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Magnetic Resonance Imaging of Dendrite Currents[1] WILLIAM JAY, BRIAN DOLASINSKI, RANJITH WIJESINGHE, Ball State University, BRADLEY ROTH, Oakland University — The action currents of active dendrites generate their own magnetic field, which can cause the phase of the spins to change. Many investigators have attempted to detect neural and dendritic currents directly using magnetic resonance imaging. Such a measurement of action currents would be remarkable, since it would allow functional imaging of neural activity using the high spatial resolution of MRI and avoid an ill-posed inverse problem to determine the current sources. Measurement of the magnetic field of neural currents would better follow the distribution of neural activity in time and space. Our goal in this presentation is to use the calculated magnetic field of a dendrite to estimate the resulting phase shift in the magnetic resonance signal. We find the phase shift produced by a collection of simultaneously active dendrites is below the threshold for detection using current MRI technology.

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