

and responding to rewarding activities and experiences. Basically, if we like something, this part of the brain helps us to remember that, and provides the ability to do it again. It is a subconscious area of the brain, characterized primarily by behavioral responses designed to keep us alive. Survival itself, then, is the ultimate function of the reward center. It is also where all drugs of abuse, including marijuana, play their primary role in addiction. The frontal cortex is where we recognize problems, plan out solutions and make decisions.

Once one crosses the line into addiction the brain is altered in dramatic fashion. Reward center function diminishes during regular use of marijuana, so those activities and experiences one normally finds enjoyable and beneficial are no longer as important. The reward center now recognizes the continued use of marijuana as the priority, even more important than these other rewarding behaviors and drives, including survival. Other interests and activities diminish while a user becomes increasingly focused on marijuana. No conscious decisions are made resulting in these changes, they tend to just happen, but a user will certainly have reasons and justifications for them, and it becomes harder and harder to imagine going without marijuana.

Another change to the brain during active addiction is related to negative feelings users begin to have when marijuana is not being used for a period of time. These negative feelings grow and in some ways take over, until marijuana is used. Unfortunately, in later stages of addiction people don't really get high anymore. They are basically using to feel normal. The reward system has adjusted to long-term use by limiting its activity, thus they do not have the same strong responses to pleasure and drugs as in the past.

Regular, long-term use also results in activation of internal stress systems which try to keep brain function normal. These stress systems cause adverse feelings such as anxiety and dysphoria resulting in a fairly negative emotional state which is felt during withdrawal. This negative emotional state becomes much longer lasting and is relieved only by a return to use

of marijuana or other drugs, unless the addict stops using altogether and for a substantial period of time, allowing the entire system to return to normal function.

The third stage of addiction is related to craving. The frontal cortex, where we think things through, plan things out, and alter our behavior to meet our own needs, is the primary part of the brain that is altered.

Craving can be described as preoccupation and anticipation of marijuana use. When those without addiction run into a minor problem due to their use (such as missing school or work due to tiredness after overusing one night), they think through what happened and determine what they want to change, and carry it out. In such a case, the individual may decide never to use as much so late into the evening. And they are likely never to do it again. However, someone addicted to marijuana may notice the same problem, and may consider a plan, but is very unlikely to carry out a reduction in use or an alteration of behavior over the long run. This is partially due to the altered function of the frontal cortex and an inability to fully recognize and carry out such a plan, especially when it means limiting use of something that has become such a priority.

As a result of addiction, the frontal lobes are no longer functioning at full capacity, limiting recognition of the problem and undermining any plans to fix it.

The description in the example above is not fact, but it is our current theoretical understanding of how addiction differs from casual drug use, and how the brain is changed by addiction. Addiction alters brain function, and perpetuates itself, becoming the primary focus of one's life. Unfortunately, the part of the brain that identifies and helps people deal with problems is also affected by the addiction and the addict can't see the problem for what it is, nor plan an effective way out of it. This is compounded by feeling rotten whenever the marijuana addict is not intoxicated.

Some people will wonder how a spiritual program can be effective for a chronic disease

of the brain. The reward center is involved in all rewarding activities. It is there that recognition of differences in rewarding and pleasurable activities are noted and stored in memory. Highly rewarding experiences are prioritized and our memory of them ensures they are repeated.

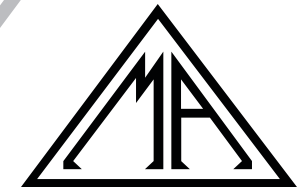
Brain scanning studies have revealed that the experience of love as well as spiritual practices are recognized as rewarding. After a marijuana addict has stopped using, and brain function starts to return to normal, love and spirituality can be powerfully rewarding.

MA meetings and the fellowship of other Marijuana Anonymous members provide the experience of loving kindness on a regular basis. In addition, the foundation of the MA program is spiritual. The personal care and loving attention expressed by others, and the spiritual practice embodied in the recommended Twelve Steps of the program, directly and positively affect the reward center, the part of the brain that has been primarily altered by addiction. This spiritual program of action provides the necessary healing to allow an addict to attain a new life in recovery from marijuana addiction: a life with hope.

If you find aspects of your experience in this writing, you may be a marijuana addict, and may benefit from the MA program.

Marijuana Anonymous does not endorse the author of this content and the MA Traditions regarding anonymity do not apply to him. His name, title and current employer are provided so that readers have the information needed to independently evaluate the doctor's credentials. The medical opinion presented is based on the doctor's research and clinical experience as of 2015 and should not be construed as the last word on the subject of marijuana addiction. Marijuana Anonymous is not affiliated in any way with any foundation, institution or other organization, and has no opinion on outside issues.

A Doctor's Opinion about Marijuana Addiction



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A Doctor's Opinion about Marijuana Addiction

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I hope that this brief writing may provide those who are seeking help a general understanding of the disease of addiction, and some specific aspects of marijuana addiction.

Many people say that marijuana is not addicting, but this is simply not accurate. People do become addicted to marijuana, just as they do to alcohol, opioids and stimulants. Marijuana addiction differs from these other types of addictions primarily by the outward or social manifestations, but internally, the same pain and anguish exist.

Marijuana addiction is much less socially visible than alcoholism or heroin addiction, in which one can easily witness problems such as driving under the influence or development of serious infections like HIV or hepatitis. The other drugs tend to cause more obvious problems when addiction takes hold.

Studies show that about 9% of those who use marijuana become addicted to it. The unfortunate truth is that the lack of serious, early consequences to marijuana addiction allow for a long, slow decline, often without recognition, resulting in later-stage addiction before the problem is confronted. An individual may wake up years into this chronic illness, without a reasonable understanding of how their life got so far off track. Often one has no major medical or legal problems, no sudden tragedy that drives the search for an answer. However, isolation from friends and family, loss of interest and lack of participation in those activities that used to bring joy, and the crushing weight of missed opportunities add up. If this is where you find yourself, you are reading the right book [*Life with Hope*, 3rd Ed.].

Addiction, like many other diseases, has both environmental and genetic risk factors. The main risk factor for addiction, accounting for

a bit over half of the risk, is in our genes. If you have addiction in your family, especially the immediate family, you are remarkably more likely to develop this disease. It does not matter if the others in the family are addicted to alcohol or cocaine, the risk of addiction to any substance increases with any addiction in the family.

There is no single gene for addiction and we do not currently have genetic testing that identifies those at high risk. It appears that a few hundred genes may be involved, complicating the development of such a test. Some people have strong genetic risk factors and others weak; this is where the environmental risk factors come into play. If you have strong genetic risk, exposure to marijuana may by itself be enough to result in addiction. If one of your parents has addiction, you are at least six times as likely as those without addiction in the family to develop addiction. If you have weak genetic risk, it may require significant environmental insults to tip the balance so that you become addicted.

Environmental factors that increase risk of addiction include early-onset use of a drug, especially in the early teenage years. Research has shown that early use correlates with increased likelihood of addiction later in life. Psychiatric disorders increase the risk of addiction. Sexual, emotional and/or physical trauma increase the risk of addiction. Stress itself is a risk factor for addiction and has been found to contribute to relapse.

The use of marijuana often includes a quasi-scientific understanding of this drug, which is regularly described as a safe and harmless “herb” with no side effects and certainly no risk of addiction. Some people succumb to this notion without formal questioning.

In the past, research has been hindered and a fair amount of misinformation about marijuana has been disseminated. Scientifically-defensible data about the true risks of regular marijuana use are more readily accessible today.

This is not a new *Reefer Madness*. It is essential information for an accurate understanding of

some of the risks associated with any drug that one has overused.

Most people can use marijuana without becoming addicted, and most who use occasionally will not suffer harmful effects. Still it is important to know the risks, especially considering the new forms and tremendously high levels of THC available to users. The higher the potency of the drug consumed, the higher the likelihood of addiction, and the higher the likelihood of adverse side effects. It is also important to recognize that marijuana has several hundred ingredients, many of which we know very little about. With new research, more information will be coming to help us understand both the good and bad effects of marijuana in all of its forms.

Research on regular users of marijuana has shown that certain brain regions are vulnerable and at risk for impairment. One of the primary findings has been an association between frequent use of marijuana during adolescence and into adulthood, with declines in IQ scores. There is clear evidence of impaired cognitive function during marijuana use and for several days following use, which undermines the ability to learn. School performance suffers when marijuana is used regularly, and regular users are more likely to drop out. The research is suggestive of long-term cognitive impairment, though additional research is needed to help determine if this is the case.

There is a link between marijuana use and psychosis, especially for those with a family history of psychosis. Marijuana use can also worsen the symptoms of those with schizophrenia. There are concerns about regular marijuana use and cancer, but no frank correlation is described at this time. Correlations with other lung diseases are also being studied. There is clear evidence that immediate exposure to marijuana and long-term use impair driving. The impairment is different than that experienced with alcohol, but there is a direct correlation between blood THC concentration and impaired driving performance.

Scientists have discovered an internal cannabinoid system that includes receptors that respond to THC-like substances that we all produce naturally. This system is essential to cell function in the brain and other areas of the body. These cannabinoid receptors are in our brains for a reason, and THC overrides their normal capacity, contributing to the intoxicating experience of marijuana. The effects and side effects of marijuana are directly linked to this system.

Throughout my 27-year career working in addiction medicine, I have seen dramatic changes in our understanding of addiction; it is now defined as a chronic brain disease. This was certainly not the case when the original Twelve Steps were written in 1939, but even then it was referred to as a disease. Nor was addiction as a brain disease widely recognized when the MA text was first published in 1995. In fact, it is still not common knowledge, and some people continue to argue that addiction is not a disease—but if you are reading this book [*Life with Hope*, 3rd Ed.], it is essential that you have a solid understanding of the problem you are facing, just as with any other disease.

Addiction research has developed since the 1950s and accelerated dramatically over the past 30 years. This research reveals a complex illness. It is often referred to as a bio-psycho-social-spiritual disease because its manifestations undermine all of these aspects of life. We now have a good understanding of the underlying brain pathology that results in addiction.

Casual or social marijuana use is not addiction. Addiction manifests in a compulsion to seek and take the drug, loss of control over limiting intake of the drug, diminished recognition of significant problems, emergence of a negative emotional state, craving, chronicity and relapse. You can witness these features in the stories found in this book [*Life with Hope*, 3rd Ed.].

Many parts of the brain are critical to addiction, but the two main parts involved are the reward center and the frontal cortex. The reward center of the brain is involved in recognizing