

MORPHINE

Overview

Morphine (C₁₇ H₁₉ NO₃), named after Morpheus, the God of dreams and son of Hypnos the God of sleep, is the most prominent of the 24 different alkaloids found in [Opium](#). It was first isolated in 1803, yet the full chemical structure was not deciphered until 1925. It is a narcotic which numbs senses, reduces pain, and induces sleep.

Pharmacology and Metabolism

Morphine, like other [opiates](#) including [Heroin](#), acts on the central nervous system as an opioid receptor agonist. It binds to and activates the μ -opioid receptors in the central nervous system. Within the brain, the μ -opioid receptors are concentrated in the thalamic, hypothalamic, and amygdalar regions, as well as the periaqueductal grey area, which is a region responsible for pain modulation. Morphine causes several effects, including analgesia, respiratory depression, sedation, and feelings of euphoria. Morphine and similar alkaloids do not interfere with nerve signals to the brain but selectively change how the brain receives the messages, or how the brain perceives the pain signals. The molecule occupies and blocks pain receptors in the brain, and it mimics the actions of endorphins and dynorphins, the body's natural painkillers. Endorphins are made up of two pentapeptides that contain five amino acids. Morphine and natural endorphins both share one of these units, a B-phenylthylamine unit, which makes them structurally similar enough to bind to the receptors in the brain. The B-phenylthylamine unit is also central to the mechanism of hallucinogenic molecules such as [LSD](#) and mescaline. Morphine and its analogues differ from hallucinogens because they have narcotic, pain relieving, sleep-inducing effects.

For a thorough explanation of the chemical structure and composition of morphine and its analogues see Le Coutuer and Burrison. Bibliographic information below in reference section.

Uses

Morphine is used as widely as a painkiller.

It is also used to treat diarrhea. Morphine works on the myenteric plexus in the intestinal tract; it causes constipation by reducing the speed at which the intestinal tract moves.

Health Effects

Morphine acts on the central nervous system and causes sedation, relieves pain, and induces sleep.

Regulation

In the United Kingdom, morphine is listed as a Class A drug under the Misuse of Drugs Act 1971.

In the United States, morphine is classified as a Schedule II drug under the Controlled Substances Act.

In Australia, morphine is classified as a Schedule 8 drug under the Therapeutic Goods Act 1989.

Internationally, morphine is a Schedule I drug under the Single Convention on Narcotic Drugs.

History

Pure morphine was isolated in 1803 by German apothecary [Frederich Serturmer](#). The development of the hypodermic needle in 1853 allowed for morphine to be administered easily. It was used extensively in the Civil War as an [analgesic](#) and sedative often by rubbing it directly onto the wounds. Soldiers today carry with them an autoinjector of morphine to use if they are wounded.

The decoding of the chemical structure of morphine was central to the development of modern scientific experimentation. From Le Coutuer:

"Classical methods of determination, new laboratory procedures, an understanding of the three dimensional nature of carbon compounds, and new synthetic techniques were just some of the results of the unraveling of this marathon chemical puzzle."

Morphine was the most commonly abused narcotic in the world during the first half of the 19th century. A mixture of morphine (10%) and [Ethyl Alcohol](#) (90%)

called [laudanum](#) was widely prescribed as a cure-all. Because it was cheap and widely available, [laudanum](#) was heavily abused. In 1874, [Heroin](#) was derived from morphine and has come to be one of the most addictive and widely abused substances of modern times.

Morphine and its derivatives are the most effective painkillers known today. These include the prescription drugs [Codeine](#) and Demerol. Its well-known street drug derivatives are [Heroin](#) and methadone.

Controversy and Opinion

There is a lot of controversy surrounding the use of morphine in the Civil War. Many have claimed that by war's end, 400,000 soldiers were addicts. The causes and implications of this claim played a large part in constructing the foundations of drug policy in the US. Others contend there was no such problem and that the myth created around morphine addiction formed a false basis for society's attempt to regulate [opioids](#). See : Mandel, Jerry. "The Mythical Roots of US Drug Policy: Soldier's Disease and Addicts in the Civil War." Retrieved on 12-18-06 from [here](#).

Note: the above paper has not been published in an academic journal.

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