



## DEXTROMETHORPHAN

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

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### 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 commonly abused products, Robitussin and Coricidin.

### Licit Uses:

DXM is an antitussive found in more than 120 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. For 2017, IQVIA™ reported a total of 12.3 million DXM products sold to individuals. In 2018 and 2019, reporting indicated an increase of 13.0 million and 13.4 million products sold, respectively (IQVIA™). Several states have implemented and/or passed legislation prohibiting the sale or purchase of DXM products to persons under the age of 18.

### Chemistry and Pharmacology:

Dextromethorphan (DXM) (*d*-3-methoxy-*N*-methylmorphinan) is the dextro isomer of levomethorphan, a semisynthetic morphine derivative. Although structurally similar to other narcotics, DXM does not act as a *mu*-receptor opioid (e.g. morphine, heroin). DXM and its metabolite, dextrorphan, act as potent blockers of the *N*-methyl-*d*-aspartate (NMDA) receptor. At high doses, the pharmacology of DXM is similar to the controlled substances phencyclidine (PCP) and ketamine that also antagonize the NMDA receptor. High doses of DXM produce PCP-like behavioral effects. DXM may cause a false-positive test result with some urine immunoassays for PCP. Approximately 5-10% of individuals are poor DXM metabolizers which increases their risk for overdoses 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 various web sites. The sale of the powdered form of DXM over the Internet 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 clinical presentation of DXM

intoxication involves hyper excitability, lethargy, ataxia, slurred speech, sweating, hypertension, and/or nystagmus. Abuse of combination DXM products also results in health complications from the other active ingredient(s), which include increased blood pressure from pseudoephedrine, potential delayed liver damage from acetaminophen, and central nervous system toxicity, cardiovascular toxicity and anticholinergic toxicity from antihistamines. The use of high doses of DXM in combination with alcohol or other drugs is particularly dangerous and deaths have been reported.

Abusers of DXM describe the following four dose-dependent "plateaus:"

Plateau	Dose (mg)	Behavioral Effects
1 <sup>st</sup>	100–200	Mild stimulation
2 <sup>nd</sup>	200–400	Euphoria and hallucinations
3 <sup>rd</sup>	300– 600	Distorted visual perceptions Loss of motor coordination
4 <sup>th</sup>	500-1500	Dissociative sedation

According to the American Association of Poison Control Centers (AAPCC), there were 12,077 case mentions, 9,223 single exposures, and one death related to dextromethorphan preparations (not otherwise classified or in combination with other substances) for 2016. In 2017, there were 11,931 case mentions, 8,986 single exposures, and no deaths reported by the AAPCC for dextromethorphan preparations, as noted previously.

The 2017 Monitoring the Future (MTF) survey indicated that the annual prevalence of non-medical use of OTC cough and cold medicines among students in 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> grades was 2.1%, 3.6%, and 3.2%, respectively. In 2018, MTF survey outcomes for past year use prevalence was 2.8%, 3.3%, and 3.4% for 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders, respectively; with no significant increases in prevalence for 8<sup>th</sup> and 12<sup>th</sup> graders or decreases for 10<sup>th</sup> graders.

### Illicit Distribution:

DXM abuse has traditionally been with 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 ecstasy or methamphetamine.

According to DEA's National Forensic Laboratory Information System (NFLIS), federal, state and local forensic laboratories reported 218 drug reports/exhibits identified as DXM in 2016, 180 in 2017; along with preliminary reporting of 127 drug reports/exhibits for 2018.

### Control Status:

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