

## What Is an Opioid?

Opioid is the generic term for any substance that binds to the opioid receptors found in the central nervous system (CNS) and other tissues such as the gastrointestinal tract. Opioids are classed as depressants because they act on the CNS to slow down breathing, heart rate and brain activity.

Opioids fall into four main categories:

- endogenous opioids (e.g., endorphins), which occur naturally in the body
- opium alkaloids (e.g., morphine and codeine), which are wholly derived from the opium poppy (*Papaver somniferum*)
- semi-synthetic opioids (e.g., heroin and oxycodone), which are modified forms of opium alkaloids
- fully synthetic opioids (e.g., methadone and meperidine), which have similar properties to the alkaloids and semi-synthetics but are completely man-made

Endogenous opioids appear to function as neurotransmitters, relaying signals within the nervous system. They are the body's pain regulators and are the natural equivalent of opioid medications and drugs.

Opium alkaloids and semi-synthetic opioids are collectively known as opiates and originate in the seed pod of the opium poppy. The harvesting process involves cutting slashes into ripened seed pods, which then exude a white, milky, latex substance that dries to a sticky brown resin and can be scraped off of the pods as raw opium. Further processing of the opium produces morphine and codeine, which in turn can be modified to produce semi-synthetic opioids such as heroin.

Opioids are particularly effective pain relievers (analgesics), which has led to their widespread medical use. Opioids have also become well known as drugs of abuse because of their psychoactive properties and their ability to induce euphoria.

## Medical Use

Opioids, either by themselves (e.g., morphine) or compounded with non-opioid analgesics (e.g., codeine with acetaminophen in Tylenol® 2, 3 and 4, or oxycodone with aspirin in Percodan®), are used to treat acute pain that non-opioid analgesics alone cannot control. They also

play an important role in the palliative care of people with terminal conditions or serious illnesses such as cancer. In such cases the need to provide adequate pain relief and to improve the person's quality of life outweighs most potential side effects or loss of mental alertness.

The use of opioids in the treatment of non-malignant chronic pain (sometimes referred to as chronic non-cancer pain or CNCP) has been a more complex and controversial issue than their application in relieving acute pain and providing palliative care. This is partly because of concern that long-term use of opioids might lead to the development of addiction.

In addition, it has been argued that medication alone is not effective in addressing CNCP and that a multidisciplinary team approach should be used to tackle the psychological and social factors, such as physical inactivity, depression and social isolation, associated with chronic pain. Non-drug therapies including physiotherapy, stress management, exercise and relaxation techniques are seen as important adjuncts in the care of people with CNCP.

The goal when prescribing opioids for CNCP is often to control pain to improve function, rather than to eliminate pain completely. Although a history of addiction would not rule out the use of opioid pain relievers, there needs to be a thorough assessment before they are prescribed and careful monitoring throughout treatment for any evidence of overuse or misuse of the medications.

Although they are best known for their pain-relieving properties, opioids have other medical applications. Opioids, especially codeine, have long been used in cough medicines because they suppress the cough reflex.

Through their depressant action on the CNS, opioids slow down the body's digestive process, leading to constipation. This property has been exploited as a way of treating chronic diarrhea. Diphenoxylate (Lomotil®) is an opioid with low addictive potential used in such cases.

## **Tolerance, Physical Dependence and Withdrawal**

Continued use of most opioids leads to the development of tolerance: increasing amounts of the drug or medication are required to maintain constant levels of pain relief or euphoria. When opioids are being used for their psychoactive properties, tolerance often reaches the point where feelings of euphoria are no longer attainable and users report having to continue taking their medication or drug just to function and feel normal.

Prolonged opioid use is also characterized by physiological changes in the body's pain control and other mechanisms, leading to physical dependency. Once this is established, abrupt cessation of use will produce withdrawal symptoms. Even when opioids are being appropriately prescribed and consumed for a legitimate medical reason, physical dependency will occur over time but is not normally considered problematic. In such cases, once the opioid medication is no longer required the dose should be slowly reduced to avoid placing the person into withdrawal.

Withdrawal from opioids, unlike that from alcohol or barbiturates, is not life-threatening but can produce high levels of discomfort and symptoms similar to a severe case of gastric flu. Commonly these will start to occur between eight and 24 hours after the last dose, depending on the type of opioid consumed.

Usual symptoms include aches (especially in the joints and back), runny eyes and nose, sweats and chills, sneezing, yawning, stomach cramps, diarrhea and insomnia. Although most of these effects will peak between 36 and 72 hours and will generally last for seven to 10 days, some symptoms such as insomnia might take several weeks to fully subside.

## **Psychological Dependence/Addiction**

Psychological dependence or addiction to opioids is marked by cravings and a compulsive need to continue taking the medication or drug despite any harmful or negative consequences arising from its use. Psychological dependence is typically associated with a loss of control. For example, a person may

start with appropriate use of an opioid medication for pain control, but then progress to misuse or abuse because they become addicted to its psychoactive effects. They may use their medication more rapidly than it was prescribed and could even escalate to visiting more than one physician (“double-doctoring”) or to buying medication on the street to ensure a continuing supply.

As with any psychoactive drug, the feelings experienced when using opioids depend on the specific drug, the amount used, how it is taken, what the person expects, previous exposure of the body to this and other drugs, the setting or location and the user’s mental state. The most commonly reported effects are drowsiness, warmth, a sense of well-being and contentment, and detachment from pain and anxiety. The euphoric effects are heightened when opioids are injected into a vein and produce an almost instantaneous, short-lived sensation sometimes referred to as a “rush.”

Opioids can be used in a variety of ways other than intravenously; they can be injected under the skin or into muscle. They can also be smoked, snorted or swallowed.

Although heroin is the opioid most commonly associated with misuse and abuse, it is a relatively rare street drug in Alberta. Most illicit opioid use in the province involves over-the-counter (e.g., Tylenol® 1) or prescription opioids (e.g., morphine, Percocet®, Percodan® or MS Contin®) that have been stolen or diverted from legitimate sources or obtained on prescription by faking injury or illness.

### **Opioid Side Effects and Risks**

The most common side effects arising from opioid use are nausea and vomiting, drowsiness, itchiness, dry mouth and constipation. Unlike alcohol, tobacco and many other psychoactive substances, opioids are not directly harmful to the body if used appropriately.

When overdoses and fatalities do occur, they are normally caused by the respiratory depression arising from opioids’ effects on the CNS. An excessive single dose could potentially be fatal for someone who is not a regular opioid user and has not developed a

tolerance to their depressive action. Even long-term opioid users are at risk if they accidentally or deliberately take a stronger dose than usual or resume their normal dosing after a period of abstinence.

Taking more than one kind of CNS depressant at a time has a cumulative effect on respiratory depression. Combining even moderate doses of opioids with other substances such as alcohol, tranquillizers or sleeping pills could result in a fatal overdose.

Generally, it is the lifestyle and patterns of behaviour that sometimes accompany illicit opioid use that put street drug users at greatest risk, rather than the drugs themselves. Intravenous use increases the chance of overdosing, and is one of the main transmission routes for viruses including hepatitis C and HIV. Infections from contaminated drugs or unsterile injecting equipment are common and can cause localized problems such as abscesses or more serious conditions such as endocarditis, an infection of the heart valves and lining.

Opioid drug users may also have poor nutrition and living conditions, and may engage in high-risk activities in order to fund their dependency.

### **Prevalence and Cost of Illicit Opioid Use**

It is difficult to obtain an accurate picture of illicit opioid use in either Canada or Alberta for a number of reasons. Most studies do not differentiate medical use from street use; those that do often concentrate only on heroin, and even then tend to group it together with unrelated substances such as steroids and solvents.

According to the 2004 Canadian Addiction Survey, approximately 1% of the Canadian population aged 15 or older had tried heroin one or more times during their lifetime; the figure for Alberta was less than 2%. None of the people surveyed in Alberta reported using heroin in the previous year.<sup>1</sup> However, these statistics are not truly representative of opioid use in Alberta, because pharmaceutical opioid use is far more prevalent than heroin use.

Such statistics also mask the personal and financial costs of opioid use. There are an estimated 80,000 to 125,000 intravenous drug users in Canada, the majority of whom are using illicit opioids.<sup>2</sup> It has

been calculated that an active, untreated opioid user represents an annual cost to society of \$45,000 because of their health-care needs, criminal activity, welfare benefits and loss of taxation revenue.<sup>2</sup>

In recent years, deaths from pharmaceutical opioid analgesic overdoses in the United States have overtaken those attributed to heroin and cocaine. Between 1999 and 2002, there was a 91.2% increase in the number of opioid analgesic poisonings cited on death certificates.<sup>3</sup>

### Medication-Assisted Treatment for Opioid Addiction

Although it is possible to detox or “go cold turkey” from opioids, many people struggle to do so because of the unpleasant withdrawal symptoms and psychological cravings. Even after a successful detoxification, some people find it difficult to maintain abstinence, and subsequently relapse.

Since the early 1960s, methadone (a synthetic opioid medication) has been used very successfully to treat opioid users for whom other interventions have not been effective. Methadone was originally developed as an analgesic, but it was found to have a number of particular properties that made it suitable for use in addiction treatment:

- Methadone is an opioid agonist, and therefore binds to the body’s opioid receptors and prevents physical withdrawal when a person abstains from any other opioid that they have been using.
- Methadone also reduces physiological cravings without producing euphoria or sedation.
- Methadone is consumed orally, therefore eradicating the risks inherent in intravenous drug use.
- Methadone is a long-acting opioid and remains active in the body for 24 to 36 hours, so in most cases only a single daily dose is required.
- Methadone partially blockades some opioid receptors, which can reduce the euphoric effects of other opioids.

All of these benefits taken together make it easier to abstain from opioids and to regain or maintain a stable lifestyle.

In 2005, the synthetic opioid buprenorphine was licensed for use in Canada as a treatment for opioid dependency. It shares most of methadone’s properties and has been used in several other countries for many years. At the time of writing, it was not yet generally available and protocols for its use were still being drafted.

Naloxone (Narcan®) and naltrexone (ReVia®) are other medications used in the treatment of opioid dependency. Unlike methadone and buprenorphine, naloxone and naltrexone are opioid antagonists, which means they replace other opioids on the receptors without producing any opioid-like effects. EMS and other medical staff most commonly use naloxone to treat opioid overdoses, because it forces opioids out of the receptors and reverses the depressive action of opioids. Naltrexone can be prescribed after an opioid detox because it blocks opioid effects, which helps to reinforce abstinence.

### Methadone and Pregnancy

Illicit opioid use and abrupt withdrawal during pregnancy is dangerous for the mother and the fetus. It can lead to miscarriage, premature labour and still-birth.

Pregnant women who are addicted to opioids often have poor nutrition and rest, little obstetrical care, and exposure to fluctuating levels of opioids and other drugs. They are also at risk for infections related to injection drug use. There is a high risk of miscarriage if a mother abruptly stops taking opioids.

Methadone maintenance is considered the standard of care for women who are addicted to opioids. There are many benefits for both the woman and her fetus, including

- improved prenatal care
- improved nutrition
- decreased incidence of maternal opioid withdrawal
- engagement of the woman into alcohol and other drug programs, and other supports
- decreased criminal activity and sex trade work

- decreased injection drug use and decreased risk of blood-borne pathogens
- decreased incidence of premature delivery
- decreased infant mortality

A baby born to a mother dependent on opioids may or may not experience neonatal abstinence syndrome (which happens when a newborn experiences withdrawal).

At birth, the baby should be properly assessed. The symptoms include irritability, hyperactivity, abnormal sleeping patterns, high screaming activity, tremors, vomiting and diarrhea.

Tapering from methadone during pregnancy is not recommended. Those who wish to withdraw should be given information and counselling about the risks involved, particularly about the risk of miscarriage. Some women will, however, decline methadone maintenance and request tapering. Adequate studies have not been done comparing pregnancy outcomes among women stabilized and then maintained throughout pregnancy with outcomes among women stabilized and then weaned (slowly withdrawn). This has been done with success at B.C. Children's and Women's Health Centre without obstetrical complications, but only under proper supervision and with a select group of women.

Health Canada best practice guidelines indicate that breastfeeding should be encouraged. However, the baby may experience withdrawal when breastfeeding is discontinued. Breastfeeding is generally not recommended if the woman is HIV positive or if she is actively using certain substances such as heroin, cocaine or amphetamines. Women should thoroughly discuss with their doctor the pros and cons of breastfeeding.

The majority of infants exposed to methadone in the uterus are healthy and show fewer negative outcomes than infants exposed to heroin and other illicit

drugs. Women taking methadone can conceive and be safely maintained on a stable methadone dosage during pregnancy, without negative long-term effects on their health and the health of their infants.

## Opioids and the Law

Under Canada's Controlled Drugs and Substances Act, unlawful possession of opioids is a criminal offence. For less serious charges tried by summary conviction, the penalty for a first offence is a fine of up to \$1,000 and six months' imprisonment. For subsequent offences, the penalty is a fine of up to \$2,000 and one year's imprisonment. When the charges are considered more serious and are tried by indictment, the penalty for possession of opioids is up to seven years' imprisonment. Producing, trafficking, importing and exporting opioids are indictable offences punishable by up to life imprisonment.

## REFERENCES

1. Adlaf, E. M., Begin, P., & Sawka, E. (Eds.) (2005). *Canadian Addiction Survey (CAS): A national survey of Canadians' use of alcohol and other drugs: Prevalence of use and related harms: Detailed report*. Ottawa, ON: Canadian Centre on Substance Abuse.
2. Fischer, B., Rehm, J., Brissette, S., Brochu, S., Bruneau, J., El-Guebaly, N., et al. (2005, June). Illicit opioid use in Canada: Comparing social, health, and drug use characteristics of untreated users in five cities. *Journal of Urban Health*, 82(2), 250–266.
3. Paulozzi, L. J., Budnitz, D. S., & Xi, Y. (2006, July 24). Increasing deaths from opioid analgesics in the United States. *Pharmacoepidemiology and Drug Safety Journal*, 15(9), 618–627.

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