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EVALUATION OF MAGNETIC STIMULATION FOR CELL MEMBRANE PORATION

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Exposure of biological cells and tissues to magnetic fields has not been studied much, and most of the research to date has focused on electrical stimulation. However, an even newer modality that might hold promise, is based on interactions of magnetic fields with living cells and tissues. Progress in experimental techniques has resulted in the burgeoning development of new approaches to target and observe effects of magnetic fields at the intracellular and molecular levels [1, 2]. Time-varying magnetic fields can also produce electric fields (and change transmembrane potentials) based on Faraday's law of induction. n neural tissues. Also, while medical applications based on electric fields require direct application via electrodes inserted into tissue, pulsed magnetic fields would allow treatment without invasive electrodes. This advantage could lead to an expansion of bioelectric treatments by allowing clinicians to affect any target within the body in a contactless manner.

An analysis into the time-dependent development of electric fields at cell membranes due to an externally applied magnetic field will be discussed. The parameter space for the magnetic stimulation for bringing about membrane poration will be discussed. Our results will focus on the time-dependent magnetic vector potential, and the resulting transmembrane potential, and poration based on the Smoluchowski equation.

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