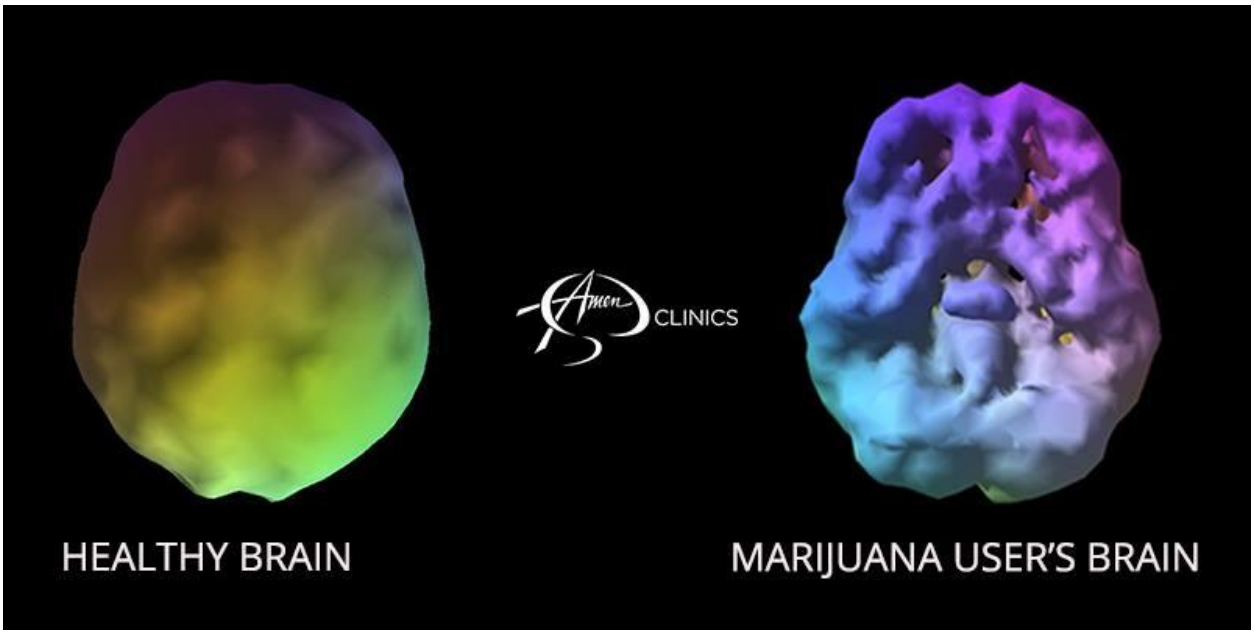
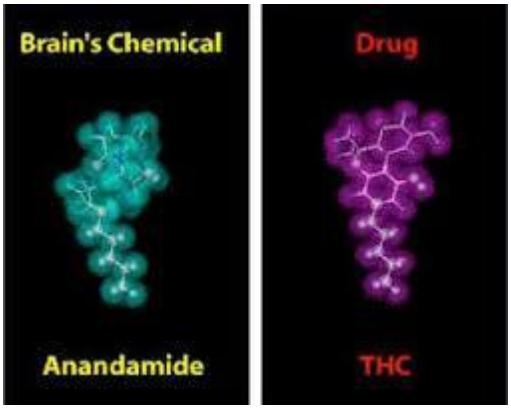
Daily Life with Christ-74: Understanding brain addictions (13). Psychoactive drugs: how marijuana changes the brain.





This series is part of a New Year's Special. The emphasis in this study is on the physical side of addictions that make is so difficult to keep one's New Year's Resolution. In brain addictions, the chemistry of the brain physically changes, making it doubly difficult to free oneself from compulsive cravings along with the inhibition of the prefrontal cortex (for illustration of the three parts of the brain involved in addictions, see Daily Life in Christ-59).

As previously noted, the goal of this study is to help believers understand and thus live robust and thriving life as full human beings in the image of God, which is the essence of true freedom. The power of physically based addictions can be illustrated by the fact that even believers who love the Lord and are indwelt and filled by the Holy Spirit can still suffer from intense cravings

and even addictions due to physical changes in the brain. We are hylomorphic beings, which means that we are both physical and spiritual, what affects one affects the other.

We now examine the psychoactive drug marijuana, also known as "Maryjane." It is no surprise that there is great controversy regarding this drug. Some people see marijuana as a dangerous, addictive drug; and they often think of medical marijuana as a loophole that drug dealers and addicts use to skirt the law. Other people see marijuana as relatively harmless drug that has beneficial properties that could help patients suffering from a number of illnesses. Unfortunately, the "evidence" cited by those who unhesitatingly use and support marijuana is anecdotal or driven by other interests. The comments, "it is no worse than alcohol" . . . "my friend smokes weed all of the time and nothing happened to him" reflect the common problematic attitudes. This study focuses on the hard brain science behind marijuana addiction—how marijuana changes the brain and how this can lead to an abnormal addictive brain, a damaged brain.

Marijuana comes from the hemp plant, Cannabis sativa. This plant has a wide range of uses like making clothing, rope, and canvas. Hemp has been cultivated for thousands of years all over the world. Marijuana, hashish, and hash oil are all derived from hemp. All three forms are usually smoked and inhaled, although they are also sometimes eaten, for example, in baked cookies.

What all forms of cannabis have in common is that they contain chemicals called cannabinoids. When these chemicals enter the bloodstream, and get to the brain, they produce psychological and behavioral effects. The active chemical in the cannabinoid is known as THC. As we have noted in the study of other brain addictions, chemicals in the drug bind to different receptors in the brain. There are two major types of cannabinoid receptors in the body: CB1 and CB2. The CB2 receptors play an important role in the immune system and are not thought to be involved in the psychological effects produced by marijuana. The CB1 receptors in the brain underlie those effects.

This means that there are natural cannabinoid receptors in the brain. In other words, cannabinoids are produced in the brain. Those produced in the brain are called endogenous cannabinoids. These are different from exogenous cannabinoids, which come from outside of the body. The cannabinoid that is made in the body is called anandamide while the exogenous cannabinoid is called THC, the latter comes specifically from cannabis.

Anandamide, the endogenous cannabinoid, helps regulate the brain. It prevents too much excitement as well as too much inhibition. There is also evidence that this chemical plays a role in helping us forget things we need to forget. It is because cannabinoids are critical in unlearning fear that exogenous cannabinoids have been helpful for those suffering from PTSD. This also explains why marijuana users often report memory problems.

Other medical benefits from exogenous cannabinoids have included relief from pain, increasing appetite for those who seriously ill, and treatment for chemotherapy-induced nausea and AIDS. However, there are very effective alternative drugs that can treat the same symptoms without the psychoactive effects of cannabinoids.

Natural cannabinoid receptors are all over the brain. They are found in areas involved in motor control and in areas that process fear and anxiety. They are also found in the VTA dopamine reward system. The fact that these receptors are found in so many places explains why cannabinoids like THC have such a broad range of effects. Many marijuana users report a feeling of euphoria and exhilaration as well as lowered inhibitions. Users also often report feeling relaxed and calm, and many experience enhanced visual and auditory perception. Some people also report a sense that time is slowing down substantially.

At higher doses, marijuana produces less-pleasant symptoms, such as disorganized thoughts and feelings of paranoia and anxiety. Higher doses are also associated with impaired judgment and agitation. However, there are no reported cases of death as a result of marijuana overdose.

As far as abuse and addiction, it should be noted that marijuana is the most widely used illegal drug in the world. More than 17 million Americans use marijuana in a typical month, and there are more than 3 million daily users. Marijuana is moderately addictive; about 9% of those who tried marijuana at lease once become addicted.

Marijuana operates like many of the more dangerous drugs in that it leads to firing of dopamine neurons in the VTA. Chronic users also experience withdrawal symptoms, including craving, irritability, anxiety, depression, and reduced appetite.

Other negative behavioral consequences on marijuana users have typically included lower grades and thus more likely to drop out of school, and what is known as the amotivational syndrome. Chronic users tend to be more apathetic or aimless than nonusers, and are generally less productive. There is also evidence that marijuana is a gateway to other drugs for some individuals.

There are also negative health consequences like bronchitis and possible lung cancer due to the fact that marijuana has higher concentrations of some carcinogens than cigarettes. However, it is generally recognized that marijuana does not have as many bad effects as alcohol and cigarettes.

Recent studies using PET imaging demonstrate the release of dopamine in the striatum, a region of the brain that is involved in working memory, impulsive behavior, and attention, results showed that heavy marijuana use has similar dopamine releasing behaviors as cocaine and heroin. Several studies in chronic cannabis users show structural changes to the hippocampus persist, even after six months of abstinence.

U.S. Surgeon General Dr. Vivek Murthy has already warned that we're too quick to legalize the popular drug when research still hasn't shown whether or not it's truly safe. Just published in the most recent Journal of Alzheimer's Disease, the research finds that, after studying imaging of 1,000 cannabis users' brains, there were signs of noticeable deficiencies of blood flow. The study, which included 25,168 non-cannabis users, and 100 healthy controls, shows a scary and obvious difference in blood flow levels for those that used cannabis. Additionally, those that used marijuana showed a significant lack of blood flow in the right hippocampus, the area of the brain that helps with memory formation. This part of the brain is severely affected with those that suffer from Alzheimer's disease.

Again, scientific research has proven that marijuana users have lower cerebral blood flow than non-users. The most predictive region separating these two groups is low blood flow in the hippocampus on concentration brain SPECT imaging. This work suggests that marijuana use has damaging influences in the brain – particularly regions important in memory and learning and known to be affected by Alzheimer's.

The media has given a general impression that marijuana is a safe recreational drug, recent research in brain imaging directly challenges that notion. What cannot be denied is that marijuana (THC) most assuredly changes the structure of the brain. Brain changes/damage and memory loss may be worth the price for those who suffer from PTSD because it helps them lose haunting memories. But recreational use simply for a temporary euphoria, the experience of a buzz, from THC is certainly not worth the risks of damaging one's brain. And no one can rationally deny that there are serious risks of THC on the brain, and the brain always affects the mind—and the mind is the only means whereby we as human beings can freely live and thrive in awareness of the wonderful gift of life and creation with all of the gifts of therein, preeminently among them is living in the blessedness of loving God with all of our MINDS. We do not need to dope up and damage our brains with THC just to enjoy the wonderful gift of life.

Enjoying the Abundant Life in Christ,

Pastor Don