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Digital Models for Electric Field Dosimetry in Non-Invasive Brain Stimulation

Accurate evaluation of the delivered electric dose is a key challenge in therapeutic brain stimulation based on physical stimulation, as clinical effects depend on the spatial distribution of brain induced electric fields. Numerical simulations were developed to describe electric field distributions in the heads of patients using two modelling approaches: one simulating transcranial magnetic stimulation treatments and one addressing time-interfering electric field paradigms for deep brain stimulation with surface electrodes. MRI-based personalized head models were used to predict electric field distributions as a function of electrode or coil placement, signal amplitude and duration, and anatomical and morphological variability. These digital models provide key information for therapy dosing and for defining safe and effective stimulation protocols.

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