

**Alpha-Stim**  
Tamra Standage, DPT, COMT

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**Objectives**

- ▶ Participants should be able to state underlining principles behind the usage of microcurrent therapy, both with probe application and with cranial electrotherapy stimulation.
- ▶ Participants should be able to state protocols to treat with both the microcurrent probe and cranial electrotherapy stimulation.
- ▶ Participants should be able to state conditions that may respond to alpha stim

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**Cranial Electrotherapy Stimulation<sup>3, 6</sup>  
History**

- ▶ Introduced to the US in 1960s from USSR, Europe as "electrosleep"
- ▶ Research was completed in US, Russia, and Europe in the 1960s and 1970s to find reliable parameters to induce sleep- none were found
- ▶ However it was found that microcurrent waveforms caused patients: improved relaxation and decreased anxiety
- ▶ 1979 the FDA approved CES for the treatment of insomnia, anxiety, and depression
- ▶ Improved levels of stress, allowed improvement in cognitive function, with an average gain of 12 to 18 points on standardized IQ tests
- ▶ VA is performing studies on veterans to assist with pain, anxiety, depression, insomnia, PTSD

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### Cranial Electrotherapy Stimulation<sup>1</sup>

- ▶ Microcurrent: 0.5 Hz typically (up to 100 Hz)  
Current of 10-600 microamperes (µA)  
Pulse width of 500,000 +/- µs
- ▶ Compare to TENS: 2 - 1000's Hz  
Current of approximately 60-100 mA  
Pulse width of 250-400 µs

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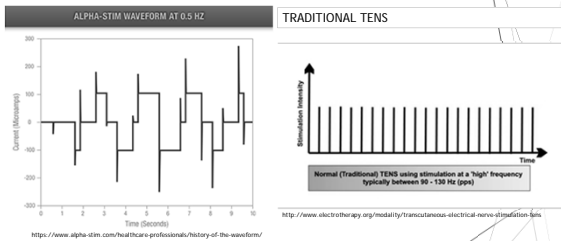
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### Waveforms of Alpha-Stim and TENS<sup>1, 2</sup>




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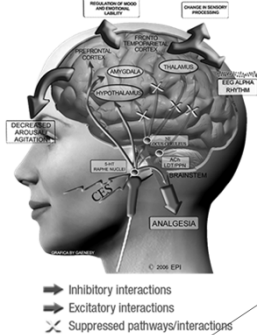
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### Proposed Mechanism of Function of CES<sup>2</sup>

Alpha-Stim CES engages the serotonergic (5-HT) raphe nuclei of the brainstem. 5-HT inhibits brainstem cholinergic (ACh) and noradrenergic (NE) systems that project supratentorially. This suppresses thalamo-cortical activity, arousal, agitation, alters sensory processing and induces EEG alpha rhythm. 5-HT can act directly to modulate pain sensation in the dorsal horn of the spinal cord, and alter pain perception, cognition, and emotionality within the limbic forebrain.




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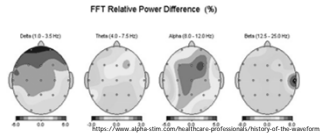
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### EEG changes in brain waves with CES<sup>2,3</sup>



qEEG changes in 30 subjects treated with 20 minutes of Alpha Stim CES. There is an increase (Red) in alpha activity with a simultaneous decrease (Blue) in beta and delta.

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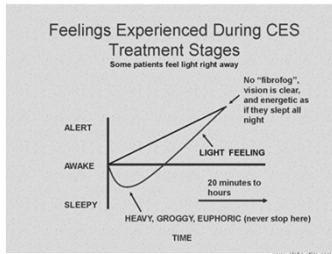
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### Potential response to CES<sup>2</sup>




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### Microcurrent Therapy- Probes<sup>6</sup>

- ▶ Microcurrent has been shown to promote tissue healing
- ▶ Has been shown to assist with bone healing
- ▶ Has been shown to assist with ulcers due to pressure, venous or arterial insufficiency, and diabetes
- ▶ Has been shown to assist with chronic tendonopathy
- ▶ Results of studies demonstrate that microcurrent may assist in and promote tissue healing. More studies are needed to assist with developing guidelines for use and to investigate the underlying process of healing

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### Application of Alpha Stim-Probes<sup>2</sup>




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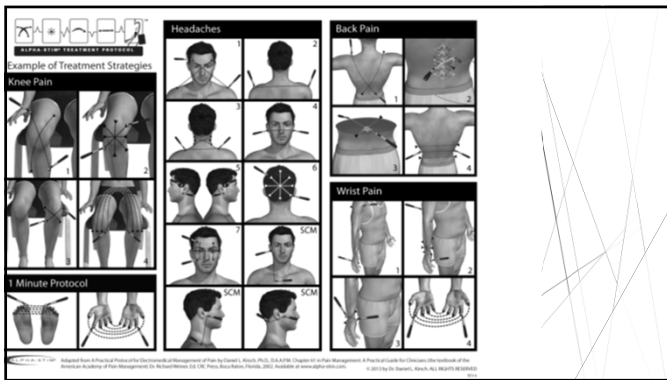
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### Contraindications<sup>2</sup>

- ▶ Implanted demand type cardiac pacemakers and implanted defibrillators
- ▶ Do not stimulate directly on the eyes, or press the probes over the carotid sinus
- ▶ Adverse effects: data on approximately 8,800 patients
  - dizziness (6 cases, 0.07%)
  - skin irritation/ electrode burns (6 cases, 0.07%)
  - headaches (9 cases, 0.10%)

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### CES with mild traumatic brain injury<sup>5</sup>

- ▶ Several case studies have demonstrated improved behavior, decrease aggression, decreased elopement attempts. These improvements continued even after discontinuation of CES
- ▶ A double blind pilot study was conducted on 21 closed TBI patients. Time since injury ranged from 6 months-32 years. Average age: 30 years. Those assigned to CES group had significantly better anxiety, depression, fatigue, cognitive function, and Total Mood Disturbance score
- ▶ CES has been found to augment the effects of biofeedback including the speed of learning and length of retention

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### References:

1. AlleviaHealth (2014, March). TENS vs MET Comparison Retrieved from <https://www.alleviahealth.com/wp-content/uploads/2014/03/MET-vs.-TENS.pdf>
2. Electromedical Products International, Inc. (2018). Healthcare Professionals. Retrieved June 1, 2018, from <https://www.alpha-stim.com/healthcare-professionals/>
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6. Kirsch, D. 2008 CES for Mild Traumatic Brain Injury. *Practical Pain Management*. July/August 70-77.
7. Poltawski, L and Watson, T. 2009 Bioelectricity and microcurrent therapy for tissue healing - a narrative review. *Physical Therapy Reviews* 14(2): 104-111

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