

TOXICOLOGY TODAY

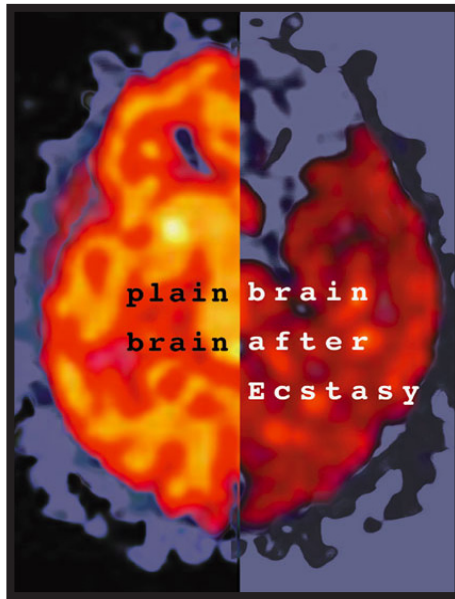


ECSTASY

by Josh Wiley,
PharmD Candidate

Introduction

Ecstasy (3,4-methylenedioxymethamphetamine, MDMA) has three properties that make it unlike any other recreational drug of abuse. It contains stimulatory properties of amphetamines, hallucinogenic properties of mescaline, and limited anxiolytic properties. MDMA has become known as the “love drug” and also goes by other street names, which include: “XTC,” “Adam,” “M & M,” or “E.” It is popular at “raves” and is taken for its mood-enhancing properties. According to the 2003 National Survey of Drug Use and Health (NSDUH), 2.1 million Americans aged 12 and older have tried MDMA. The risk of death for first-time users has been estimated to be between 1 in 2000 to 1 in 5000.¹ MDMA tablets can contain multiple adulterants, including dextromethorphan, amphetamine, methamphetamine, ketamine, caffeine, and acetaminophen.¹



Source: National Institute of Drug Abuse

Pharmacology/ Kinetics

MDMA causes the release of several neurotransmitters, primarily serotonin (5HT), but also dopamine (DA), and norepinephrine (NE). It inhibits the reuptake of serotonin and has the potential, with chronic use, to destroy serotonin nerve terminals. These neurotransmitters are involved in mood regulation, thermoregulation, sleep control, appetite, reward, and the autonomic nervous system.

MDMA is usually formulated as a tablet for

ingestion, although it can be snorted, smoked, or injected. Serum half-lives generally range from 7 to 16 hours in acid urine to 16 to 31 hours in alkaline urine.² The typical half-life is 8 hours and a typical “high” lasts 3 to 5 hours.

Adverse Effects

Adverse effects include jaw clenching, loss of appetite, trismus, bruxism, nausea, dry mouth, confusion, sweating, headache, fatigue, insomnia, constant restless movements of the legs and muscle aches. Major adverse effects include hypertension, tachycardia,

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TRAMADOL

by Tung Vu,
PharmD Candidate

Tramadol is a centrally-acting analgesic available in the US for oral administration as an immediate and extended-release tablet and in combination with acetaminophen. It is a codeine analog that has weak affinity for mu-opioid receptors and also inhibits reuptake for serotonin (5-HT) and norepinephrine (NE).

The most common adverse effects associated with tramadol include dizziness, drowsiness, headache, vertigo, constipation, and nausea. It is metabolized in the liver by CYP2D6 and 3A4 and increased adverse effects may be seen with patients on other medications that inhibit the activity of these enzymes. Because tramadol inhibits the

uptake of serotonin, serotonin syndrome is a possibility especially in combination with other serotonergic medications.

Toxicity associated with tramadol is a direct extension of its pharmacologic action. In two multi-center studies of tramadol exposures reported to poison control centers, the most common clinical effects reported were CNS depression, nausea and vomiting, tachycardia and seizures.^{1,2} Respiratory depression occurred rarely. In one case series involving 87 reports, seizures occurred in 7 (8%) cases and 6/7 patients experienced a single seizure that was brief and self-limiting.² The other patient had two witnessed seizures. In a second series 26 of 190 tramadol exposures reported to a state-wide poison center network seized, 80% had a single seizure, (cont. on pg. 3)

SENIOR MEDICATION SAFETY PROGRAM

Marty Malheiro, the Utah Poison Control Center (UPCC) outreach educator was part of a team that developed a national poison prevention education program aimed at older adults. The program, based on the Health Belief Model theory, addressed poison prevention and medication misuse. Pilot tested with 100 older adults, the evaluation showed the program was successful in raising awareness and changing behavior regarding the potential adverse consequences associated with medication misuse and drug interactions. Two of the most positive findings included:

1. a significant increase in knowledge with the question, "You need to tell your doctor about vitamins you are taking."
2. a significant change in attitude related to the question, "You control your medicines and how they should be combined."

One month after the training, 99% of participants remembered the program and 20% had modified their medicine taking habits. For additional information about the study, contact Marty Malheiro at 801/587-0603.



BIENNIAL UPDATE CONFERENCE

Mark your calendars. The UPCC biennial Poison Control Update Conference will be held in Salt Lake City on May 29th and in Richfield on June 5th, 2008. This conference is designed for public health advocates, such as nurses, health educators, pharmacists, and other public safety professionals. Some of the topics to be covered at the conference include poisonings involving lead, arsenic, caffeine, hand sanitizers, as well as current trends in prescription drug abuse. The conference brochure will be mailed out in January 2008 and will be available on our website.

Checkout our website for more poison prevention information at
www.utahpoisoncontrol.org

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Ecstasy

QT prolongation, psychosis, panic attacks, malignant hyperthermia, seizures, cerebral hemorrhage, hepatitis, rhabdomyolysis, disseminated intravascular coagulation, and acute renal failure.³

Hypertension and tachycardia are due to excess sympathomimetic effects, primarily from norepinephrine. In a volunteer human study, MDMA increased systolic blood pressure 40 mm Hg and the heart rate by 30 beats per minute.³

Clinical Toxicology/ Toxicokinetics

MDMA is a drug commonly associated with the club scene. Environmental factors that may confound or magnify toxicity of MDMA include ambient temperature and physical exertion. Dancing in poorly ventilated areas can lead to increased body temperature, excessive fluid loss and increased muscle activity.

Recreational doses are usually 50-100 mg orally (1.5 mg/kg).² MDMA can lead to confusion, delirium, hyponatremia, hyperthermia, cardiovascular complications, seizures, rhabdomyolysis, hepatotoxicity and multisystem organ failure. Hepatotoxicity may be an isolated finding or associated with hyperpyrexia. It can occur either after an acute single overdose or with chronic use. Dilutional hyponatremia can result from water intoxication due to drinking

large volumes of water or carbonated beverages in order to prevent dehydration. Clubs have been encouraged to provide "chill out" areas with drinking water available.¹ MDMA can also cause SIADH, which can result in hyponatremia. Serum sodium concentrations as low as 115 mEq/L have been reported.² Women appear to be at four-fold increased risk of hyponatremia and coma.⁴

The duration and magnitude of hyperthermia are predictors of mortality risk. Mortality is high when the peak core temperature exceeds 42°C.¹ Hyperthermia can also cause complications such as rhabdomyolysis, impaired consciousness, seizures, disseminated intravascular coagulation, and multi-organ system failure. Individuals with preexisting hypertension or other cardiac complications are at increased risk of sudden death.¹

Treatment

Observe acutely intoxicated patient in the ED for at least 4 hours. Consider obtaining serum electrolytes, creatinine, liver function, creatine kinase and an electrocardiogram in symptomatic patients. Supportive care with simple cooling methods is the mainstay of therapy for hyperthermia. Hyperthermia associated with severe muscle rigidity can be treated with the skeletal muscle relaxant dantrolene.¹

Hypertension, tachycardia, seizures and agitation should be initially treated with benzodiazepines. If severe hypertension and tachycardia persists, the

combination of a beta blocker and a vasodilator, such as nitroglycerin or nitroprusside, should be used. The use of beta blockers alone can result in worsening hypertension due to unopposed alpha adrenergic effects and vasoconstriction.

Hyponatremia is generally managed with fluid restriction. In severe cases, hypertonic saline can be used. Caution is required when correcting hyponatremia; if the serum sodium is corrected too rapidly, osmotic demyelination syndrome can occur.

References

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2. Shannon M. Methylenedioxy-methamphetamine (MDMA, "Ecstasy"). *Ped Emerg Care* 2000;16(5):377-380.
3. Mas M, et al. Cardiovascular and Neuroendocrine Effects and Pharmacokinetics of 3,4-Methylenedioxy-methamphetamine in Humans. *J Pharmacol and Exp Ther* 1999;290(1):136-145.
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MUSHROOM POISONING

by Anna McKeone, MD
Emergency Medicine Resident

(cont. from pg. 1)

Tramadol

3.8% had two seizures and 11.5% of patients had multiple seizures.¹ In this series, almost all patients had a seizure within 6 hours of the ingestion with the majority of patients seizing within 2 hours of the ingestion.¹ Seizures were reported more frequently in a group of drug and tramadol abusers.³

The treatment of a tramadol overdose is primarily supportive. Activated charcoal may be considered for patients that present within 1-2 hours after ingestion. Naloxone may be effective in reversing respiratory depression. Benzodiazepines are indicated for the treatment of seizures. Naloxone is not effective in treating tramadol-induced seizures. Patients should be monitored for a minimum of 6 hours and possibly longer following ingestion of the extended-release preparation. An acetaminophen concentration should be obtained on all patients who have intentionally overdosed or abused tramadol.

Tramadol is a unique analgesic with opiate and non-opiate effects. Please feel free to consult with the staff of the UPCC for assistance in managing a poisoning or overdose.

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2. Spiller HA, Gorman SE, Villalobos D, et al. Prospective multicenter evaluation of tramadol exposure. *J Toxicol Clin Toxicol* 1997;35(4):361-4.
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E - NEWSLETTER

**TOXICOLOGY TODAY
DISTRIBUTED VIA EMAIL!**

You can register to receive this newsletter via email by visiting the newsletter registration page on the Utah Poison Control Center website at: www.utahpoisoncontrol.org/newsletters. Don't miss any exciting issues! If you have questions, need assistance registering or you don't have email, please feel free to call us at (801) 587-0600.

Mushroom poisonings are increasing worldwide secondary to the growing popularity of picking wild mushrooms for food or for their psychedelic properties.¹ Unfortunately, differentiating poisonous mushrooms from edible types is quite difficult, even for experts. Many types of toxins, and therefore toxidromes, are associated with poisonous mushrooms making the diagnosis challenging. In addition, growth conditions, decay, ingestion amount and individual susceptibilities can affect how symptomatic patients become.

Most commonly, patients develop self-limited nausea, vomiting and abdominal pain following ingestion. However, certain species, such as *Amanita phalloides*, are highly poisonous and can be fatal. Some mushroom toxins have delayed effects, causing symptoms days following ingestion. Diaz suggested a classification system based on onset of symptoms and target organs for identification and diagnosis: Early-onset (<6hrs): neurotoxic, allergic and gastrointestinal; Late-Onset (6-24hrs): hepatotoxic, nephrotoxic and erythromelalgia; and Delayed-Onset (>1 day): nephrotoxic, rhabdomyolytic and neurotoxic. Subgroups with specific mushroom species are listed for each toxidrome.¹

Any patient with symptoms developing 6 or more hours after ingestion should be seen in the emergency department. White mushroom caps with white gills are concerning for the highly poisonous *Amanita phalloides* and should be evaluated for liver toxicity. If possible, the mushroom or its spores, which may be obtained from gastric lavage, should be identified by a mycologist.

Treatment includes gastric decontamination with lavage and activated charcoal and supportive care. Patients presenting with signs of hepatic or renal failure should be transferred to a facility capable of performing hemodialysis and liver transplantation. Case reports of hepatic failure from *Amanita sp.* that improved with N-acetylcysteine, benzyl penicillin, silibinin (an extract of milk thistle) and cimetidine have not been supported

by controlled research.² Obtaining liver function tests, renal function panel and creatinine kinase for up to 2 weeks can help to rule-out pathology in patients who may have ingested mushrooms associated with delayed-onset toxins.

The Utah Poison Control Center is available to help with mushroom identification, evaluation and treatment recommendations.



Amanita muscaria

Photo courtesy of USU Extension. Thank you to Maggie Wolf and Michael Piep. Photographer: Craig Poulson

References

1. Diaz JH: Evolving global epidemiology, syndromic classification, general management, and prevention of unknown mushroom poisonings. *Crit Care Med* 2005; 33(2): 419-26.
2. Tong, TC et al: Comparative treatment of alpha-amanitin poisoning with N-acetylcysteine, benzylpenicillin, cimetidine, thiocetic acid, and silybin in a murine model. *Ann Emerg Med*. 2007;50(3):282-8.

**TELECOMMUNICATIONS
AND THE UPCC**

All "emergency" calls to the UPCC are recorded. The digital recording becomes part of the patient's medical record. Digital recordings are valuable in training new employees and are an integral part of our continuous quality improvement program.

TOXINS IN THE NEWS

Home Lead Test Kits Unreliable: The U.S. Consumer Product Safety Commission (CPSC) tested commonly available home lead test kits on a variety of paints and other products containing different levels of lead. Of 104 total test results, more than half (56) were false negatives, and two were false positives. Based on the study, consumers should not use lead test kits to evaluate consumer products for potential lead hazards.

Haloperidol IV: Updated labeling includes WARNINGS stating that Torsades de Pointes and QT prolongation have been observed in patients receiving haloperidol, especially when the drug is administered intravenously or in higher doses than recommended. Haloperidol is not approved for intravenous use.

Dietary Supplements for Erectile Dysfunction - Dangerous Ingredients: The dietary supplements Actra-Rx, Axcil, Desirin, Energy Max, Libidus, Liviro3, Nasutra, Neophase, Rhino V Max, True Man, V. Max, Vigor-25, Zencore, Zimaxx, or 4EVERON may contain analogs of sildenafil, tadalafil, or vardenafil. These agents are marketed on web sites as natural products for erectile dysfunction or sexual enhancement. The labeling does not mention these ingredients and the FDA considers these products to be illegal drugs.

MEET THE UPCC STAFF



DR. E. MARTIN CARAVATI is the Medical Director of the Utah Poison Control Center and attending toxicologist at the University Hospital and Primary Children's Hospital. He received a medical degree from

the Medical College of Virginia. His residency training in emergency medicine was completed at Carolinas Medical Center in Charlotte. He obtained a master's degree in Public Health at the University of Utah and is board certified in both emergency medicine and medical toxicology.

He is currently Secretary-Treasurer for the American Academy of Clinical Toxicology and an Associate Editor of the Annals of Emergency Medicine. He is a co-author of the textbook, Medical Toxicology. When not solving toxicological mysteries, he enjoys fly-fishing, traveling, basketball, hiking and dark chocolate.

Favorite poisons: arsenic, mercury, ethylene glycol, acetaminophen.



UTAH POISON CONTROL CENTER STAFF

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Barbara Insley Crouch, PharmD, MSPH

Medical Director

E. Martin Caravati, MD, MPH

Associate Medical Director

Douglas E. Rollins, MD, PhD

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Outreach Education Provider

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Assistant Education Provider

Sherri Pace, BS, CHES

Editors

E. Martin Caravati, MD, MPH

Barbara Insley Crouch, PharmD, MSPH

Please send comments and suggestions for future articles to the editor of Toxicology Today at:

**585 Komas Dr., Suite 200
Salt Lake City, Utah 84108**

Or send e-mail to

poison@hsc.utah.edu

*CSPI denotes Certified Specialist in Poison Information.



THANK YOU

The Utah Poison Control Center expresses its sincere thanks to the health care professionals, public health officials and toxicology colleagues that work together to treat and prevent poisonings.



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