Electric Relaxation Processes in Lipid-Bilayers after Exposure to Weak Magnetic Pulses

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Biological effects of weak magnetic fields are widespread, but poorly understood. Besides magnetic particles, which have been shown to be involved in only few cases, membranes are discussed as the site of perception. However, the mechanism is unknown. We have subjected pure lipid membranes to weak magnetic pulses, and found, that their electric properties are modified.

Black lipid membranes were prepared from purified asolectin on a teflon septum separating electrically the two chambers of a teflon cuvette, using the technique of Mueller *et al.* (1962). Single magnetic pulses were applied for 10 μs, whose intensity could be varied from 0 to 100 G (0 to 10 mT) at the membrane. Directly after the pulse decay, the conductance of the bilayers was scanned with 10 periods of a 1 kHz triangle alternating voltage (eg. a measurement time window of 10 ms). Frequency spectra of the bilayer current rose by a frequency dependent factor ≤ 2 in a broad region around 80 kHz, when the amplitude of the preceding magnetic pulse was increased from 0 to 100 G. The data show, that weak magnetic fields can significantly change the electrical conductance of lipid films. The relaxation of electrons in a two-dimensional quantum state ("quantum hollow") will be discussed as a possible origin of these effects.