



Propofol (Diprivan®)

March 2020

Introduction:

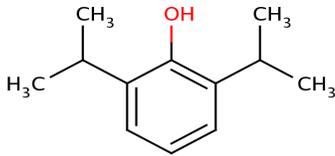
Propofol (2,6-diisopropylphenol, U.S. patent 4,447,657) is a short acting intravenous anesthetic and marketed (Diprivan®, AstraZeneca) as a sterile emulsion. It is currently available in the United States as a prescription medication for use in human and veterinary medicine.

Licit Uses:

Propofol is a non-barbiturate sedative, used in hospital settings by trained anesthetists for the induction, maintenance of general anesthesia, and sedation of ventilated adults receiving intensive care, for a period of up to 72 hours.

Chemistry:

Propofol, or 2,6-diisopropylphenol ($C_{12}H_{18}O$, MW = 178.271) is a simple molecule and its chemical structure is shown below.



Pharmacology:

Propofol produces loss of consciousness rapidly within 40 seconds of an intravenous injection. Its duration of action is short with a mean of 3 to 5 minutes following a single bolus dose of 2 to 2.5 mg/kg of body weight. Studies investigating the recovery profile of propofol have reported that patients anaesthetized with propofol wake-up “elated”, “euphoric”, and “talkative”. Clinical studies indicate that 50% of participating subjects reported “liking” on the Visual Analog Scale and showed preference for propofol over placebo. Sub-anesthetic doses of propofol are reported to produce feelings of “being high”, light-headedness, spaced out and sedation. Propofol at anesthetic doses is reported to cause dream incidence in 20% to 60% of the exposed population.

The primary effect of propofol is potentiation of GABA-A receptors. Similar to barbiturates and benzodiazepines, propofol has been shown to produce rewarding and reinforcing effects in animals. Sub-anesthetic and anesthetic doses of propofol have been shown to increase dopamine concentrations in the nucleus accumbens (brain reward system) in rats.

Propofol has a fast onset of action and crosses the blood-brain barrier very quickly. Its short duration of action is due to rapid distribution from the central nervous system to other tissues. Approximately 70% of the dose is excreted in the urine within 24 hours and 90% is excreted within 5 days of administration.

Propofol has a narrow window of safety. Induction of anesthesia with propofol is associated with cessation of

breathing in some adults and children. Prolonged high dose infusions of propofol for sedation in adults and children have been associated with cessation of breathing, breakdown of

heart muscle, and heart and kidney failure leading to death in some cases, referred as “Propofol Infusion Syndrome”. Propofol abuse may also cause accumulation of fluid in the lungs, cardio-respiratory depression and death. There is no antagonist or reversal medication for propofol toxicity.

Illicit Uses:

Case reports and surveys published in scientific literature indicate that propofol is abused for recreational purpose, mostly by anesthetists, practitioners, nurses and other health care staff. Some fatalities occurred from propofol abuse. A survey of propofol abuse in academic anesthesia programs revealed that 18% (23 of 126) of anesthesiology departments in the United States experienced one or more individuals abusing propofol in the last 10 years (up to mid-2006) and two departments had more than one incidence of abuse. The incidence of propofol abuse among all anesthesia personnel was 0.10%. The mortality among anesthesiologists abusing propofol was 28% (7 deaths in 25). This survey also suggested that among anesthesiology staff, the incidence of propofol abuse increased compared to the previous survey reported in 2002.

User Population:

Propofol is mostly abused by health care staff including anesthetists, practitioners, nurses and technicians.

Illicit Distribution:

Propofol is rarely encountered by law enforcement personnel or submitted to forensic laboratories for analysis. This may be, in part, due to its non-control status. According to the National Forensic Laboratory Information System (NFLIS) and the System to Retrieve Information from Drug Evidence (STRIDE)/STARLIMS, there were a total of 20 propofol drug reports from federal, state, and local forensic laboratories from 2010 to 2012. The number of drug reports identified has remained low and fairly stable over the years with 4 drug reports and 5 reports identified as propofol in 2016 and 2017, respectively. And, approximately two reports identified for 2018 and the first half of 2019.

Control Status:

Propofol is not scheduled under the Controlled Substances Act (CSA).

Comments and additional information are welcomed by the Drug and Chemical Evaluation Section, Fax 571-362-4250, Telephone 571-362-3249, or Email DPE@usdoj.gov.