally dilute it with such inert substances as cornstarch, talcum powder, and/or sugar, or with such active drugs as procaine (a chemically-related local anaesthetic) or with such other stimulants as amphetamines.

What is crack?

Crack is the street name given to the freebase form of cocaine that has been processed from the powdered cocaine hydrochloride form to a smokable substance. The term "crack" refers to the crackling sound heard when the mixture is smoked. Crack cocaine is processed with ammonia or sodium bicarbonate (baking soda) and water, and heated to remove the hydrochloride.

Because crack is smoked, the user experiences a high in less than 10 seconds. This rather immediate and euphoric effect is one of the reasons that crack became enormously popular in the mid 1980s. Another reason is that crack is inexpensive both to produce and to buy.

What your patients need to know about cocaine.

Cocaine affects your brain. The word "cocaine" refers to the drug in both a powder (cocaine) and crystal (crack) form. It is made from the coca plant and causes a short-lived high that is immediately followed by opposite, intense feelings of depression, edginess, and a craving for more of the drug. Cocaine may be snorted as a powder, converted to a liquid form for injection with a needle, or processed into a crystal form to be smoked.

Cocaine affects your body. People who use cocaine often don't eat or sleep regularly. They can experience increased heart rate, muscle spasms, and convulsions. If they snort cocaine, they can also permanently damage their nasal tissue.

Cocaine affects your emotions. Using cocaine can make you feel paranoid, angry, hostile, and anxious, even when you're not high.

Cocaine is addictive. Cocaine interferes with the way your brain processes chemicals that create feelings of pleasure, so you need more and more of the drug just to feel normal. People who become addicted to cocaine start to lose interest in other areas of their life, like school, friends, and sports.

Cocaine can kill you. Cocaine use can cause heart attacks, seizures, strokes, and respiratory failure. People who share needles can also contract hepatitis, HIV/AIDS, or other diseases.

How can you tell if a friend is using cocaine? Sometimes it's tough to tell. But there are signs you can look for. If your friend has one or more of the following warning signs, he or she may be using cocaine or other illicit drugs:

- Red, bloodshot eyes
- A runny nose or frequently sniffing
- A change in eating or sleeping patterns
- A change in groups of friends
- A change in school grades or behavior
- Acting withdrawn, depressed, tired, or careless about personal appearance
- Losing interest in school, family, or activities he or she used to enjoy
- Frequently needing money

Q. Isn't crack less addictive than cocaine because it doesn't stay in your body very long?

A. No. Both cocaine and crack are powerfully addictive. The length of time it stays in your body doesn't change that.

Q. Don't some people use cocaine to feel good?

A. Any positive feelings are fleeting and are usually followed by some very bad feelings, like paranoia and intense cravings. Cocaine may give users a temporary illusion of power and energy, but it often leaves them unable to function emotionally, physically, and sexually.

How does the chemistry work?

Cocaine in the brain - In the normal communication process, dopamine is released by a neuron into the synapse, where it can bind with dopamine receptors on neighbouring neurons. Normally dopamine is then recycled back into the transmitting neuron by a specialized protein called the dopamine transporter. If cocaine is present, it attaches to the dopamine transporter and blocks the normal recycling process, resulting in a build-up of dopamine in the synapse which contributes to the pleasurable effects of cocaine.

As cocaine abuse continues, tolerance often develops. This means that higher doses and more frequent use of cocaine are required for the brain to register the same level of pleasure experienced during initial use. Recent studies have shown that, during periods of abstinence from cocaine use, the memory of the euphoria associated with cocaine use, or mere exposure to cues associated with drug use, can trigger tremendous craving and relapse to drug use, even after long periods of abstinence.

What are the short-term effects of cocaine use?

Cocaine's effects appear almost immediately after a single dose, and disappear within a few minutes or hours. Taken in small amounts (up to 100 mg), cocaine usually makes the user feel euphoric, energetic, talkative, and mentally alert,

especially to the sensations of sight, sound, and touch. It can also temporarily decrease the need for food and sleep. Some users find that the drug helps them to perform simple physical and intellectual tasks more quickly, while others can experience the opposite effect.

The duration of cocaine's immediate euphoric effects depends upon the route of administration. The faster the absorption, the more intense the high. Also, the faster the absorption, the shorter the duration of action. The high from snorting is relatively slow in onset, and may last 15 to 30 minutes, while that from smoking may last 5 to 10 minutes.

The short-term physiological effects of cocaine include constricted blood vessels; dilated pupils; and increased temperature, heart rate, and blood pressure. Large amounts (several hundred milligrams or more) intensify the user's high, but may also lead to bizarre, erratic, and violent behaviour. These users may experience tremors, vertigo, muscle twitches, paranoia, or, with repeated doses, a toxic reaction closely resembling amphetamine poisoning. Some users of cocaine report feelings of restlessness, irritability, and anxiety. In rare instances, sudden death can occur on the first use of cocaine or unexpectedly thereafter. Cocaine-related deaths are often a result of cardiac arrest or seizures followed by respiratory arrest.

What are the long-term effects of cocaine use?

Cocaine is a powerfully addictive drug. Once having tried cocaine, an individual may have difficulty predicting or controlling the extent to which he or she will continue to use the drug. Cocaine's stimulant and addictive effects are thought to be primarily a result of its ability to inhibit the reabsorption of dopamine by nerve cells. Dopamine is released as part of the brain's reward system, and is either directly or indirectly involved in the addictive properties of every major drug of abuse.

An appreciable tolerance to cocaine's high may develop, with many addicts reporting that they seek but fail to achieve as much pleasure as they did from their first experience. Some users will frequently increase their doses to intensify and prolong the euphoric effects. While tolerance to the high can occur, users can also become more sensitive (sensitization) to cocaine's anaesthetic and convulsant effects, without increasing the dose taken. This increased sensitivity may explain some deaths occurring after apparently low doses of cocaine.

Use of cocaine in a binge, during which the drug is taken repeatedly and at increasingly high doses, leads to a state of increasing irritability, restlessness, and paranoia. This may result in a full-blown paranoid psychosis, in which the individual loses touch with reality and experiences auditory hallucinations.

What are the medical complications of cocaine abuse?

There are enormous medical complications associated with cocaine use. Some of the most frequent complications are cardiovascular effects, including disturbances in heart rhythm and heart attacks; such respiratory effects as chest pain and respiratory failure; neurological effects, including strokes, seizure, and headaches; and gastrointestinal complications, including abdominal pain and nausea.

Cocaine use has been linked to many types of heart disease. Cocaine has been found to trigger chaotic heart rhythms, called ventricular fibrillation; accelerate heartbeat and breathing; and increase blood pressure and body temperature. Physical symptoms may include chest pain, nausea, blurred vision, fever, muscle spasms, convulsions and coma.

Different routes of cocaine administration can produce different adverse effects. Regularly snorting cocaine, for example, can lead to loss of sense of smell, nosebleeds, problems with swallowing, hoarseness, and an overall irritation of the nasal septum, which can lead to a chronically inflamed, runny nose. Ingested cocaine can cause severe bowel gangrene, due to reduced blood flow. And, persons who inject cocaine have puncture marks and "tracks," most commonly in their forearms. Intravenous cocaine users may also experience an allergic reaction, either to the drug, or to some additive in street cocaine, which can result, in severe cases, in death. Because cocaine has a tendency to decrease food intake, many chronic cocaine users lose their appetites and can experience significant weight loss and malnourishment.

Research has revealed a potentially dangerous interaction between cocaine and alcohol. Taken in combination, the two drugs are converted by the body to cocaethylene. Cocaethylene has a longer duration of action in the brain and is more toxic than either drug alone. While more research needs to be done, it is noteworthy that the mixture of cocaine and alcohol is the most common two-drug combination that results in drug-related death.

Are cocaine abusers at risk for contracting HIV/AIDS and hepatitis B and C?

Yes. Cocaine abusers, especially those who inject, are at increased risk for contracting such infectious diseases as human immunodeficiency virus (HIV/AIDS) and hepatitis. In fact, use and abuse of illicit drugs, including crack cocaine, have become the leading risk factors for new cases of HIV. Drug abuse-related spread of HIV can result from direct transmission of the virus through the sharing of contaminated needles and paraphernalia between injecting drug users. It can also result from indirect transmission, such as an HIV-infected mother transmitting the virus perinatally to her child. This is particularly alarming, given that more than 60 percent of new AIDS cases are women. Research has also shown that drug use can interfere with judgement about risk-taking behavior, and can potentially lead to reduced precautions about having sex, the sharing of needles and injection paraphernalia, and the trading of sex for drugs, by both men and women.

Additionally, hepatitis C is spreading rapidly among injection drug users; current estimates indicate infection rates of 65 to 90 percent in this population. At present, there is no vaccine for the hepatitis C virus, and the only treatment is expensive, often unsuccessful, and may have serious side effects.

What is the effect of maternal cocaine use?

The full extent of the effects of prenatal drug exposure on a child is not completely known, but many scientific studies have documented that babies born to mothers who abuse cocaine during pregnancy are often prematurely delivered, have low birth weights and smaller head circumferences, and are often shorter in length.

Estimating the full extent of the consequences of maternal drug abuse is difficult, and determining the specific hazard of a particular drug to the unborn child is even more problematic, given that, typically, more than one substance is abused. Such factors as the amount and number of all drugs abused; inadequate prenatal care; abuse and neglect of the children, due to the mother's lifestyle; socio-economic status; poor maternal nutrition; other health problems; and exposure to sexually transmitted diseases, are just some examples of the difficulty in determining the direct impact of perinatal cocaine use, for example, on maternal and foetal outcome.

Many may recall that "crack babies," or babies born to mothers who used cocaine while pregnant, were written off by many a decade ago as a lost generation. They were predicted to suffer from severe, irreversible damage, including reduced intelligence and social skills. It was later found that this was a gross exaggeration. Most crack-exposed babies appear to recover quite well. However, the fact that most of these children appear normal should not be over-interpreted as a positive sign. Using sophisticated technologies, scientists are now finding that exposure to cocaine during fetal development may lead to subtle, but significant, deficits later, especially with behaviours that are crucial to success in the classroom, such as blocking out distractions and concentrating for long periods of time.

What are the cardiovascular effects of cocaine?

Cocaine use increases the risk of sudden heart attack and may also trigger stroke, even in users who otherwise are not at high risk for these sometimes fatal cardiovascular events. The risk is related to narrowing of blood vessels and increases in blood pressure and heart rate. Recently, NIDA-supported researchers at the Alcohol and Drug Abuse Research Centre at McLean Hospital in Belmont, Massachusetts, have identified changes in blood components that may also play a role in cocaine-related heart attack and stroke.

Dr. Arthur Siegel and his colleagues studied the effect of cocaine on blood factors that respond to inflammation by promoting clotting to initiate repair. They found that a component that promotes clotting--von Willebrand factor (vWF)--increases and remains elevated for hours after a single exposure to cocaine. They also found that, compared with less frequent users, heavy users of cocaine have elevated levels of vWF, fibrinogen (a clotting factor), and C-reactive protein (CRP), a blood protein that increases in concentration in response to inflammation and is a reliable indicator of risk for heart attack.

"These findings suggest that cocaine creates a temporary risk for heart attack or stroke by increasing clotting factors," Dr. Siegel explains. "Elevated CRP levels could indicate that long-term use of the drug is triggering inflammation in the

cardiovascular system."

"Elevated levels of CRP and clotting factors that we see in the heavy users suggest that repeated use of cocaine poses an exposure-related and cumulative risk for heart attack or stroke," Dr. Siegel says. "The fact that neither group showed any compensatory increase in anticlotting mechanisms suggests that cocaine use upsets the body's ability to maintain a balance between risk and protective factors and tips the scale toward increased risk for heart attack or stroke."

The findings are preliminary, Dr. Siegel cautions, and based on a relatively small sample of cocaine users. "Other factors certainly play a role in CRP levels, and cocaine alone is probably not responsible for the elevated levels we found. For example, age is a factor but does not account for all of the difference. Smoking also may be a factor. In our study, cocaine users who smoked had higher CRP levels than those who did not. On the whole, these findings suggest that cocaine compounds the effects of other risk factors."

If larger studies confirm the relationship between elevated CRP levels and cumulative cocaine exposure, the blood component may serve as a marker for damage, Dr. Siegel says. Moreover, he adds, "measuring CRP is simple and inexpensive, and could be used as a test for the effects of cocaine in much the same way as blood composition is used to test for diabetes. It could serve as an objective measure of risk for heart attack and stroke and provide a way for patients and treatment providers to assess progress during drug treatment."

Sources

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