

MDMA (Ecstasy)

Clinical name: 3,4-methylenedioxymethamphetamine (acronym MDMA)

Brand name: none

Street name(s): ecstasy, E, X, the love drug

Miscellaneous:

- In 1912, German chemists invented MDMA.
- MDMA was originally considered, and has been investigated, as a psychotherapy adjunct.
- In 1985 MDMA was banned as an illegal drug in the U.S. and placed in the Schedule I category.

Pharmaceutical Properties:

Commonly found in white or yellowish-white crystalline powder that is usually compressed into an orally ingested tablet.

Uses:

Psychological/emotional stimulant. Users will experience feelings of euphoria at high doses.

Administration:

Oral ingestion, insufflation, inhalation (rare), IV/IM injection (rare).²⁻⁴

Mechanism/Pharmacology:

MDMA's mechanism of action is largely unknown with regards to specificity. It is known, however, that MDMA has a stimulative effect on dopamine and serotonin.¹ MDMA's strong structural similarity to amphetamine and mescaline are undoubtedly partially responsible for the drug's psychostimulant effect. The pharmacokinetics of MDMA presents a much clearer picture, with effects beginning within 45 minutes and lasting as long as four hours.²

Side effects:

Psychological: Strong feelings of emotion. Any pre-administration emotions of either exuberance or depression will become greatly enhanced while under the influence of MDMA. Rebound anxiety and depression, however, are noted to occur a few days after the drug's use.

Physical: The drug's influence on the body most closely resembles that of stimulants with hypertension, pyresis, tachycardia, loss of appetite and mydriasis being consistently present.

Long-term: The long-term implication that is of concern regards the effect of MDMA on serotonin levels.¹⁻⁵ Animal studies have shown that MDMA leads to the deterioration of neuronal axons in neurons that are responsible for the production of serotonin. The animals that were studied and produced these effects suffered damage for up to seven years after repeated exposure.² A number of human studies, namely those performed by the National Institute of Mental Health and Johns Hopkins, found that visual and verbal memory, as well as reaction time were negatively affected.² In addition to neurological effects, there has been documented cases of MDMA use leading to fulminant hepatitis.⁶⁻⁷

Testing:

Current testing is performed through blood or hair analysis.

Treatment:

Current treatment may include antipsychotics and/or antidepressants depending on the damage (serotonin, etc.) accrued during use. Many individuals will develop a high fever (>102° F) rapidly following administration of MDMA. Immediate measures should be taken to externally cool the body and applicable antipyretics (NSAIDs/APAP/ASA) may be used in situations of pyretic crisis.

Synthesis:

Having a methamphetamine base structure, the synthesis of MDMA is similar to that of methamphetamines, with the chemical addition of two methylenedioxy groups at the three and four position. Hence, the majority of steps and products used in the chemical synthesis of MDMA are largely duplicative of those mentioned in the generation of methamphetamines.

User Identification:

Psychological: Users will be over-emotional and unable to refrain from expressing themselves.²⁻⁴

Physical: Users will display tachycardia, pyresis and palpitations.²⁻⁴

Though little can be done to avoid any physiological or brain damage as a result of MDMA's use, health professionals may notice abusers taking antioxidants or selective serotonin reuptake inhibitors (SSRIs) to avoid any detrimental serotonin side effects.² Attention should be paid to the consistent/excessive purchase of either of these products as over-usage may aid in confirming suspected users or distributors.

Citation References:

1. Green AR, Cross AJ, Goodwin GM. Review of the pharmacology and clinical pharmacology of 3,4-methylenedioxymethamphetamine (MDMA or "Ecstasy"). *Psychopharmacology (Berl)*. 1995;119(3):247-60.
2. Harvard Mental Health Letter. MDMA. 2001;18(1):5.
3. DEA drug intelligence brief. Club drugs: an update. (2001). Retrieved December 4, 2002, from <http://dea.gov/pubs/intel/01026/index.html>
4. Office of National Drug Control Policy. ONDCP Drug Policy Information Clearinghouse Fact Sheet: MDMA (Ecstasy). (April 2002). Retrieved December 5, 2002, from <http://www.whitehousedrugpolicy.gov/publications/factsht/mdma/index.html>
5. Parrott AC. Recreational ecstasy/MDMA, the serotonin syndrome, and serotonergic neurotoxicity. *Pharmacol Biochem Behav* 2002;71(4):837-44.

6. Lange-Brock N, Berg T, Muller AR, Fliege H, Neuhaus P, Wiedenmann B, Klapp BF, Monnikes H. Acute liver failure following the use of ecstasy (MDMA). *Z Gastroenterol* 2002;40(8):581-6.
7. Caballero F, Lopez-Navidad A, Cotorruelo J, Txoperena G. Ecstasy-induced brain death and acute hepatocellular failure: multiorgan donor and liver transplantation. *Transplantation* 2002;74(4):532-7.

General References:

1. Green AR, Cross AJ, Goodwin GM. Review of the pharmacology and clinical pharmacology of 3,4-methylenedioxymethamphetamine (MDMA or "Ecstasy"). *Psychopharmacology (Berl)*. 1995;119(3):247-60.
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8. Katzung BG. *Basic & Clinical Pharmacology*. 8th ed. New York (NY): McGraw Hill;2001. p.537-39.