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Bristol, RI 02809, and **Kaia R. Lindberg**. *Electrotherapy Impact on Neuronal Electrophysiology*.

Electrotherapies continue to mitigating the debilitating symptoms of numerous brain disorders, yet the underlying cellular effects of these treatments are not comprehensively understood. Using a mathematical model that couples the Poisson-Nernst-Planck system of partial differential equations and Hodgkin-Huxley based ordinary differential equations, the effects of deep brain stimulation on neuronal electrophysiology are investigated. Our results demonstrate that deep brain stimulation elevates transmembrane potential to facilitate action potential firing, and in addition, yields an influx of calcium which is known to be critical in the secretion of neurotransmitters for proper, healthy cellular functioning. Finally, comparisons to other modes of electrotherapy highlight differences in cellular-level impacts among these different treatment forms. (Received September 16, 2020)