



My Brain on Drugs

Anything that goes into your body and alters how it functions can be called a drug. By this definition, nearly everyone, every day, is effected by drugs.

Generally, when we use the word “drug” we are referring to medication or “recreational” drugs like cocaine and marijuana. We probably don’t mean alcohol, caffeine, or nicotine. But each, in its own way, enters the body, interacts with the brain and central nervous system, and temporarily alters how we perceive and act upon our world. Understanding how these drugs effect us can help us navigate our drug-filled world.

Welcome to the Twenty-First Century



How do drugs get to our brain?

Our brain is so important that our body evolved to protect it. The brain and central nervous system are protected by the skull and spinal column.

Even the blood vessels that go to the brain and central nervous system are different from the rest of the body. They are more dense and prevent most harmful things like bacteria and viruses from getting to the brain. Still, drugs have a backdoor entry to the brain—through the “reward pathway.”

The Reward Pathway—Evolution at Work

There are any number of things we must do for ourselves and our species to survive. These include eating, drinking, having sex, and caring for children. Thankfully, each of these things is pleasurable. Otherwise we wouldn’t do them and we would die.

But it’s not just coincidence that the things we need to do are also the things we like to do. In 1954 scientists confirmed that our body has a specialized neural network that makes us feel good when we do things we need to survive. This is the reward pathway.

Natural and designer drugs are all around us. Some are addictive; some are not. Some are good for us; some are not. What do we know about our brain that can help us tell the difference?

Blame It on Dopamine

When we eat something we like, neurons along the reward pathway send a message to the brain that “this is good.” The brain releases a chemical called “dopamine” which carries the pleasure message to the part of brain that stores memories. This allows the brain to remember what feels good so we can do it again. This process is essential for our survival, and it feels good. However, when it comes to drug use, there’s a clear downside to the reward pathway.

Any drug that is addictive significantly increases the production of dopamine. It is dopamine in large amounts that produces the “high” or euphoria that is felt with recreational drugs. Because dopamine gives us pleasure, initial uses of drugs often feel very good. But here’s the problem:

The brain is not used to high doses of dopamine. It seeks to lessen the effects by reducing the number of dopamine receptors along the reward pathway. The result is that, over time, the body responds less and less to the same amount of drugs. To get the same

high, the brain needs more and more of a drug. This is how people become addicted.

What's more, as the brain craves more of a drug, it often becomes less able to get pleasure from normal activities. The brain may focus almost entirely on getting more of the drug. Thinking may become erratic and uncontrolled.

To reverse these cravings, people must go through a period of withdrawal from the drug. Slowly over time dopamine reaches equilibrium and, hopefully, the brain and body go back to normal.

Recreational Drugs and Their Effects on the Brain

The following describe some of the main drugs that are used for pleasure. Not all of them, such as coffee and tea, are dangerous, but many are. Nearly all drugs if used in excess can cause mental, physical, and deadly injury.

Stimulants



Stimulants include coffee, tea, guarana, nicotine (in cigarettes), cocaine, and amphetamines (speed, ecstasy, etc.). These drugs impact the body and mind in different ways. But each increases the production of dopamine. The more intense stimulants can cause euphoria, addiction, brain damage, and death.

Depressants

Ethanol (in the form of alcoholic beverages), barbiturates, and benzodiazepines (Valium, Xanax, Librium) increase the pleasurable effects of dopamine but also slow down the brain and the central nervous system. This is why someone who is drunk may slur his or her speech or not be able to drive a car. It's easy to take too many. Stars like Marilyn Monroe and Jimi Hendrix accidentally overdosed on barbiturates and died.

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Hallucinogens

All hallucinogens alter how the brain perceives the world. They change our senses and may cause hallucinations (fantasy visions). This is part of their appeal.



Psychedelics (LSD) cause sensory overload. Colors, odours, and sounds become intense. Psychedelic "trips" last for hours and can have lasting negative effects on the brain.

Cannabis

Marijuana and hashish are produced from the cannabis sativa plant. THC (tetrahydrocannabinol) is the active chemical that causes the drug's mind-altering effects. The drug interferes with normal activity in the brain and central nervous system. Its effects can be very useful in treating some illnesses by reducing nausea and pain and increasing appetite. However, some studies have shown that use of the drug (particularly in teenagers) increases the chance of mental health problems in the future.

My Brain on Drugs | Key Terms

Dopamine	A neurotransmitter in animals that functions in part to indicate a pleasurable activity to the brain.
Dopamine receptors	These are tiny receptors at the end neurons that promote the release of dopamine in the brain.
erratic	Having no fixed course, wandering, unpredictable.
euphoria	A feeling of extreme well being or elation.
hallucination	A perception of objects that are not real, often arising from a disorder of the nervous system. Often in response to LSD.
Neural Network	The structure of the human brain which allows it to process and retain information. Also used to describe computer networks.
Reward Pathway	A specialized part of the human nervous system that transmits pleasurable activities to the brain and releases dopamine.

Discussion Points

1. Our brains have evolved to reward us for doing things we need to do to survive. It's easy to see why eating, drinking and having sex is important. But why do you think caring for infants is also rewarded with a boost in dopamine?
2. Other than stimulants like coffee and tea, most drugs have been shown to have potentially negative side-effects. The so-called recreational drugs often lead to addiction and physical and mental damage. This information is widely known. Why then do you think so many people still use dangerous drugs?
3. Do you think society's drug laws are fair and right? How would you improve them and why?

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