

# BEYOND THE BASICS

## Cocaine and Crack

### *What are cocaine and crack?*

Cocaine and crack are two versions of the same drug (benzoylecgonine) derived from the coca bushes that grow primarily in the Andes Mountains of Bolivia and Peru. They are stimulants – drugs that increase alertness, reduce fatigue and give users a burst of energy.<sup>1</sup>

Common street names for cocaine include “coke,” “C,” “blow,” “snow” and “flake.” Cocaine hydrochloride is the odourless, water soluble fine white powder version of the drug. It is often mixed with other non-psychoactive substances, such as benzocaine, before being sold on the street. In this form, cocaine is usually snorted into the nose, but can also be applied to other membranes, such as the gums or rectum. As well, it can be diluted in water and injected.<sup>2</sup> When snorted, the usual dose is about 25 milligrams, but the user may snort several doses in one episode, amounting to 50 to 100 milligrams.<sup>1</sup>

Cocaine is used in two other altered forms – crack and freebase. In each of these forms, the cocaine is treated chemically to change the physical quality of the drug so it can be smoked, giving the user a rapid and intense high. Crack cocaine comes in small lumps that make a cracking sound when smoked, hence its name. Another street name for crack is “rock.” Crack and freebase cocaine are smoked in pipes or added to tobacco or marijuana cigarettes.<sup>2</sup> Users who smoke crack cocaine get an average dose of about 250 milligrams – much higher than when snorting.<sup>1</sup>

### **Medical Use**

Cocaine has been used in the past as a local anaesthetic for ear, nose and throat surgery, but less toxic substances are more commonly used for that purpose now. It is only rarely used today as a topical anesthetic of the upper respiratory tract.<sup>2</sup>

Historically, Indigenous peoples in South America sought some way to counteract the fatigue caused by living at such high altitudes. They discovered if they chewed leaves from the coca bush, extracting the cocaine, they would benefit from the stimulation it provided. By the mid-1800s, the drug was hailed for its tonic properties and was used as an ingredient in patent medicines. Scientists and researchers were excited about its potential as an anesthetic and a treatment for mental and physical disorders. The Coca-Cola Company even included it in its recipe until the turn of the nineteenth century, by which time its significant addictive properties had been discovered and interest in its medicinal use declined.<sup>3</sup>

### **Prevalence of Use**

In Canada, cocaine use is much less prevalent than the use of two other common drugs – alcohol and cannabis.<sup>4</sup> The 2009 Canadian Alcohol and Drug Use Monitoring Survey (CADUMS), a collaborative initiative led by Health Canada

and involving national and provincial alcohol and drug agencies, was one of the country’s most extensive surveys on addiction. The CADUMS sample included 13,909 Canadians aged 15 and older. Results of the survey indicated almost 80% of Canadians had used alcohol during the year before the survey, while just over 14% had used cannabis during this time. Past year use of cocaine and crack was not as prevalent: 1.2% of the respondents reported use during the 12 months before the survey, which is down from 1.9% in 2004.<sup>4</sup>

A student drug survey with 4,992 respondents completed in 2007 in Manitoba found 2.8% of high school students in grades 7 to 12 had used cocaine and 1.9% had used crack in the previous year. Use was more prevalent in grades 11 and 12 than in the younger years.<sup>5</sup> A 2009 survey of about 9,000 high school students in Ontario revealed that in the past year, 5.1% had used cocaine and 1.5% had used crack. As in the Manitoba study, more older students used these drugs than students in the lower grades.<sup>6</sup>

Dependently involved cocaine users are typically between the ages of 12 and 39, use at least three drugs and are male. They tend to have coexisting mental health issues known as co-occurring disorders. Nearly all are alcohol-dependent as well.<sup>1</sup>

## Pharmacokinetics

Cocaine is easily absorbed into the body via mucous membranes, the stomach and the lungs, so it can be snorted, smoked, injected or ingested. Once it reaches the brain, penetration is rapid.<sup>1</sup>

- Snorting through the nose is the least effective method because cocaine acts to constrict blood vessels, thereby limiting its absorption. Through snorting, only 20 to 30% of the drug will be absorbed into the blood via the mucous membranes in the nose, and levels in the blood will not peak for 30 minutes to an hour.<sup>1</sup>
- If the user inhales cocaine base that is vapourized, it is rapidly absorbed in the lungs. The effects are almost immediate and last for about half an hour. Six to 32% of the drug in the dose will be absorbed.<sup>1</sup>
- If cocaine is injected by needle into the blood, most of the injected dose will reach the brain in about 30 to 60 seconds.<sup>1</sup>
- Taking cocaine orally is not common, but if done, levels in the blood will peak in about an hour – similar to snorting.<sup>1</sup>

Cocaine is rapidly metabolized in the liver and plasma, but it can be detected in the brain about eight hours after use and in the urine for up to 12 hours. Cocaine is metabolized primarily to the metabolite *benzoylecgonine*. This metabolite can be detected in the urine for about 48 hours in irregular users and up to two weeks in chronic users.<sup>1</sup>

## Pharmacodynamics

Cocaine has an effect on several different neurotransmitter systems, including the dopamine system.<sup>7</sup> Dopamine is the body's natural chemical messenger associated with pleasure. Cocaine prevents dopamine's re-uptake by blocking its transporter. This means that more dopamine is left in the synaptic cleft, and therefore the dopamine receptors become chronically stimulated. Users experience a "rush," then a "crash" when the dopamine levels fall after the effects of the cocaine wear off. As well, cocaine hinders the uptake of norepinephrine and serotonin (5-HT), which causes these neurotransmitters to build up at post-synaptic receptors.<sup>8</sup> Cocaine affects other neurotransmitter systems, resulting in its anesthetic effects and its ability to constrict blood vessels.<sup>1</sup>

Chronic stimulation of DA receptors leads to their down regulation as an adaptation to restore homeostasis. This results in a relative inability to feel pleasure (anhedonia) after long-term use. Once cocaine use is terminated, however, a gradual return to normal receptor functioning occurs. Normal experience of pleasure/reward is not fully restored for about 12 months or longer for heavy, long-term users.<sup>1</sup>

## Short-term Effects

Cocaine and crack have the same effects, but crack's effects are felt more quickly and more intensely. The high from smoking crack lasts about five to 10 minutes, while a cocaine high lasts for 15 to 20 minutes.<sup>9</sup>

With a low dose of cocaine or crack, a person feels euphoric, alert and self-confident. The user experiences rapid breathing and an increased heart rate, dilated pupils, a loss of appetite and decreased need for sleep.<sup>2</sup>

With larger doses, a feeling of intense euphoria changes to severe agitation. The user may experience paranoid thinking, erratic behaviour, muscle twitches and tremors, headaches and nausea. There may be an increase in blood pressure and a weak, rapid pulse. The user could suffer a heart attack. Other serious consequences may include lung damage from inhalation of the drug, and paranoid psychosis with repeated use.<sup>2</sup> Regular snorting of cocaine can lead to inflamed sinuses, sore throat and severe damage to the cartilage of the nose.<sup>10</sup>

When users "crash" or come down from a high, they feel very lethargic, depressed and hungry, so some people will take repeated doses to maintain the high.<sup>2</sup> Continuous use, usually over a period of 12 hours (but sometimes lasting for several days), is known as a "coke run."<sup>10</sup>

An overdose of cocaine can cause heart attacks, bleeding in the brain and ongoing seizure, all of which can lead to death. A lethal dose, which can vary depending on factors such as tolerance and how it is administered, is estimated to be 70 to 150 milligrams for a person weighing 70 kilograms (150 pounds).<sup>2</sup>

## Long-term Effects

Effects of using cocaine over the long term include anxiety, lack of sleep and paranoia. People may become impulsive, and it is common for the long-term user to display repetitive, compulsive behaviour.<sup>1</sup> Drug-induced rage that could lead to violence has also been known to occur. Users can fall into a state of depression after the drug wears off, leading to possible suicide attempts.<sup>10</sup>

As well, long-term users may experience chest pain, hypertension, heart damage and other cardiovascular problems that could cause death. Atherosclerotic plaques have been known to develop in the coronary arteries of long-term users. Damage to the liver may also occur because cocaine metabolites are toxic to this organ. Users may suffer from cognitive impairment and stroke.<sup>10</sup>

Smoking cocaine can cause chronic throat inflammation and severe damage to the lungs, including ruptured alveoli and the development of chronic bronchiolitis, known as "crack lung."<sup>10</sup> Long-term users who snort cocaine have been known to experience a perforation of the nasal septum.<sup>2</sup>

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## **Feeling No Pleasure**

One reported withdrawal symptom of cocaine after even occasional use is the inability to feel pleasure, which is known as *anhedonia*. This happens because the user has been artificially stimulating their pleasure centre with cocaine, and when use stops, the action of dopamine – the brain’s natural pleasure chemical – takes a few days to get back to normal.

These few days may take a toll on users. If they cannot feel pleasure during that time, the temptation to go back to cocaine so they can “feel good” can be overwhelming.<sup>3</sup>

Users who regularly alternate binges with periods of abstinence may have mood swings, restlessness, extreme excitability and paranoia. They may experience sleep and eating disorders, visual and auditory hallucinations, and impotency.<sup>2</sup>

## **Toxic Effects**

When taken together, cocaine and alcohol combine in the body to form *cocaethylene*, a compound more toxic than either drug alone and one that impacts the brain for a much longer duration.<sup>9</sup> Using both alcohol and cocaine increases the risk that the user will become dependent on both drugs, leading to chronic use and severe withdrawal symptoms.<sup>1</sup>

## **Tolerance and Dependence**

Cocaine is considered to be one of the most highly addictive of all drugs partly due to the extremely fast rise in blood levels after use. Studies have shown that, if given free access to cocaine, laboratory rats or monkeys will take the drug until they have a seizure or kill themselves. This phenomenon can occur in humans as well, as evidenced by one user who claimed: “If I had been in a room full of cocaine, I would have kept using it until it was all gone, and I still would have wanted more.”<sup>3</sup>

However, not all users will have a uniformly bad experience with chronic cocaine use. While the chronic user is much more likely to become dependent on the drug, many long-term users do not experience dependency. Surveys and studies on patterns of use in various countries, including Canada, show “controlled use” is the most common pattern of use, as opposed to compulsive use, which often results in other areas of the user’s life – such as family, work and school – to become disrupted.<sup>11</sup>

## **Withdrawal Symptoms**

The physical withdrawal process from cocaine involves days to weeks of fatigue and exhaustion, leading to prolonged but disturbed sleep. Loss of appetite is gradually replaced with intense hunger, and irritability and violent behaviour may become evident. Severe depression, sometimes leading

to thoughts of suicide, is one of the most serious withdrawal complications.<sup>12</sup> Withdrawal symptoms tend to be more severe for intravenous and freebase users, as these methods result in higher levels of the drug in the blood.<sup>2</sup>

While these withdrawal symptoms can be severe for some users, it is not medically necessary to withdraw from cocaine gradually.<sup>2</sup>

## **Risks & Other Harms**

Those who snort cocaine can develop serious nasal and sinus problems and diseases, such as inflammation of the sinuses and a perforation of the septum (the cartilage between the nostrils).<sup>13</sup>

Those who smoke crack can develop chronic bronchitis, shortness of breath and chest pain.<sup>13</sup>

Abusers who inject the drug expose themselves to additional risks, including contracting human immunodeficiency virus (HIV), hepatitis B and C and other blood-borne viruses.

Users can die from exposure to toxic impurities that may have been added to “cut” the cocaine. As well, the presence of impurities has the potential to cause a fatal allergic reaction.<sup>14</sup>

As is the case in any abuse of licit and illicit drugs, there are potential adverse consequences related to the law, a person’s financial situation, family relationships, and generally putting oneself at risk by participating in unsafe behaviours while under the influence of cocaine or crack.

## **Illegal Production**

The American government’s Crime and Narcotics Center estimates that about two-thirds of the coca used to produce cocaine is cultivated in Colombia, and the rest originates in Bolivia and Peru.<sup>9</sup> The coca is converted into cocaine hydrochloride in South American labs, and the white powder – sometimes as much as 95% pure – is packed into “kilo-bricks” and smuggled out of the country.<sup>15</sup> Colombian traffickers dominate the production of cocaine, while Mexican criminal groups tend to control distribution in North America.<sup>9</sup> As it travels from importer to user, the pure cocaine is often diluted with additives such as local anaesthetics, talc, cornstarch and sometimes even other drugs such as heroin. The final product can range from having a trace of cocaine to being 95% pure.<sup>15</sup>

## **Legal Issues**

Unlawful possession of cocaine is a criminal offence under Canada’s *Controlled Drugs and Substances Act*. If tried by summary conviction – a less serious charge – a first-time offender could be fined up to \$1,000 and/or be sent to prison for

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up to six months. Subsequent offences carry a heavier penalty of up to \$2,000 in fines and/or one year in prison. When the charges are considered more serious and therefore are tried by indictment, a person in possession of cocaine could face up to seven years imprisonment.

Trafficking, producing, importing or exporting cocaine are all indictable offences. A person found guilty faces a maximum penalty of life in prison.<sup>16</sup>

## Pregnancy & Lactation

Experts have noted that it is difficult to say what effect cocaine will have on a newborn. They argue “crack babies” are born to mothers who are often addicted to nicotine and alcohol as well, and who receive inadequate prenatal care, contributing to a poor start in life. Nicotine and cocaine (stimulants) constrict blood vessels, reducing blood supply to the fetus and robbing it of vital nutrients.<sup>3</sup> Many cocaine-exposed babies are born prematurely with low birth weights. Cocaine can cause premature separation of the placenta from the uterus, which can result in brain damage or death.

Women who use cocaine while pregnant increase their risk of miscarriage, stillbirth and malformation.<sup>13</sup> Infants are likely to be irritable and over-sensitive to stimulation.<sup>3</sup>

Many cocaine-exposed newborns gradually improve, and they may develop normally.<sup>3</sup> Others, however, may continue to have difficulties as they continue into childhood, such as problems

developing attachments with others, becoming easily frustrated and having problems with unstructured play.<sup>1</sup>

It is also known that cocaine is passed to babies through breast milk.<sup>1</sup> Data is scarce, but it is thought that this can make the baby irritable and likely to have vomiting, diarrhea and seizures.<sup>17</sup>

## Substance Use & Mental Health

- Substance use and mental health problems can often occur together. This is commonly referred to as a co-occurring disorder.
- Substance use may increase the risk of mental health problems.
- People with mental health problems are at higher risk of developing substance abuse problems:
  - Sometimes they use alcohol and other drugs in an attempt to relieve themselves from mental health symptoms.
  - For most people alcohol and other substance use only covers up the symptoms and may make them worse.

**Remember:** A person's experience with any drug can vary. Here are a few of the many things that may affect the experience: the amount and strength of the drug taken, the setting, a person's mood and expectations before taking the drug, gender, overall health, past experience with that drug and whether more than one drug is being used at the same time. Using alcohol and other drugs at the same time can also be dangerous.

## Sources

1. Julien, Robert M. *A Primer of Drug Action*, New York: Henry Holt and Company, 2001, p. 116-128.
2. Brands, Bruna, Sproule, Beth & Marshman, Joan. *Drugs & Drug Abuse*, Addiction Research Foundation, Toronto, 1998, p. 239-248.
3. Kuhn, Cynthia, Swartzwelder, Scott & Wilson, Wilkie. *Buzzed – The Straight Facts About the Most Used and Abused Drugs from Alcohol to Ecstasy*, Duke University Medical Centre, 2003, p. 210-227.
4. *Canadian Alcohol and Drug Use Monitoring Survey: Summary of Results for 2009*, Health Canada, 2009. Available at [www.hc-sc.gc.ca/hc-ps/drugs-drogues/stat/\\_2009/summary-sommaire-eng.php](http://www.hc-sc.gc.ca/hc-ps/drugs-drogues/stat/_2009/summary-sommaire-eng.php)
5. Friesen, K., Lemaire, J. & Patton, D. *Alcohol and Other Drugs: Students in Manitoba 2007*, Addictions Foundation of Manitoba, November 2008, p. 41.
6. Paglia-Boak, A., Mann, R.E., Adlaf, E.M. & Rehm, J. *Drug Use Among Ontario Students, 1977-2009: Detailed OSDUHS findings*. (CAMH Research Document Series No. 27). Toronto, ON: Centre for Addiction and Mental Health, 2009, p. 41.
7. Fandrey, S. L. *Applied Aspects of Pharmacology*, Addictions Foundation of Manitoba, 2005, p. 181.
8. National Highway Traffic Safety Administration Website – Drugs and Human Performance Fact Sheets: <http://www.nhtsa.dot.gov/PEOPLE/INJURY/research/job185drugs/cocain.htm>
9. *Street Drugs: A Drug Identification Guide*, Publishers Group, LLC, Plymouth, MN, 2005, p. 46.
10. Doweiko, Harold E. *Concepts of Chemical Dependency – 5th Edition*, Wadsworth Group, Pacific Grove, California, 2002, p. 144-149.
11. Peele, Stanton & DeGrandpre, Richard. “Cocaine and the concept of addiction: environmental factors in drug compulsion.” *Addiction Research*, Vol. 6, p. 235-263, 1998. Available at <http://www.peele.net/lib/cocaine.html#abs>
12. *CODI Resource Package*, Clinical Training Guideline #3 Appendices, p. 7.
13. Arkangel, Carmelito (Sonny) Jr. *Cocaine Abuse Overview*. Available at [http://www.emedicinehealth.com/cocaine\\_abuse/article\\_em.htm#Cocaine%20Abuse%20Overview](http://www.emedicinehealth.com/cocaine_abuse/article_em.htm#Cocaine%20Abuse%20Overview)
14. *Cocaine Overview*, Canadian Centre on Substance Abuse website: <http://www.ccsa.ca/Eng/Topics/SubstancesAndAddictions/Cocaine/Pages/CocaineOverview.aspx>, 2008.
15. Website: [www.emedicine.medscape.com](http://www.emedicine.medscape.com), 2009.
16. *Controlled Drugs and Substances Act, 1996, c.19*, Department of Justice Canada website: <http://laws.justice.gc.ca/eng/C-38.8/20100325/page2.html?rp2=HOME&rp3=SI&rp1=cocaine&rp4=all&rp9=cs&rp10=A&rp13=50#anchorbo-ga:1>
17. Centre for Addiction and Mental Health (CAMH). *Exposure to Psychotropic Medications and Other Substances During Pregnancy and Lactation: A Handbook for Health Care Providers – Cocaine*, 2007. Available at [http://www.camh.net/Publications/Resources\\_for\\_Professionals/Pregnancy\\_Lactation/per\\_cocaine.html#feeding](http://www.camh.net/Publications/Resources_for_Professionals/Pregnancy_Lactation/per_cocaine.html#feeding)

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