Abstract

**Thesis Project:** Exploring the Feasibility of the Detection of Neuronal Activity Evoked By Dendrite Currents Using MRI

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MRI has been applied to directly detecting neuronal activity. The direct detection of multiple dendrite sites within the brain offers an important tool in the analysis of the brain for mapping cognition. In this, multiple dendrite contributions can be applied with the same model between the parallel and anti-parallel orientations depending on a spatial depolarization and re-polarization wave. Once the strength of the dendritic contribution was calculated, the spatially dependent phase shifts were theoretically modeled. In the construction of this column the dendrites were modeled as having cylindrical symmetry, uniform current density, and the intracellular current was taken as the primary current contribution to the volume dendrite model.

The method examined the system using the known volume density of the dendrites treated with the current dipole model over a voxel. The maximum effect of the field strength, phase, and percent signal change was theoretically calculated. The maximum field was calculated as 1.07 nT, the maximum phase was calculated as 2.14 mrad, and the maximum percent signal increase was calculated as 0.217 %.