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Electromagnetic Biology and Medicine (formerly Electro- and Magnetobiology)

**Publisher:** Taylor & Francis**Issue:** Volume 21, Number 3 / 2002**Pages:** 243 - 248**URL:** [Linking Options](#)**DOI:** 10.1081/JBC-120015995**ELF-ELECTROMAGNETIC FIELDS INHIBIT THE PROLIFERATION OF HUMAN CANCER CELLS AND INDUCE APOPTOSIS**Lijun Pang <sup>A1</sup>, Nelly Traitcheva <sup>A2</sup>, Gislinde Gothe <sup>A3</sup>, Juan A. Camacho Gomez <sup>A4</sup>, Hermann Berg <sup>A5</sup><sup>A1</sup> Institute of Physics, Nankai University, Tianjin, P.R. China<sup>A2</sup> Institute of Plant Physiology "M. Popov", Bulgarian Academy of Sciences, Sofia, Bulgaria<sup>A3</sup> FG Molecular Cytology, IMB, Jena, Germany<sup>A4</sup> Elektron Microscopie, IMB, Jena, Germany<sup>A5</sup> Laboratory Bioelectrochemistry, Saxonian Academy of Sciences at Leipzig, Leipzig, Germany**Abstract:**

Weak and low-frequency pulsating electromagnetic fields (ELF-MF) can be applied to change cell metabolism, if cells are treated in a specific range of frequency and amplitude. In our case, the influence on proliferation of human K562 cells has been studied by applying a sinusoidal 50 Hz field of magnetic flux densities (B) between 2 and 13 mT for 2 or 4 days. In repeating all runs three times—counting each day—no difference between experiment and control was found below 6 mT. However, stronger field amplitudes inhibit cell division and induce apoptosis and necrosis as shown by flow cytometry. Treatment with  $\geq 10$  mT decreases the number of living cells to only 2% of the control. This electromagnetically induced apoptosis may be a first step for a noninvasive treatment of cancer tissue for inhibition of its proliferation.

**Keywords:**

K-562 cells, Electromagnetic induction, Solenoid field, Flow cytometry, Apoptosis induction, Proliferation inhibition, ELF-MF effects

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