IS MDMA NEUROTOXIC?

WHAT IS MDMA?
- 3,4-methylenedioxymethamphetamine
- Stimulant and Psychedelic
- Produces energizing effects and distortions in time and perception
- Dosage: 60-120 mg lasts 3-6 hours

WHAT DOES IT DO?
- It causes serotonin neurons to release large amounts of serotonin at once, causing a euphoria.
- It is absorbed quickly, but interferes with body’s ability to metabolize it, giving it long lasting effects.

HISTORY OF MDMA
- Developed in the early 1900s by Merck
- Created to help dissolve blood clots
- Used as psychotrapeutic tool in 1970s in US and became available on the streets in the early 80s
- Deemed illegal in the US in 1985
- Started being used for clinical trials in 2000 for PSTD

IS IT NEUROTOXIC?
- No definite answer. So far all we know is the effects on animals.
- There is no doubt that it is toxic at some point, but the exact amount is unknown.
- Moderate to high levels have been proven to be toxic to neurons.
- Doses as low as 1.28 mg/kg have been shown to reduce SERT proteins, however they often reappeared after several months of not using the drug.
  - Due to either surviving axons growing, or a change in response to drug exposure
- Current and previous users show worse mental health than non-drug users, but it is no more significant than any other drug users

RECREATIONAL USE
- MDMA is typically used in social scenarios such as bars, clubs, and music festivals.
- Due to the fact that MDMA is illegal many of the drugs that are branded as such like Molly and ecstasy have other drugs laced into them.
- More than 450,000 users have been estimated in the US in the past month
- Between 1-5% of people abuse this drug in almost every demographic

EFFECTS ON THE BRAIN
- MDMA alters the activity of chemical messengers, enabling nerve cells to communicate
- Causes increased levels of serotonin, dopamine, and norepinephrine activity.
  - MDMA releases more serotonin and less dopamine than other stimulant drugs, causing more mood elevations. However, once the effects has worn off, there is a strong depletion of important neurotransmitters, causing negative behavioral effects
  - Short-Term Effects: mental and sensory stimulation and decreased anxiety
  - Long-Term Effects: possible long-lasting confusion, depression, and memory impairment
- *These can be influenced by: gender, dosage, frequency, intensity, age, other drugs, and genetics
- Toxic effects of the 5HT neurons. When too much serotonin is released, the body creates reactive oxygen species to compensate, which damage the cells, destroying the transport mechanism.

CHEMICAL STRUCTURE

SOURCES
1. https://dancesafe.org/drug-information/is-mdma-neurotoxic/

WHAT DOES IT WORK?
- MDMA’s high affinity causes serotonin receptors to pick up MDMA rather than serotonin.
- MDMA is taken into the vesicle by SERTS where it binds to MVETS and is transported within the neuron.
- This causes a large release of serotonin into the synapse and all over the brain, causing a euphoria.

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ABUSE AND ADDICTION
- Addiction: MDMA affects many of the same neurotransmitter systems in the brain that are targeted by other drugs. In lab tests, animals will self-administer MDMA (sign of addiction) but not as much as cocaine. It is known that users admit to continuing administration despite knowledge of physical or psychological harm
- Withdrawal: nausea, chills, muscle cramps, aggression, impulsiveness, loss of appetite, sleep disturbances, blurred vision, fever, dehydration, elevated blood pressure, heart or kidney failure
- There is no current pharmacological treatment for MDMA
- Cogitative behavioral therapy is the best option