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An investigation into the induced electric fields from transcranial magnetic stimulation. RAVI HADIMANI, ERIK LEE, Iowa State University, WALTER DUFFY, MOHAMMED WARIS, WAQUAR SIDDIQUI, FAISAL ISLAM, MAHESH RAJAMANI, RYAN NATHAN, Premier Psychiatric Group, DAVID JILES, Iowa State University, DAVID C JILES TEAM, WALTER DUFFY COLLABORATION — Transcranial magnetic stimulation (TMS) is a promising tool for noninvasive brain stimulation that has been approved by the FDA for the treatment of major depressive disorder. To stimulate the brain, TMS uses large, transient pulses of magnetic field to induce an electric field in the head. This transient magnetic field is large enough to cause the depolarization of cortical neurons and initiate a synaptic signal transmission. For this study, 50 unique head models were created from MRI images. Previous simulation studies have primarily used a single head model, and thus give a limited image of the induced electric field from TMS. This study uses finite element analysis simulations on 50 unique, heterogeneous head models to better investigate the relationship between TMS and the electric field induced in brain tissues. Results showed a significant variation in the strength of the induced electric field in the brain, which can be reasonably predicted by the distance from the TMS coil to the stimulated brain. Further, it was seen that some models had high electric field intensities in over five times as much brain volume as other models.

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