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Cranial Electrotherapy Stimulation For Mild Traumatic Brain Injury and Post-Concussion Syndrome

by **Christopher Fisher, PhD** on October 24, 2009 in [Electrotherapy](#), [Featured](#)



Mild traumatic brain injury (mTBI) is an acute medical condition that results from a significant impact to the human skull. Post-concussion syndrome (PCS) occurs when mTBI symptoms, such as dysphoria, anxiety, and chronic pain continue for an extended period. There is much debate over the causes of PCS with physical attributions (i.e., physiological/neurological changes) on one side of the continuum and purely psychological explanations on the other. [McCrea \(2008\)](#) argues that PCS reflects a psychological state best described as Undifferentiated Somatization Disorder*. Although his conclusions are not without debate, if true, this squarely places the treatment of PCS in the psychological realm.

CES represents one obvious potential treatment as it has been shown to safely reduce several of the most common symptoms associated with mTBI/PCS, albeit with different populations (non-mTBI), and is available for a modest cost compared to medications. A review of the available literature located two randomized controlled studies of CES for mTBI.

Introduction To Cranial Electrotherapy Stimulation

Readers not familiar with CES may want to first review “What Is Cranial Electrotherapy Stimulation?” [Part 1](#) and [Part 2](#) to better understand this article. The Part 1/2 series details CES’ effectiveness to treat conditions like depression and anxiety in non-TBI populations and provides important data on potential side effects and risks.

What Is Mild Traumatic Brain Injury and Post-Concussion Syndrome?

The Defense and Veterans Brain Injury Center Working Group’s operational definition of mBTI is: “Mild TBI in military operational settings is defined as an injury to the brain resulting from an external force and/or acceleration/deceleration mechanism from an event such as a blast, fall, direct impact, or motor vehicle accident which causes an alteration in mental status typically resulting in the temporally related onset of symptoms such as: headache, nausea, vomiting, dizziness/balance problems, fatigue, insomnia/sleep disturbances, drowsiness, sensitivity to light/ noise, blurred vision, difficulty remembering, and/or difficulty concentrating” (p. 2). This mTBI definition is noteworthy and preferred (in my opinion) because of its requirement of an “alteration” of mental status, rather than a loss of consciousness (LOC). This is consistent with current research that suggests that a LOC may not be a common symptom in mTBI, despite the common perception that it is ([McCrea, 2008](#)).

Post Concussion Syndrome may be assigned to persons that experience symptoms presumably related to a prior head injury for longer than three months. The American Psychiatric Association (APA) gives preliminary diagnostic criteria for PCS in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR) under “Criteria Sets and Axes Provided for Further Study.” These include (summarized): (1) History of head trauma with a significant cerebral concussion that include loss of consciousness, post-traumatic amnesia, and less commonly, seizure onset, (2) Neuropsychological testing or objective cognitive assessment verification of attention or memory difficulties, (3) Three or more of the following symptoms temporally related to the TBI for at least 3 months: fatigue, disordered sleep, headache, dizziness, irritability or aggression, anxiety, depression, or affective lability, personality change, and apathy or loss of

spontaneity (4) The symptoms cause a significant impairment in social or occupational functioning As seen above, mTBI and PCS have similar diagnostic criteria.

As can be seen, one primary distinguishing characteristic between mTBI and PCS is the length of time since injury.

Overview of Controlled CES For mTBI Studies

Smith, Tiber, & Marshall (1994) administered CES (CES Labs brand device) for 45 minutes, 4 times per week for 3 weeks, to patients with closed head injuries using a randomized design with placebo and double-blind controls (n=21). The average time since injury was 11 years (SD=8.91). They reported significant improvements on all mood measures, including tension/anxiety, depression/dejection, anger/hostility, fatigue/inertia, confusion/bewilderment, and total mood disturbance. Prior to the start of the study, 86% of the subjects were being treated for seizures with anti-seizure medication. None of the subjects in the CES treatment group experienced seizures through the time period under study, though one subject in the sham treatment group had a seizure.

Michals, Crismon, Misko, & Childs (1993) investigated CES for the treatment of posttraumatic memory impairment in individuals with head injuries using a double-blind, sham-controlled research design. The average time since injury was 4.23 years (SD=4.46). A Neurotone III CES device was used for 40 minutes per day over 4 weeks. Short-term or delayed recall measures did not evidence significant improvement. The researchers recommended that further investigation is warranted using devices with different electrical wave forms and amplitudes. Importantly, none of the subjects in this study experienced significant or long lasting side effects. It is worth mentioning that memory improvements have been found in CES single case studies with head injured patients, using Alpha-Stim, a device that uses a wave form that is different from the Neurotone III's wave form. For example, Childs & Crismon (1988) reported improvement in immediate and delayed memory recall in a report of 2 case studies with TBI.

Conclusion

Cranial Electrotherapy Stimulation (CES) represents one promising treatment for the lingering symptoms of mTBI and PCS. The initial evidence presented here suggests that CES may be a safe treatment for mTBI/PCS and that CES may be able to significantly reduce longstanding and presumably treatment resistant symptoms. Additional large scale controlled studies are needed to better estimate CES' safety and effectiveness with these conditions, as well as to determine if devices with different wave forms can help improve memory.

Enjoy.

CFisher

*Undifferentiated somatoform disorder is characterized by (summarized) 1 or more physical complaints (fatigue, loss of appetite, gastrointestinal, or urinary) lasting at least 6 months that cannot be explained by a medical evaluation and is not faked. See the [Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR Fourth Edition \(Text Revision\)](#) for a completion definition.

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About Christopher Fisher, PhD

Dr. Christopher Fisher, Managing Editor for The Behavioral Medicine Report, received his PhD in Clinical Health Psychology & Behavioral Medicine from University of North Texas. His clinical training emphasized biopsychosocial approaches to health and wellness, including Cognitive Behavioral Therapy (CBT), neurofeedback, biofeedback, cranial electrical stimulation (CES), and QEEG. He is Board Certified in Neurofeedback (BCN) by BCIA. Dr. Fisher also received a master's degree in Clinical Psychology from Texas A&M - Corpus Christi. Dr. Fisher maintains a private practice in Corpus Christi, Texas, and offers individual therapy, group therapy, peripheral biofeedback, and neurofeedback. You can learn more at <http://www.christopherfisherphd.com>. He also maintains an informational website for panic attacks (panic disorder) here:<http://www.panicintervention.com> Dr. Fisher enjoys spending time with family, watching sports and movies, and outdoor activities.

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