

Chronic traumatic encephalopathy (CTE), a form of tauopathy, is a progressive degenerative disease found in people who have suffered repetitive brain trauma, including sub-concussive hits to the head that do not cause immediate symptoms. CTE has been most commonly found in professional athletes participating in American football, association football, ice hockey, professional wrestling, stunt performing, bull riding, bicycle motocross, rodeo, and other contact sports who have experienced repetitive brain trauma. Individuals with CTE may show symptoms of dementia, such as memory loss, aggression, confusion and depression, which may appear years or many decades after the trauma. In the case of blast injury, a single exposure to a blast and the subsequent violent movement of the head in the blast wind can cause the condition.

Ischemic Cascade of Neuronal Cell Death

Secondary injury of the brain is the damage that occurs seconds, minutes, hours, or even days after the traumatic event and may even be superimposed on a mechanical injury. Because of the primary injury, oxygen and nutrients are not delivered to brain cells. Hypoxia causes dysfunction in normal cellular metabolism, and neurons die. Cellular ion pumps fail, leading to anaerobic metabolism and buildup of lactic acid. Calcium ions flow into the neurons. Glutamate is released and more calcium enters the cells. Excess calcium causes free radicals and excess enzymes damaging cell membranes, mitochondria break down, and cellular death occurs. When cells die, more glutamate is released, more cells in the area are injured, edema increases, and the cascade spreads to undamaged neurons.

CBD stops this process and protects neurons as noted in this document. U.S. patent U.S. Patent 6,630,507 assigned to The United States Of America As Represented By The Department Of Health And Human Services. "Oxidative associated diseases include, without limitation, free radical associated diseases, such as ischemia, ischemic reperfusion injury, inflammatory diseases, systemic lupus erythematosus, myocardial ischemia or infarction, cerebrovascular accidents ..., spinal cord trauma, ...The present invention is believed to be particularly beneficial in the treatment of oxidative associated diseases of the CNS, because of the ability of the cannabinoids to cross the blood brain barrier and exert their antioxidant effects in the brain. ...invention is used for preventing, arresting, or treating neurological damage in Parkinson's disease, Alzheimer's disease and HIV dementia; ... and hypoxic or anoxic neuronal damage that can result from apnea, respiratory arrest or cardiac arrest, and anoxia caused by drowning, brain surgery or trauma (such as concussion or spinal cord shock)."

Suggested dosing is 60mg per day.

- Frequency: My suggestion is CBD two to three times daily. If liquid, put under the tongue or into the mouth. If possible swish throughout the mouth and avoid swallowing as long as possible to maximize the mouth absorption, then swallow. The doses do not all have to be the same. If capsule, just swallow. Best absorption is with fatty food or meal.
- Formulations: Elixinol comes in several forms: Capsules of 15mg, Tincture 100mg CBD in 1oz, Tincture 300 mg CBD in 1oz; Tincture 3600 mg CBD in 4oz; and X Pen, 1000mg CBD in 10 mL tubular oral dispenser. There is no evidence that one is better than the other. The X pen is the most natural product with entourage support. A newer product, Hemp Oil Liposomes 100-300mg in 1oz., is water soluble and may be more potent per mg than the oils and better tasting. Tinctures are highly effective topically using several drops rubbed into the joint or area of pain or trauma.
- Side Effects: rare. occasionally, vivid dreams, fatigue, mild/moderate headache, mild reflux shortly after dose and meal. CBD is not toxic and has no overdose levels. If fatigue, reduce the

preceding single dose and add to another dose such as before bed or add a fourth dose to regimen.

- Interactions: CBD can potentiate or make some drugs stronger in their effect on the body, reduce other medication dose. Suspect one of these medication if any side effects appear. Clobazam is one such medication.
- Nutritional support: omega-3 oils help CBD by stimulating the endogenous cannabinoid system (ECS) in the body. Hemp oils are a healthy source for omega-3, 1T per day. Avoid all processed foods especially sugar. Supplement Vitamin D to keep serum levels above 30ng/mL ideally between 60-100ng/mL. Iodine in the form of kelp. Diet: ketogenic has been effective in this condition. A ketogenic diet consists of very low carbohydrate, high fat, and modest protein, without grains or dairy. It cuts out almost all carbohydrates. There now quality ketone products on the market that appear effective in multiple disorders with or without the ketogenic diet. For more information go to <https://goo.gl/54UHyy>
- Maintenance Dose: Keep adjusting the dose, timing and frequency to meet your particular needs. Many users are able to reduce their CBD dose to 1/4 of their acute dose after 2-3 months.

Other effects of CBD reported:

- significant relief of pain, anxiety, neuropathy
- relaxed and expressive facial muscles
- relaxation of whole body
- improved memory, mental clarity
- improved task orientation and focus
- increase rate of speech
- decreased stomach, intestine cramping
- decreased nausea, improved appetite
- feelings of compassion
- lifting of mood, well being
- improved ability to express positive emotion and feeling
- enhancement of the senses: taste, smell, and vision
- enhanced libido (sexual desire and/or function in adults)
- improved sleep
- skin and hair improvements

Report your results to Johns Hopkins University School of Medicine
<https://www.theroc.us/orr> Please report your experience with CBD, good or bad, to this registry because other doctors need to know.

Other Resources

[Elixinol.com](http://elixinol.com) -for product information or customer services

<https://www.theroc.us/contact> -Call Realm of Caring for Questions about using cannabis for health conditions.

<http://prohealthadvisor.com> -Offers paid continuous clinical coaching for CBD, ketogenic diet, and medical conditions by Dr Blair and a team dietitians.

Telephone Appointment If you would like to have a short conversation confirm a time and day that is most suitable to you.

Disclaimer: CBD is not approved for use as a treatment of any medical condition. This information is based on animal studies as human trials have not been done. My recommendations are suggestions that should be considered with your licensed health care provider as we do not intend to give you medical advice.

Philip Blair MD

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