

TOXALERT



MARYLAND POISON CENTER

February, 2001

Volume 18, Issue 1

Adolescent Dextromethorphan Abuse

Elora Hilmas, PharmD
Pediatric Pharmacy Resident
Johns Hopkins Hospital

Dextromethorphan is found in more than 140 non-prescription products.

Slang names for dextromethorphan include "C-C-C", "Robo", "Red Devils", "DXM" and "dex".

An 18 year old male was brought to the Emergency Department by his mother because he was hallucinating. He admitted to taking an unknown amount of "C-C-C" tablets (Coricidin[®] HBP Cough and Cold) one hour prior to arrival, to get high. His heart rate was 108 beats/minute, blood pressure 158/89 mmHg, and respiratory rate 16 breaths/minute. His pupils were dilated with rotary nystagmus. The Maryland Poison Center was contacted and recommended activated charcoal, cardiac monitoring, and seizure precautions. Symptoms resolved within six hours of the ingestion and following administration of 50 grams of activated charcoal. He was discharged to home the following day.

Dextromethorphan (DM) is an opioid agent used as a cough suppressant. Although dextromethorphan has been available since the 1960's, there seems to be new interest in the abuse of this substance among adolescents. A recent survey of 376 4th – 12th graders in New Mexico revealed that non-prescription products containing dextromethorphan ranked significantly higher in selection to "get high" than those without it. The most frequently identified abused product was Nyquil[®]. The reported abuse ap-

peared to increase with student age.

In addition to the United States, cases of dextromethorphan abuse have been reported in Sweden, Australia, Germany and Canada. Dextromethorphan-related deaths have been seen in Sweden. Of twenty-five intentional exposures to dextromethorphan reported to the Maryland Poison Center in 2000, eighteen involved adolescents and young adults. Sixteen of these exposures were classified as intentional abuse and nine were classified as intentional use for a suspected suicide attempt. There were eight cases of intentional ingestion of a dextromethorphan-containing product called Coricidin[®] HBP Cough and Cold. The Cincinnati Drug & Poison Information Center reported a series of 19 Coricidin[®] HBP Cough and Cold cases over a 6-week period in 2000.

Street names given to Coricidin[®] or dextromethorphan include "C-C-C", "Robo", "Red Devils", "DXM", or "dex". Dextromethorphan is found in more than 140 non-prescription products. Most products contain between 10-15mg of dextromethorphan per unit dose. Coricidin[®] HBP Cough and Cold contains 4 mg of chlorpheniramine and

Dextromethorphan (continued)

30 mg of dextromethorphan per tablet, which is the largest amount of dextromethorphan per dosage unit on the market. The high quantity of dextromethorphan in this product makes it very attractive to teens, who become nauseated with the large amounts of cough syrup needed to be ingested to achieve a "high". Other Coricidin[®] formulations contain ingredients such as chlorpheniramine, diphenhydramine and/or acetaminophen. Abuse of the wrong Coricidin[®] product could lead to inadvertent hepatotoxicity, cardiovascular or neurological toxicity.

Teens can receive guidance from the internet on how to best abuse dextromethorphan. There are web sites which provide information such as how to drink two bottles of Robitussin DM[®] without vomiting, how to extract pure dextromethorphan from syrups, how to order the drug in pure powder form and how to determine how much dextromethorphan you need to get "high" based on weight (dosing calculators). Following some of this advice can lead to overdoses.

Dextromethorphan (D-isomer of levorphanol, a semisynthetic morphine derivative) has activity on the cough center of the medulla oblongata and suppresses the overactivity of the glutamate system in the CNS. Unlike other opioids, dextromethorphan has no analgesic properties and is not addictive. It noncompetitively antagonizes NMDA receptors and possibly affects 5-HT_{1A} receptors. In comparison, LSD has effects on 5-HT₂ receptors.

Dextromethorphan is well absorbed from the GI tract; however, erratic and slow absorption may occur with sustained release products. Peak levels after therapeutic doses occur within 2-3 hours after ingestion of immediate release preparations,

and 6 hours after sustained-release products. Dextromethorphan is metabolized in the liver via oxidative O-demethylation, producing the active metabolite dextrorphan at varying rates. Approximately 10% of the Caucasian population and 1-10% of other ethnic groups are slow metabolizers of dextromethorphan. This may have implications for teens who take dextromethorphan in high doses. Less than 10% of dextromethorphan is renally excreted unchanged. The plasma half-life is 2 to 4 hours.

Teenagers are abusing dextromethorphan to get an LSD-like "high". This "high" has been described as a state of separation from the environment or an "out of body" experience. Hallucinations or vivid dreams that involve visions and sounds can also occur. It has been suggested that in high doses, symptoms are caused by the active metabolite dextrorphan, which binds to the same central nervous system receptor (NMDA) as phencyclidine. At high doses, some of the specificity is lost and tachycardia, hypertension, and mental status changes can occur. Lethargy, ataxia, slurred speech, confusion, hallucinations, choreoathetoid movements and seizures are present at very large doses. CNS depression and seizures usually occur early in the clinical course. If vomiting occurs during extreme drowsiness, aspiration might occur.

The diagnosis of dextromethorphan toxicity is based primarily on clinical effects. Quest Diagnostics Laboratory will screen for dextromethorphan with a 6-hour turnaround time. This screen requires three milliliters of refrigerated serum. Occasionally, a false positive

Teens use dextromethorphan to get an LSD-like "high".

Tachycardia, hypertension, lethargy, hallucinations and seizures can occur with large doses of dextromethorphan.

Naloxone is sometimes effective in reversing CNS and respiratory depression.

for phencyclidine is noted in the urine toxicology screen. Since acetaminophen is a component of some cough and cold products, a plasma acetaminophen concentration should be determined.

Despite these concerns, dextromethorphan is considered to be a safe drug overall. Ingestion of greater than 10 mg/kg might produce toxic symptoms, but doses in excess of 100 times the usual adult dose have not been fatal. Mortality from dextromethorphan is rare unless there are co-ingestants (such as MDMA, monoam-

ine oxidase inhibitors, antidepressants, or antihistamines).

Management of dextromethorphan overdose is primarily supportive (monitor vital signs, IV fluids if needed). Activated charcoal (1gm/kg) is effective in binding dextromethorphan. Naloxone has been used with variable success (0.4-2mg IV repeat q2-3min up to a total dose of 10mg) to reverse the CNS and respiratory depressant effects of dextromethorphan at opioid receptors.

References available on request.

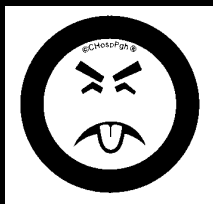
Poison Prevention Week Coming Soon (March 18 – 24, 2001): Materials Available from Maryland Poison Center

Since 1961, the third week of March has been recognized as National Poison Prevention Week. During this week, a focused effort is made to heighten the public's awareness of the dangers of poisons and ways to prevent poisoning.

This year, Poison Prevention Week will be held from March 18 – 24. The Maryland Poison Center will be offering two posters that will provide excellent displays for waiting rooms, hallways and lobbies. These colorful, eye-catching 11 x 17 posters incorporate children's artwork with key poison prevention messages. One of the posters, produced by the National Poison Prevention Week Council, highlights the message: "Children act fast...so do poisons." The other poster has been produced by Baltimore SAFE KIDS and the Maryland Poison Center, and it features a child's illustration and the message: "Do not touch!...Keep poisons out of the reach of children."

These posters will be available free of charge in limited quantities to any organization to promote awareness of poison prevention during Poison Prevention Week and throughout the year. They are being offered in conjunction with a supply of handouts (including Mr. Yuk stickers) for distribution during that week. Larger quantities of posters and/or handouts will be available for minimal charge.

If you are interested in obtaining these materials, please contact Melissa Melum, Health Educator, at 410-706-2151.



***Children act
fast...so do
poisons!***

Maryland Poison Center
University of Maryland at Baltimore
School of Pharmacy
20 N Pine St
Baltimore, MD 21201

Bulk Rate
U. S. Postage
PAID
Permit No. 6735
Baltimore, MD



410-706-7701 or 1-800-492-2414

TOXALERT

TOXNOTES: Nutmeg

My 2 year old daughter just ate several tablespoonfuls of nutmeg. Should I be concerned?

Yes, a potentially toxic dose has been ingested. Nutmeg, commonly used as a flavoring agent, is the seed of the *Myristica fragrans* plant. Myristicin is the chief toxic component; however, several volatile oils, including eugenol, can also produce toxic effects. Symptoms of toxicity occur 3-6 hours after ingesting 1-3 whole nutmegs or 1-2 tablespoons of ground nutmeg. Restlessness, uneasiness, feelings of detachment, inability to concentrate and delirium have been reported. Drowsiness, stupor, coma and respiratory depression follow, with large doses. Tachycardia, dry mouth, flushing and hallucinations mimic anticholinergic toxicity, but pupils are often constricted instead of dilated. Other symptoms might include muscle fasciculations, nausea, vomiting and abdominal pain. Symptoms usually last 1-8 days and resolve with activated charcoal and supportive care.

