

Changes in cerebellar functional connectivity and autonomic regulation in cancer patients treated with the Neuro Emotional Technique for traumatic stress symptoms

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Abstract

Purpose A growing number of research studies have implicated the cerebellum in emotional processing and regulation, especially with regard to negative emotional memories. However, there currently are no studies showing functional changes in the cerebellum as a result of treatment for traumatic stress symptoms. The Neuro Emotional Technique (NET) is an intervention designed to help improve symptoms related to traumatic stress using an integrative approach that combines emotional, cognitive, and motor processing, with a particular focus on autonomic nervous system regulation. In this study, we evaluated whether the NET intervention alters functional connectivity in the brain of patients with traumatic stress symptoms associated with a cancer-related event. We hypothesized that the NET intervention would reduce emotional and autonomic reactivity and that this would correlate with connectivity changes between the cerebellum and limbic structures as well as the brain stem.

Methods We enrolled patients with a prior cancer diagnosis who experienced distressing cancer-related memories

associated with traumatic stress symptoms of at least 6 months in duration. Participants were randomized to either the NET intervention or a waitlist control. To evaluate the primary outcome of neurophysiological effects, all participants received resting-state functional blood oxygen level-dependent (BOLD) magnetic resonance imaging (rs-fMRI) before and after the NET intervention. In addition, autonomic reactivity was measured using heart rate response to the traumatic stimulus. Pre/post comparisons were performed between the NET and control groups.

Results The results demonstrated significant changes in the NET group, as compared to the control group, in the functional connectivity between the cerebellum (including the vermis) and the amygdala, parahippocampus, and brain stem. Likewise, participants receiving the NET intervention had significant reductions in autonomic reactivity based on heart rate response to the traumatic stimulus compared to the control group.

Conclusions This study is an initial step towards establishing a neurological signature of treatment effect for the NET intervention. Specifically, functional connectivity between the cerebellum and the amygdala and prefrontal cortex appear to be associated with a reduction in autonomic reactivity in response to distressing cancer-related memories.

Implications for cancer survivors This study contributes to the understanding of possible mechanisms by which interventions like NET may help reduce emotional distress in cancer patients who suffer from traumatic stress symptoms.

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