



National Institute
on Drug Abuse

DrugFacts

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MDMA (Ecstasy or Molly)

MDMA (3,4-methylenedioxy-methamphetamine), popularly known as ecstasy or, more recently, as Molly, is a synthetic, psychoactive drug that has similarities to both the stimulant amphetamine and the hallucinogen mescaline. It produces feelings of increased energy, euphoria, emotional warmth and empathy toward others, and distortions in sensory and time perception.

MDMA was initially popular among White adolescents and young adults in the nightclub scene or at “raves” (long dance parties), but the drug now affects a broader range of users and ethnicities.

How Is MDMA Abused?

MDMA is taken orally, usually as a capsule or tablet. The popular term Molly (slang for “molecular”) refers to the pure crystalline powder form of MDMA, usually sold in capsules. The drug’s effects last approximately 3 to 6 hours, although it is not uncommon for users to take a second dose of the drug as the effects of the first dose begin to fade. It is commonly taken in combination with other drugs. For example some urban gay and bisexual men report using MDMA as part of a multiple-drug experience that

includes cocaine, GHB, methamphetamine, ketamine, and the erectile-dysfunction drug sildenafil (Viagra).

How Does MDMA Affect the Brain?

MDMA acts by increasing the activity of three neurotransmitters, serotonin, dopamine, and norepinephrine. The emotional and pro-social effects of MDMA are likely caused directly or indirectly by the release of large amounts of serotonin, which influences mood (as well as other functions such as appetite and sleep). Serotonin also triggers the re-lease of the hormones oxytocin and vasopressin, which play important roles in love, trust, sexual arousal, and other social experiences. This may account for the characteristic feelings of emotional closeness and empathy produced by the drug; studies in both rats and humans have shown that MDMA raises the levels of these hormones.

The surge of serotonin caused by taking MDMA depletes the brain of this important chemical, however, causing negative after effects—including confusion, depression, sleep problems, drug craving, and anxiety—

that may occur soon after taking the drug or during the days or even weeks thereafter.

Some heavy MDMA users experience long-lasting confusion, depression, sleep abnormalities, and problems with attention and memory, although it is possible that some of these effects may be due to the use of other drugs in combination with MDMA (especially marijuana).

Is MDMA Addictive?

Research thus far on MDMA's addictive properties has shown varying results, but we do know that some users report symptoms of dependence, including continued use despite knowledge of physical or psychological harm, tolerance (or diminished response), and withdrawal effects.

The neurotransmitter systems targeted by MDMA are the same as those targeted by other addictive drugs. Experiments have shown that animals will self-administer MDMA—an important indicator of a drug's abuse potential—although the degree of self-administration is less than some other drugs of abuse such as cocaine.

What Are Other Health Effects of MDMA?

MDMA can have many of the same physical effects as other stimulants like cocaine and amphetamines. These include increases in heart rate and blood pressure, which are particularly risky for people with circulatory problems or heart disease. MDMA users may experience other symptoms such as muscle tension, involuntary teeth clenching, nausea,

blurred vision, faintness, and chills or sweating.

In high doses, MDMA can interfere with the body's ability to regulate temperature. On rare but unpredictable occasions, this can lead to a sharp increase in body temperature (hyperthermia), which can result in liver, kidney, or cardiovascular system failure or even death. MDMA can interfere with its own metabolism (breakdown within the body), causing potentially harmful levels to build up in the body if it is taken repeatedly within short periods of time.

Compounding the risks is the fact that ecstasy tablets and even capsules of supposedly pure "Molly" sometimes actually contain other drugs instead or in addition. Those may include ephedrine (a stimulant), dextromethorphan (a cough suppressant), ketamine, caffeine, cocaine, methamphetamine, or even, most recently, synthetic cathinones (the psychoactive ingredients in "bath salts"). These substances are harmful alone and may be particularly dangerous mixed with MDMA. Users who intentionally or unknowingly combine such a mixture with additional substances such as marijuana and alcohol may be putting themselves at even higher risk for adverse health effects.

Additionally, the closeness-promoting effects of MDMA and its use in sexually charged contexts (and especially in combination with sildenafil) may encourage unsafe sex, which is a risk factor for contracting or spreading HIV and hepatitis.

Does MDMA Have Therapeutic Value?

MDMA was first used in the 1970s, not as a recreational drug but as an aid in psychotherapy—although without the support of clinical trial research or FDA approval. In 1985, the Drug Enforcement Administration labeled MDMA a Schedule I substance, or a drug with high abuse potential and no recognized medicinal use. Some researchers remain interested in its potential therapeutic value when administered under carefully monitored conditions. It is currently in clinical trials as a possible pharmacotherapy aid to treat post-traumatic stress disorder (PTSD) and anxiety in terminal cancer patients.

Learn More

For more information on MDMA, visit:

www.drugabuse.gov/publications/research-reports/mdma-ecstasy-abuse/letter-director