

PTSD in Veterans: A Spark of Hope

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Many veterans suffer from post-traumatic stress disorder (PTSD), a condition characterized by intense and disturbing thoughts and feelings that last long after a shocking, scary, or dangerous experience has ended. The symptoms of the disorder include: flashbacks or dreams; frightening thoughts; avoidance of feelings, thoughts, places, or events; sleep disorders; and intense anger or other strong feelings. Minor issues can trigger these symptoms, causing the individual to overreact, resulting in disruption of their lives and the lives of those surrounding them. But new studies on the effects of hemp-derived cannabidiol (CBD) offer a spark of hope for those suffering from this condition.

Who Suffers from PTSD – and Why?

Individuals in the military are routinely subjected to traumatic events. Besides the job-related trauma, both male and female veterans are subject to sexual trauma with over half of all veterans with military sexual trauma being men.¹ The U.S. Department of Veterans Affairs estimates that PTSD affects up to 30% of Vietnam War veterans, 12% of Desert Storm veterans, and 20% of veterans of Operation Iraqi Freedom and Operation Enduring Freedom.¹

In spite of this prevalence, many veterans with PTSD avoid getting help, because memories of the associated event(s) are often distorted and associated with feelings of chaos, helplessness, and/or guilt. Overreactions to minor life situations cause these individuals to fear that they will be unable to control future behavior. This is manifested as anxiety, which causes the frequency and severity of symptoms to increase even more. Military training encourages individuals to ignore minor issues and pursue an intended goal. However, this does not work with PTSD. Research has shown that refusing to recognize one's PTSD actually worsens, not lessens, its symptoms and secondary effects.

Understanding PTSD's Effects on the Body

Recent advances in science have allowed us to gain a better understanding of why PTSD takes such a devastating toll on those suffering from it and how to reduce its impact.

To understand PTSD better, animal models have been used, since animals will often exhibit the behavioral characteristic of PTSD in humans. In these animal models, pathological and physiological changes occur in areas of the brain associated with anxiety and memory, areas that are affected in PTSD. These changes include decreasing cannabinoid receptor 1 (CB1), increasing synaptophysin (the main protein of synaptic vesicles), and increasing 5-HT_{1A} (serotonin 1A) receptors, all of which are integral to the human endocannabinoid system (ECS).²

Human patients with PTSD-like emotional and psychological disorders can have mitochondrial dysfunction, which changes neural synaptic plasticity and cellular resilience, resulting in brain atrophy.³ In addition, biosynthetic changes occur in the memory area of the brain over time and repetition, resulting in solidification of the abnormal aspects of the memory (that is, if we tell a lie enough times, we start believing it is the truth).⁴ These physical changes in brain function and structure are the basis for the psychological changes that occur with PTSD. So, the problem with PTSD really is in your head: the way your brain works has changed, and it needs to be fixed, just like any other disease process.

Mixing Memory and Emotions

Understanding how physical changes in the brain cause the psychological symptoms of PTSD requires first understanding how the brain processes and stores memories. A memory is a collection of nerve cells connected in a specific manner in specific areas of the brain. Along

with the events that occur, our memory stores all the sensory information – sounds, sights, smells, touches, and tastes – as well as all the emotions associated with the event; it stores them all together.

Whenever something jogs that memory, all that information is transferred to our consciousness (another area of the brain), and we process it along with any new information. The past memory is then re-stored in permanent memory along with the new information. This process is called memory consolidation. As long as we can control the emotions associated with the memory, we think rationally about the situation and reconsolidate the memory in a logical way. Then, when a similar situation occurs, logic will drive our reaction to it, not our emotions.

Crossed Wires: the Negative Feedback Loop

In PTSD patients, the emotions associated with the traumatic event(s) are very strong – so strong that they override the individual's ability to logically process the events. When current events jog the memory, the tremendous strength of the associated emotions included with this memory drive the individual's reactions, causing him or her to react abnormally, even psychotically. These reactions lead to guilt and shame, resulting in anxiety and fear of "losing control" again. So, the individual learns to fear the memory. These reactions lead to a chronic elevation in adrenaline levels causing both physical stress and increased emotional lability.

Therefore, in PTSD, emotional memory overload, the increased anxiety, adrenal levels, and adverse behaviors all inhibit corrective memory consolidation.⁵ The emotional memory overload allows the brain to store emotionally irrelevant memories with the PTSD memory, further magnifying the emotional memory overload. Since memories drive dreams, individuals with PTSD are plagued by sleep disorders, bizarre emotional dreams, and trauma-associated sleep disorder (dream enactment behavior).⁶ All of these processes result in the emotions becoming stronger during memory reconsolidation, worsening the symptoms of PTSD.

To summarize, PTSD symptoms are caused by and associated with:

- Anxiety
- Learned fear
- Elevated adrenaline levels causing physical stress and psychotic-like reactions
- Emotional memory overload inhibiting logical thinking
- Abnormal memory consolidation
- Abnormal sleep and dreams.

Current medical therapy for PTSD involves medications (to reduce anxiety and control symptoms) and psychotherapy. Examples of psychotherapy are exposure therapy (helping the patient to inhibit learned fear) and cognitive restructuring (helping the patient to reconsolidate the memory in a manner that makes more sense). Of course, all of these therapies have significant limitations. Medications have significant side effects and limited efficacy. Exposure therapy often yields only temporary improvement.⁷ Cognitive restructuring can produce more long-lasting improvement, but it is difficult for individuals to decrease the intensity of the emotional portion of the memory.

Cultivating a More Effective Treatment

CBD, a cannabinoid produced by the hemp plant, has been found to be very helpful in both animal and human studies in reducing the symptoms of PTSD. Research in animal models of PTSD has shown that CBD decreases anxiety and lessens learned fear. In addition, CBD blocks anxiety-induced alterations, so many individuals report fewer and less bizarre dreams.⁸

Most importantly, CBD has been found to facilitate corrective cognitive reconstruction of memories that can improve PTSD symptoms. CBD seems to separate and lessen the emotional aspects of a memory, thereby reducing emotional memory overload and allowing reconsolidation of the memory in a more logical manner.⁹ In addition, when the memory is re-stored in permanent memory, the emotional aspect is reduced, reducing the emotional memory overload burden the next time the memory is transferred to consciousness.

In summary, CBD addresses all of the areas of PTSD listed above. It reduces anxiety, decreases fear expression, reduces physical stress, provides antipsychotic relief, reduces emotional memory overload, and enhances “learned fear” extinction.¹⁰ These effects of CBD permit flexibility in the renewing memories, enable targeting reconsolidation, and allow for change specific learned responses and memories, thereby reducing the maladaptive mental states and behaviors associated with PTSD.¹¹

A Friend and a Threat, Both from the Same Plant

In a study of eleven patients with PTSD who were allowed to self-adjust their dose of CBD, all but one experienced a significant decrease in PTSD symptom severity after just four weeks, and eight of these ten experienced a further decrease in symptoms after another four weeks.¹² In addition, six reported fewer bad nightmares, and four reported better sleep. Four patients continued to receive CBD for at least 36 weeks, and all of them experienced long-term sustained reductions of the symptoms.

Given the strength of this evidence, one might wonder if marijuana may be helpful in the treatment of PTSD. The answer is a resounding **NO!** Tetrahydrocannabinol (THC), for example, is another cannabinoid produced by the hemp plant. THC use correlates positively with the severity of PTSD symptoms (including suicide) in veterans, with worse treatment outcomes, and worsening maladaptation.¹³ In summary, THC use seems to actually enhance the development and severity of PTSD.

Conclusions and a Crossroads

PTSD research has shown that CBD: decreases emotional memory overload, anxiety, adrenaline levels, and psychotic-like reactions; improves extinction of learned fear; facilitates corrective cognitive reconstruction of memories; and improves sleep and dreaming. All of these are related to PTSD symptoms.

The limited direct research in humans with PTSD has shown that CBD may be able to have significant impact in the treatment of PTSD by reducing anxiety, severity of PTSD symptoms, decreasing “bad” dreams, and improving sleep. All these findings would support the use of CBD for PTSD treatment. However, the U.S. Food and Drug Administration has not yet approved CBD for PTSD therapy or for treatment of PTSD symptoms.

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ENDNOTES:

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