

Dose of Education Series:

CANNABIS AND TRAUMATIC BRAIN INJURIES



Overview of TBI/CTE:

In the United States, traumatic brain injuries (TBI's) account for about 30% of all injury-related deaths. TBI's can be caused by bumps, blows, and jolts to the head, disrupting the normal functioning of the brain. TBI's can have long-lasting and in many cases, devastating effects. Mild TBI's are indicated by a brief change in mental status or consciousness while severe TBI's are indicated by an extended period of unconsciousness or memory loss. In 2013, there were about 2.8 million TBI-related emergency visits and hospitalizations in the U.S., and 50,000 of those resulted in death. Falls are the leading cause of TBI's and disproportionately affect the youth and elderly. Symptoms of TBI's include impaired thinking, memory, movement, sensation, and emotional functioning.¹ Repeated TBI's can result in chronic traumatic encephalopathy (CTE) which has been linked to military personnel, boxers, and football players. CTE results in a progressive decline of memory and cognition, as well as depression, suicidal behavior, poor impulse control, aggressiveness, parkinsonism, and, eventually, dementia.²

Cannabis and TBI/CTE:

Cannabis may possess a unique ability to protect the brain against TBI's and the development of CTE. In a 2013 study published in the Journal of Experimental Brain Research, researchers demonstrated that ultra-low doses of THC could protect against the cognitive deficits of a variety of neural insults if applied one to seven days before, or one to three days after the insult. The dose given was 0.002mg/kg which would be 0.136mg for a 150lb individual with effects lasting for seven weeks.* These long-lasting effects indicate a single treatment with an ultra-low dose of THC can modify brain plasticity and induce long-term behavioral and developmental effects in the brain.³ CBD may offer additional benefits when it comes to neuroprotective effects. In a 2007 study published in the Journal of Neuropharmacology, researchers demonstrated CBD was superior to THC in protecting the brain against cerebral ischemia. This was in part due to the fact that no tolerance developed to CBD's promotion of increased blood flow in the brain and it did not lead to desensitizing and down-regulating the CB1 receptors.⁴

**It is also important to note that these studies have not been replicated in humans.*

Cannabis and TBI/CTE Symptoms:

TBI's and the development of CTE can create serious long-lasting symptoms. Such symptoms are often combated with a large list of medications in an attempt to stop them all. The major TBI/CTE related symptoms cannabis may help treat are as follows:

¹ "TBI: Get the Facts | Concussion | Traumatic Brain Injury | CDC Injury Center", 2017

² Stern et al., 2011

³ Fishbein et al., 2012

⁴ Hayakawa et al., 2007

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- 1. Chronic Pain** - Cannabis can improve pain and functional outcomes for patients who experience chronic pain. Patients can also use cannabis to significantly reduce the number of opiates they need to manage their pain levels.
- 2. Sleep Disorders** - Cannabis offers relief for a variety of sleep-related disorders. CBD may be helpful in the treatment of insomnia as well as for REM sleep behavior disorder and excessive daytime sleepiness. THC can decrease the amount of time required to fall asleep, help prevent nightmares, improve sleep among chronic pain patients, and improve sleep apnea.
- 3. Mood Disorders** - Clinical studies have shown altered endocannabinoid signaling in patients who experience mood-related disorders. Several studies indicate that THC may be helpful when pain, anxiety, and depression are present together. Recent studies indicate CBD may hold promise in providing rapid and sustained antidepressant effects in animal models.

When working with patients or loved ones, it is important to consider whether or not a TBI could have been a root cause in their symptoms. Many of these symptoms can be helped by cannabis and the following suggestions may be useful:

1. CBD and ultra-low doses of THC are going to be the best option for aiding in the treatment of TBI's and CTE. Because CBD is not a potent molecule, most patients need 50mg or more to find relief. I recommend starting with 10mg for three days and working up by 10mg per three days until desired relief is achieved.
2. In terms of pain, THC can help provide relief and reduce the use of opiates. Strains high in Myrcene such as Blue Dream may provide better relief and opiate reduction due to Myrcenes ability to relax muscles and provide added pain relief.
3. Higher doses of CBD (160mg+) can be used to help insomnia while small doses (15 mg) can aid in reducing excessive daytime sleepiness. THC should be used intermittently to aid in the time required to fall asleep but long-term can impair sleep quality.
4. For mood disorders, strains high in Limonene are ideal as they synergize with CBD to provide relief from depression and anxiety. Tahoe OG is a great option as it is high in limonene and myrcene.⁸

**We are not doctors and all our information is based on research. References are available upon request.*

-Derek Espinoza, Baked Bros Director of Education

⁵ Haroutounian et al., 2016

⁶ Babson, Sottile & Morabito, 2017

⁷ Huang, Chen & Zhang, 2016

⁸ Sales et al., 2018

⁹ Russo, 2011

¹⁰ Linares et al., 2018