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Adverse Effects of Morphine

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Commentary

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Description

Morphine is an opiate pain reliever derived naturally from the poppy plant in a dark brown, resinous form (*Papaver somniferum*). It can be taken orally or intravenously. It works directly on the Central Nervous System (CNS) to produce analgesia and alter pain perception and emotional response With repeated administration, physical and psychological dependence and tolerance may develop. It is commonly used for pain from myocardial infarction, kidney stones and during labour. It can be taken for both acute and chronic pain. Morphine can be administered Orally, Subcutaneously, Intravenously into the space around the spinal cord or rectally. It has a strongest impact after about 20 minutes when administered intravenously and 60 minutes when administered orally, and its effect lasts 3–7 hours. Morphine long-acting formulations are available under the brand names MS-Contin, Kadian and others, as well as generically.

Morphine's life-threatening side effects include decreased respiratory effort, vomiting, nausea and low blood pressure. Morphine is a highly addictive substance. Opioid withdrawal symptoms may occur if one's dose is reduced after long-term use. Drowsiness, vomiting and constipation are common morphine side effects. Even though it may be detrimental to the health of the baby, morphine should be avoided during gestation and lactation.

Morphin like loperamide and other opioids, acts on the myenteric plexus in the intestine, reducing gut motility and causing constipation. The gastrointestinal effects of morphine are primarily mediated by nerve terminals in the intestine. Morphin reduces the rate of intestinal transit by inhibiting gastric emptying and reducing propulsive

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peristalsis of the intestine. Constipation is also caused by a decrease in gut secretion and an increase in intestinal fluid absorption. Opioids may also have an indirect effect on the gut *via* tonic gut spasms caused by the inhibition of nitric oxide production. In animals, a nitric oxide precursor, L-arginine was shown to reverse morphine-induced changes in gut motility.

Clinical studies show that morphine, like other opioids, frequently causes hypogonadism and hormone imbalances in chronic users of both sexes. This is a dose-dependent side effect that occurs in both therapeutic and recreational users. Morphine can disrupt menstruation in women by suppressing luteinizing hormone levels. According to many studies, the majority of chronic opioid users have opioid-induced hypogonadism. This effect may be responsible for the increased risk of osteoporosis and bone fracture seen in chronic morphine users. According to research, the effect is only temporary. Morphine is the model opioid and it serves as the standard against which other opioids are measured. It primarily interacts with the opioid (Mu-Delta) receptor heteromer. The binding sites in the human brain are discretely distributed with high densities in the posterior amygdala, hypothalamus, thalamus, nucleus caudatus, putamen and certain cortical areas. They are also found on the terminal axons of primary afferents within the spinal cords laminae I and II (*Substantia gelatinosa*) and in the trigeminal nerve's spinal nucleus.

Morphine can be administered orally, sublingually, bucally, rectally, subcutaneously, intranasally, intravenously, intrathecally or epidurally and inhaled through a nebulizer. As a recreational drug, it is becoming more popular to inhale however for medical purposes, intravenous (IV) injection is the most common method of administration. Morphine undergoes extensive first-pass metabolism (a large portion is broken down in the liver), so when taken orally, only 40% to 50% of the dose reaches the central nervous system. The plasma levels after Subcutaneous (SC), Intramuscular (IM) and Intravenous (IV) injection are all comparable. Morphine plasma levels peak in about 20 minutes after Intramuscular (IM) or Subcutaneous (SC) injections and in about 30 minutes after oral administration.

Approximately 60% of morphine is converted to Morphine-3-Glucuronide (M3G), with the remaining 6% to 10% converted to Morphine-6-Glucuronide (M6G). Not only does metabolism occur in the liver but it can also occur in the brain and kidneys. Morphine-3-Glucuronide (M3G) does not bind to opioid receptors and thus has no analgesic effect. Morphine-6-Glucuronide (M6G) binds to receptors and is half as effective as morphine as an analgesic in humans. Morphine can also be broken down into normorphine, codeine and hydromorphone in small amounts. Gender, age, diet, genetic makeup, disease state and use of other medications all influence metabolism rate. Morphine has an elimination half-life of about 120 minutes, though there may be slight differences between men and women.