Heroin

Heroin is an opiate drug that is synthesized from *morphine*, a naturally occurring substance extracted from the seed pod of the Asian opium poppy plant. Heroin usually appears as a white or brown powder, or as a black sticky substance, known as *black tar heroin*.

How is heroin abused?

Heroin can be injected, snorted, sniffed, or smoked—routes of administration that rapidly deliver the drug to the brain. Injecting is the use of a needle to administer the drug directly into the bloodstream. Snorting or sniffing is the process of inhaling heroin powder through the nose, where it is absorbed into the bloodstream through the nasal tissues. Smoking involves inhaling heroin smoke into the lungs. All three methods of administering heroin can lead to addiction and other severe health problems.

How does heroin affect the brain?

Heroin enters the brain, where it is converted to morphine and binds to receptors known as *opioid receptors*. These receptors are located in many areas of the brain and the body, especially those involved in the perception of pain and reward. Opioid receptors are also located in the brain stem, and are important for automatic processes critical for life, such as breathing, blood pressure, and arousal. Heroin overdoses frequently involve a suppression of breathing.

After an intravenous injection of heroin, users report feeling a surge of euphoria, or a rush accompanied by dry mouth, a warm flushing of the skin, heaviness of the extremities, and clouded mental functioning. Following this initial euphoria, the user goes on the nod, an alternately wakeful and drowsy state. Users who do not inject the drug may not experience the initial rush, but other effects are the same.

With regular heroin use, tolerance develops, in which the user's physiological and psychological response to the drug decreases, and more heroin is needed to achieve the same intensity of effect. Heroin users are at high risk for addiction.

What other adverse effects does heroin have on health?

Heroin abuse is associated with serious health conditions, including fatal overdose, spontaneous abortion, and—particularly in users who inject the drug—infectious diseases, including HIV, AIDS, and hepatitis. Chronic users may develop collapsed veins, infection of the heart lining and valves, abscesses, and liver or kidney disease. Pulmonary complications, including various types of pneumonia, may result from the poor health of the abuser, as well as from heroin's depressing

effects on respiration. In addition to the effects of the drug itself, street heroin often contains toxic contaminants or additives that can clog blood vessels leading to the lungs, liver, kidneys, or brain, causing permanent damage to vital organs.

Chronic use of heroin leads to *physical dependence*, a state in which the body has adapted to the presence of the drug. If a dependent user reduces or stops use of the drug abruptly, he or she may experience severe symptoms of withdrawal. These symptoms, which can begin as early as a few hours after the last drug administration, can include restlessness, muscle and bone pain, insomnia, diarrhea, vomiting, cold flashes with goose bumps, and kicking movements. Users also experience severe cravings for the drug during withdrawal, which can precipitate continued abuse or relapse. Major withdrawal symptoms peak between 48 and 72 hours after the last dose of the drug, and typically subside after about one week. Some individuals, however, may show persistent withdrawal symptoms for months. Although heroin withdrawal is considered less dangerous than alcohol or barbiturate withdrawal, sudden withdrawal by heavily dependent users who are in poor health is occasionally fatal. In addition, heroin craving can persist years after drug cessation, particularly upon exposure to triggers such as stress, or certain people, places, and things associated with drug use.

Heroin abuse during pregnancy, together with related factors like poor nutrition and inadequate prenatal care, has been associated with adverse consequences including low birth weight, an important risk factor for later developmental delay. If the mother is regularly abusing the drug, the infant may be born physically dependent on heroin and could suffer from serious medical complications requiring hospitalization.

What treatment options exist?

A range of treatments exist for heroin addiction, including medications and behavioral therapies. Science has taught us that when medication treatment is combined with other supportive services, patients are often able to stop using heroin or other opiates, and return to stable and productive lives.

Treatment usually begins with medically assisted detoxification to help patients withdraw from the drug safely. Medications such as *clonidine* and *buprenorphine* can be used to help minimize symptoms of withdrawal. However, detoxification alone is not treatment, and has not been shown to be effective in preventing relapse. It is merely the first step. Medications to help prevent relapse include the following:

- *Methadone* has been used for more than 30 years to treat heroin addiction. It is a synthetic opiate medication that binds to the same receptors as heroin, but when taken orally, it has a gradual onset of action and sustained effects, reducing the desire for other opioid drugs while preventing withdrawal symptoms. Properly administered, methadone is not intoxicating or sedating, and its effects do not interfere with ordinary daily activities. Methadone maintenance treatment is usually conducted in specialized opiate treatment programs. The most effective methadone maintenance programs include individual and group counseling, as well as provision of, or referral to, other needed medical, psychological, and social services.

- *Buprenorphine* is a more recently approved treatment for heroin addiction and other opiates. Compared with methadone, buprenorphine produces less risk for overdose and withdrawal effects, and produces a lower level of physical dependence. Patients who discontinue the medication generally have fewer withdrawal symptoms than those who stop taking methadone. The development of buprenorphine, and its authorized use in physicians' offices, give opiate addicted patients more medical options and extend the reach of addiction medication. Its accessibility may even prompt attempts to obtain treatment earlier. However, not all patients respond to buprenorphine—some continue to require treatment with methadone.
- *Naltrexone* is approved for treating heroin addiction, but has not been widely utilized due to poor patient compliance. This medication blocks opioids from binding to their receptors, and thus prevents an addicted individual from feeling the effects of the drug. Naltrexone as a treatment for opioid addiction is usually prescribed in outpatient medical settings, although initiation of the treatment often begins after medical detoxification in a residential setting. To prevent withdrawal symptoms, individuals must be medically detoxified and opioid free for several days before taking naltrexone.
- *Naloxone* is a shorter acting opioid receptor blocker, used to treat cases of overdose.

For pregnant heroin abusers, methadone maintenance, combined with prenatal care and a comprehensive drug treatment program, can improve many of the detrimental maternal and neonatal outcomes associated with untreated heroin abuse. Preliminary evidence suggests that buprenorphine may also be a safe and effective treatment during pregnancy, although infants exposed to either methadone or buprenorphine prenatally may still require treatment for withdrawal symptoms. For women who do not want or are not able to receive pharmacotherapy for their heroin addiction, detoxification from opiates during pregnancy can be accomplished with medical supervision, although potential risks to the fetus and the likelihood of relapse to heroin use should be considered.

There are many effective behavioral treatments available for heroin addiction—usually in combination with medication. These can be delivered in residential or outpatient settings. Examples are individual or group counseling, contingency management (which uses a voucher based system where patients earn points based on negative drug tests—these points can be exchanged for items that encourage healthy living), and *cognitive-behavioral therapy* (designed to help modify a patient's expectations and behaviors related to drug abuse, and to increase skills in coping with various life stressors).

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U.S. National Institute of Health, National Institute on Drug Abuse. (Revised 2010, March). *DrugFacts: Heroin*. Retrieved April 3, 2013, from http://www.drugabuse.gov