

126. A Mathematical Approach for Assessing tDCS Efficacy for Post-Traumatic Stress Disorder

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Post-Traumatic Stress Disorder (PTSD) is a neurological condition caused by distressing or traumatic events. It has been recently found that symptoms of PTSD can be combated using forms of neurostimulation, in particular, transcranial direct current stimulation (tDCS). While it is known that the electrical energy delivered by this treatment to targeted areas of the brain is effective in treating PTSD, the optimal positioning of tDCS electrodes and treatment parameters for achieving the greatest efficacy is unknown. We have implemented a partial differential equation based mathematical model of tDCS with application to PTSD, and have generated numerous numerical simulations using the finite element method, all using distinct electrode montages, treatment parameters known to mitigate PTSD symptoms, and a three-dimensional MRI-derived cranial cavity with biologically-based tissue conductivities. The model predicts not only voltage and electrical current density within the head cavity, but also the sensitivity of the brain tissue to fire an action potential during treatments. We present our current results and findings that begin to shed light on ideal tDCS settings for treating PTSD.