

Effects of Cocaine On the Brain

Coca leaves have been in use by native tribes in South America for thousands of years before the sacred plant was transformed into the drug we know today, cocaine. Warriors used it to remain alert on watch. Shamans used it for more spiritual purposes, while others used it as simply a harmless pass time. The alkaloid for cocaine was first separated in 1855. If only they knew what they had truly discovered. Cocaine would soon become a cure-all for any ailment before quickly becoming banished to the underworld of drugs and crime. While many people in society are quick to dismiss it as an addicting party drug, very few have taken the time to truly understand how this drug functions.

What must first be understood is that illicit drugs, such as cocaine, do not create unique effects. Illicit drugs simply mimic or block the mechanisms of specific neurotransmitters already found in the brain. Cocaine potentiates the effects of dopamine, norepinephrine, and serotonin (Julien, 2008). It does so by blocking the reuptake of the neurotransmitters so they continue to remain in the synapse and prolong their effects. As of lately, Dopamine, a neurotransmitter linked with pleasure, has been the focus of much research (Ratey, 2001).

Research has found that there is a dopaminergic pathway consisting of the ventral tegmentum, nucleus accumbens, and frontal cortex, with the nucleus accumbens being the most important. Cocaine and other amphetamines activate this pathway and therefore increase the levels of dopamine. It also has been discovered

that this pathway is related to our reward system, which in turn is a necessary component for someone to become an addict (Julien, 2008).

There have been studies done to observe what specific effects cocaine has on the brain's reward system. In an experiment done in 2011 involving rats, it was observed that cocaine affects the sensitivity of neurons to delay of reward and reward size. The rats were more likely to choose the quicker reward (one drop of water two seconds after the lever was pressed) even though there was a larger reward but it involved patience (two drops of water, but more than two seconds after the lever was pressed). This change in the reward system adds to cocaine's addictiveness and seems to be the reason for sustained addiction to the drug (Zuo, 2011).

The effects of increasing the levels of dopamine have been compared to similar effects felt after engaging in high-risk behaviors, such as biking quickly on a narrow ridge. When engaged in these types of activities your body needs to be able to focus and pay attention for long periods of time, and increasing dopamine levels enables us to do so (Ratey, 2001). Other effects on the body include increased heart rate, increased oxygen and glucose levels in the blood and dilated pupils. Effects on the mind include increased attentiveness and energy, a better mood, almost euphoric, as well as reduced fatigue and appetite (Julien, 2008).

As with most psychostimulants, however, there are negative side effects with prolonged exposure and increased doses. More common side effects include irritability, insomnia and anxiety. As usage increases these negative effects become more intense. With much higher doses, cocaine can produce toxic and almost

psychotic side effects including paranoia, impulsive actions and compulsive, repetitive behavior (Julien, 2008).

Some people must wonder why others would choose to take this drug when they know full well of these dangerous side effects. There has been an observation made that monkeys readily learn to inject themselves with morphine and other highly addictive drugs. Ciaran Regan, in the book *Intoxicating Minds: How Drugs Work*, hypothesized that this is so because drug use is a normal behavior for humans, but society has deemed it uncouth and has restrained the behavior. And because of society's damnation, misconceptions and myths have flooded the public's perception of these so-called 'illicit' drugs. But hopefully, with continued research to fully understand these psychostimulants and their effects on the brain and body, people will become more informed and be able to come to their own conclusions and opinions about these substances that have continued to remain in our lives for thousands of years.

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