

# **The Implications of Cannabis Legalization on Measuring and Interpreting Impairment Thresholds**

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## **Introduction**

Thirty-nine states have legalized the regulated use of medicinal cannabis for treatment of various conditions. More recently, states have expanded these policies to include the legalization of adult recreational use: 21 states to date including the State of New Jersey. Despite the legalization of medicinal and/or recreational cannabis in most states, it remains a Schedule 1 controlled substance under the Federal Controlled Substances Act (CSA) creating a disconnect between state and federal law. Moreover, our understanding of the consequences of these laws remains inconclusive at best. In this brief, we will address the barriers of measuring cannabis impairment and its implications for establishing legal thresholds.

## **Impairment Thresholds**

One of the hurdles of cannabis legalization is the ability of police agencies and policymakers to establish an impairment threshold. The question that many may ask is: Why is cannabis different from alcohol? With alcohol, we have legally definitive thresholds and the mechanics to measure impairment (e.g., breathalyzers). Alcohol, however, is more water soluble than cannabis and therefore spends much of its time in the body and blood which makes impairment levels more accurate and easier to measure. Cannabis is unlike any other type of drug, making quantification of impairment extremely hard to establish. Cannabis, specifically the psychoactive portion of the drug, delta 9 Tetrahydrocannabinol (commonly known as THC), is more fatty soluble, meaning that it metabolizes much differently. THC is quickly pulled from the bloodstream depositing in fatty tissue throughout the body, settling mainly in the brain (approximately 60% of brain matter consists of fat) making a true level of impairment difficult, if not impossible, to obtain. By way of example, after the first hour of smoking cannabis, approximately 90% of the THC leaves the blood and attaches to the fat cells in the brain. This is where the peak level of impairment is reached but is not likely to correlate with blood levels.

While there are more than 100 cannabinoids in the plant, cannabidiol (CBD) and THC are the most common cannabinoids in the cannabis flower. Delta 9 THC is the primary psychoactive compound that binds with cannabinoid receptors in our brain. This signals the release of dopamine, also referred to as the “feel good” hormone, at higher-than-normal levels into the body producing the feeling of euphoria or of being “high”. CBD, on the other hand, while used to treat conditions such as pain and inflammation, is believed to be non-intoxicating or psychoactive; however, more studies are needed to confirm this conclusion. Thus, the focus when we consider flower cannabis impairment is on the delta 9 THC component.

With levels and peaks of impairment differing for myriad reasons such as tolerance and method of use as will be discussed below, cannabis legalization also raises concerns about increased incidents of driving while impaired, particularly as we have no objective definition or measurement of impairment. In 2012, when Colorado along with the state of Washington were first to legalize recreational cannabis, we had no studies or statistics to know whether legalization would change the landscape for driving while intoxicated (DWIs) or motor vehicle accidents. Colorado's Department of Transportation (DOT), however, put forth a public education campaign, *Drugged Driving/Uncomfortable High*, to increase awareness about driving "high". This campaign signaled its concerns on the need to educate the public on the effects of cannabis ingestion, impairment and driving. As more states moved to legalize cannabis, research on the effects of legalization and DWI expanded; yet our understanding remains limited. The dearth of research is largely due to cannabis still being a federally controlled substance, thereby limiting the amount of THC that can be used in human subject research. Therefore, simulated driving studies are hampered by their inability to use current and legal THC levels and strains. The importance of this limitation cannot be overstated.

Despite the lack of objective scientific methods for measuring impairment, some states followed Colorado's lead by using an impairment threshold of 5 ng/mL in blood concentrations. A nanogram is how many parts of THC are in the blood. Studies, however, have shown that physical and cognitive impairment starts at a much lower level due to the fast metabolism rate of delta 9 THC. On the other hand, medical marijuana patients will have more than 5ng/mL in their blood due to their prescribed dosage but may not show any form of impairment because they have built a natural tolerance due to the pharmaceutical levels and repeated use.

### **Barriers to DWI Detection**

When drivers ingest any form of cannabis prior to operating a motor vehicle they pose a direct risk in operating that vehicle safely. Cannabis can affect everyone differently depending on the type, THC level, body composition and tolerance. When comparing cannabis to alcohol, alcohol level of impairment can be measured starting at .05 blood alcohol concentrate. Because, as noted above, alcohol is more water soluble and remains in the bloodstream for much longer than cannabis, we can get a more accurate measure. Cannabis does not have a true number or impairment level due to its fast metabolism rate of THC to the brain. Variation in the THC level, strain or type of cannabis (e.g., oil, synthetics, flower) would determine how long and fast a person experiences the impairing effects. Other factors include how much body fat a person has. Since THC is fat-soluble, it binds with the fat molecules and can stay in the system

much longer in those with higher levels of body fat. In addition to body fat, another factor that hinders impairment measures is tolerance. A first-time user will feel the euphoria “high” faster and more intensely than the everyday heavy user. The reason is that the brain adapts to the large amounts of THC cannabinoids from the drug resulting in the reduction of the natural production of its own endocannabinoid neurotransmitters. This is what was described above with medical cannabis patients who are “prescribed” daily pharmaceutical levels of cannabis. Thus, medicinal cannabis users or heavy everyday users are less likely to display noticeable signs of impairment due to their level of tolerance.

Further muddying the waters, cannabis presents in various forms including the flower, oils, edibles and synthetics. These are important to distinguish as their presentations will differ. A person who smokes cannabis would feel the effects immediately while someone who ingests an edible may not feel the full effect until an hour or two after initial consumption. The “high” with cannabis edibles is also more intense due to the body breaking it down to Delta 11-OH-THC, which is a stronger compound. The noted differences in the effect over time are due to the way in which the human body processes the edible and breaks down the drug in the stomach and intestines. As one might expect, whether it is the immediacy of the “high” through smoking or the delayed “high” of an edible, both create a hazard when someone decides to operate a motor vehicle and difficulties for police in detecting and measuring cannabis use/impairment.

As a person smokes cannabis, the “high” peaks after each puff or inhalation; this is when the THC levels spike in the blood. Once the person stops smoking, the body immediately begins to remove the TCH from the bloodstream to the fatty tissue, primarily the brain as noted above. Thus, if a person is involved in a motor vehicle stop or accident and stops smoking, the THC immediately starts leaving the bloodstream. Despite the time sensitive nature of assessing THC levels in the blood, police are required to obtain a warrant for blood tests. Therefore, this is not a viable option as an impairment measure. Even if a person’s saliva (oral test), blood or urine samples are obtained, the results only confirm usage, not impairment. While the signs of intoxication may be visible when the police are first on the scene, it changes in a relatively short time and becomes more cognitive impairment and less visible impairment. In some cases, officers may request the assistance of a Drug Recognition Expert (DRE); however, in doing so there is an even greater delay in assessing impairment, which means that THC continues to leave the bloodstream. DREs conduct a twelve-step process that measures both physical and clinical impairment. The impairments a DRE may observe are more cognitive and mental including eyelid tremors, body tremors, increased pulse and blood pressure, dilated pupils, short term memory, and difficulty processing multi-tasks or questions. Although DREs are trained experts and a means of

helping to establish impairment, they have yet to be fully embraced by the courts. Furthering confounding the use of DREs is that toxicology results are not quantified to corroborate the DREs' findings due to the difference in time periods.

Yet another barrier is the mixture of cannabis with alcohol. The combination is now the top cause of fatality crashes in New Jersey. In 2021, 697 people were killed in 667 motor vehicle crashes. The contributing factor in 210 of those crashes was the combination of cannabis and alcohol. That is a 30% increase from only one year prior. In a recent study conducted by Columbia University Mailman School of Public Health, researchers found two in five drivers who reported using cannabis and/or alcohol in the past year drove impaired either by alcohol, cannabis or the combination of the two. Among these drivers, 42% were arrested for DWI (8% were alcohol, 20% were cannabis and 14% were a combination of both alcohol and cannabis). Alcohol and cannabis are the two most common substances used together in DWI and motor vehicle crashes. Current studies are showing when used together, the alcohol is metabolized more slowly, causing the person to be impaired for a longer period of time.

## **Research Limitations and Conclusion**

Research examining the correlation between cannabis and impaired driving has yielded mixed results. What we do know is that the statistics suggest there has been an increase in the use of cannabis among juveniles and adults and that more cannabis users are driving impaired whether using cannabis alone or in combination with alcohol. What we don't know is if cannabis related motor vehicle crashes and fatal accidents have increased, which is due to the limitations in assessing, defining, and measuring impairment. These factors skew our research and therefore limit our understanding of this important issue. Moreover, toxicology samples are not always obtained from a motor vehicle crash or fatality. When they are, determining the time of ingestion is predicated on the truthfulness of the driver.

Because cannabis is federally regulated, there are very few validated studies to prove how the various forms and strains of cannabis affect the human brain and body. When a person ingests an alcoholic beverage, we can determine how much and how impaired the person is; this does not hold true with cannabis. We can't determine how much cannabis a person consumed and if that quantity is too much to safely operate a motor vehicle. Moreover, federally funded schools and laboratories are limited in their ability to conduct research on THC levels that are legally and readily available for use. Federal law restricts human subject research to 3% to 5% THC; yet the highest THC strain is a concentration of 34%. Since the late 1960s, the federal government has mandated that all marijuana used in research has to come through the federal government at 2% to 5%

delta 9 TCH. Even at those low levels, impairment has been reported in simulated studies.

Although we see an increasing number of states legalizing the use of adult recreational cannabis, our ability to objectively measure impairment by scientifically proven methodology is still trailing far behind. Despite efforts by states such as Colorado and California to introduce various thresholds (i.e., 5 ng/mL) and means of measurement (e.g., saliva), as well as ongoing attempts to create a scientific device to accurately measure cannabis impairment, these measures are criticized for concerns of accuracy and open for legal challenges. Perhaps with the ongoing legalization of cannabis at the state level, research will continue to move forward despite federally restrictive limitations, and we will be able to find answers to this very important question.

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