

Dextromethorphan

(Street Names: DXM, CCC, Triple C, Skittles, Robo, Poor Man's PCP)

Introduction:

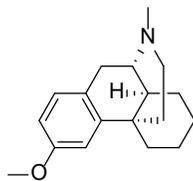
Dextromethorphan (DXM) is an over the counter (OTC) cough suppressant commonly found in cold medications. DXM is often abused in high doses by adolescents to generate euphoria and visual and auditory hallucinations. Illicit use of DXM is referred to on the street as "Robo- tripping" or "skittling." These terms are derived from the most abused products, Robitussin and Coricidin.

Licit Uses:

DXM is found in more than 100 OTC cold medications either alone or in combination with other drugs such as, analgesics (e.g. acetaminophen), antihistamines (e.g. chlorpheniramine), decongestants (e.g., pseudoephedrine) and/or expectorants (e.g., guaifenesin). The typical antitussive adult dose is 15 or 30 mg taken three to four times daily. The anti-coughing effects of DXM persist for 5 to 6 hours after oral administration. When taken as directed, side-effects are rarely observed. According to IQVIA's National Prescription Audit™, total prescriptions dispensed in the United States for all products containing dextromethorphan were approximately 12.9 million in 2010, 12.5 million in 2015, 8.5 million in 2020, and 15.6 million in 2024. Several states have implemented and/or passed legislation prohibiting the sale or purchase of DXM products to people under the age of 18.

Chemistry:

DXM (*d*-3-methoxy-*N*-methyl-morphinan) is the dextro isomer of levomethorphan, a semisynthetic morphine derivative. The molecular weight is 271.40 g/mol with a molecular formula of C₁₈H₂₅NO.



Pharmacology:

Although structurally similar to other narcotics, DXM does not act as a significant *mu*-opioid receptor agonist (e.g. morphine, heroin), but binds to sigma opioid binding sites. DXM and its metabolite, dextrorphan, act as *N*-methyl-*d*-aspartate (NMDA) receptor antagonists. At high doses, the pharmacology of DXM is similar to that of phencyclidine (PCP) and ketamine that also antagonize the NMDA receptor. High doses of DXM produce PCP-like behavioral effects. Approximately 5-10% of individuals are poor DXM metabolizers, which increases their risk for overdose and deaths. DXM should not be taken with antidepressants due to the risk of inducing a life-threatening serotonergic syndrome.

Illicit Uses:

DXM is abused by individuals of all ages but its abuse by teenagers and young adults is of particular concern. This abuse is fueled by DXM's OTC availability and extensive "how to" abuse information on internet. The internet sale of the powdered form of DXM poses additional risks due to the uncertainty of composition and dose. DXM abusers report a heightened sense of perceptual awareness, altered time perception, and visual hallucinations. The typical DXM intoxication involves hyper excitability, lethargy, ataxia, slurred speech, sweating, hypertension, and nystagmus. Abuse of combination DXM products also results in health complications from the other active ingredients, which include increased blood pressure from pseudoephedrine, potential delayed liver damage from acetaminophen, and central nervous system toxicity, cardiovascular toxicity, and anticholinergic toxicity. The use of high doses of DXM in combination with alcohol or other CNS depressants is particularly dangerous, and deaths have been reported.

According to America's Poison Centers (APC), there were 7,358 case mentions related to DXM preparations (not otherwise classified or in combination with other substances) for 2023.

The 2024 Monitoring the Future (MTF) survey MTF survey outcomes for past year use prevalence were 4.4%, 4.0%, and 2.8% for 8th, 10th, and 12th graders, respectively; with increases in prevalence creases for all 8th to 12th graders in 2023.

Illicit Distribution:

DXM abuse has traditionally been as the OTC liquid cough preparations. More recently, abuse of tablet and gel capsule preparations has increased. DXM powder sold over the internet is also a source of DXM for abuse. DXM is also distributed in illicitly manufactured tablets, containing only DXM or mixed with other illicit drugs such as MDMA or methamphetamine. The DEA's National Forensic Laboratory Information System (NFLIS) Drug database collects scientifically verified data on drug items and cases submitted to and analyzed by participating federal, state, and local forensic drug laboratories. NFLIS-Drug received 75 reports of DXM in 2021, 60 in 2022, 68 in 2023, and 102 in 2024 (reports still pending). In total, there have been over 3800 reports since 1997.

Control Status:

DXM is not controlled 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 Email: DPE@dea.gov.