



## DESOMORPHINE

### (Dihydrodesoxymorphine; dihydrodesoxymorphine-D; Street Name: Krokodil, Crocodil)

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#### **Introduction:**

Desomorphine (Dihydrodesoxymorphine or dihydrodesoxymorphine-D) is a synthetic opioid-like substance synthesized in the 1930s in the United States. Its street names are "Krokodil" and "Crocodil." Desomorphine produces an opiate-like action with a fast onset and brief action. As a powerful morphine derivative, it is about ten times more potent than morphine.

Desomorphine abuse first appeared internationally in 2002. The skin, in long-term abusers of desomorphine, may present as greenish and scaly due to damaged blood vessels, thrombosis and damaged soft tissues surrounding the injection sites. The skin's appearance is similar to a crocodile's scaled and rugged skin. The skin injuries can eventually develop into severe tissue damage leading to thrombophlebitis and gangrene. These conditions usually result in limb amputation or sometimes death.

#### **Licit Uses:**

There is no accepted medical use for desomorphine in the United States and it has been controlled in the United States since 1936. It had been used medically in Switzerland under the brand name Permonid.

#### **Chemistry:**

Desomorphine (4,5- $\alpha$ -epoxy-17-methylmorphinan-3-ol; CAS Registry Number 427-00-9) is a semi-synthetic opioid most closely related in the chemical structure to morphine, and produces opioid-like effects. It has the molecular formula  $C_{17}H_{21}NO_2$ , and molecular weight 271.35 g/mol. It has a melting point of 189°C and is a solid at room temperature. The salt forms of desomorphine are freely soluble in water.

#### **Pharmacology:**

Pharmacology studies on laboratory animals with desomorphine demonstrated that desomorphine was generally more potent than morphine in all tested activities including: 1) toxicity in white mice and young rabbits, 2) analgesic action in cats, 3) respiratory effects in rabbits, 4) general depression in rabbits, and 5) gastrointestinal motility in rabbits. Desomorphine has a rapid onset and a brief duration of action. Limited animal studies have indicated that in comparison to morphine, desomorphine is at least 15 times more effective as a general depressant, more than 10 times as effective as an analgesic, and three times more toxic.

Abuse potential studies of desomorphine in animals had shown that it exhibited limited addiction liability. In monkeys, desomorphine had 10 times the depressant effect of morphine, developed tolerance less rapidly and

less completely, and did not lead to the appearance of abstinence symptoms during withdrawal. Studies in rats receiving a daily injection of desomorphine at a constant dose showed that the animals developed tolerance slowly to the depressant effect of desomorphine.

Clinical studies in humans have demonstrated that desomorphine appeared to be an adequate substitute for morphine in symptomatic treatment. Desomorphine produces relatively brief but powerful narcotic and analgesic effects. It also has a relatively powerful respiratory depressant effect to which tolerance does not develop. Repeated administration of desomorphine at short intervals in patients with severe cancer pain indicated that desomorphine produced a high degree of addiction liability.

#### **Illicit Uses:**

The National Forensic Laboratory Information System (NFLIS) is a DEA database that collects scientifically verified data on drug items and cases submitted to and analyzed by federal, state, and local forensic laboratories. In 2004, two drug reports/exhibits submitted to forensic laboratories were identified as desomorphine. Since then, no other exhibits have been identified in NFLIS as desomorphine, to date.

#### **User Population:**

Desomorphine is abused for its opioid-like effects. As with most opiates, abuse of desomorphine is associated with tolerance, addiction, and dependence. As a cheaper alternative to heroin within the drug abuse community, desomorphine abuse was reported to be increasing, in 2009, among Russian young adults. Desomorphine is illicitly synthesized from codeine by abusers and generally abused intravenously.

#### **Illicit Distribution:**

Desomorphine is available illicitly from sources through the internet.

#### **Control Status:**

Desomorphine is controlled as a schedule I substance under the Controlled Substances Act.

Comments and additional information are welcomed by the Drug and Chemical Evaluation Section, Fax 571-362-4250, Telephone 571-362-3249, or E-mail [DPE@usdoj.gov](mailto:DPE@usdoj.gov).