Computational modeling evidence of a nonthermal electromagnetic interaction mechanism with living cells

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Abstract
A computational hydrodynamics model consisting of a system of four coupled time-domain partial differential equations is applied to study the response of the cellular sodium ion channel to a microwave electric-field excitation. The model employs a dynamic conservation law formulation, which has not been previously applied to this problem. Results indicate that the cellular sodium ion channel exhibits an electrical nonlinearity at microwave frequencies, which generates an intermodulation spectrum when excited by an amplitude-modulated electric field. Intermodulation products having frequencies down to 50 MHz, and very likely well below 50 MHz, appear possible. This is a new nonthermal microwave interaction mechanism with living tissues that, if observable below 0.1 MHz, could enable the stimulation of excitable biological tissues, and thereby have significant implications for human health and safety.