

Enhancement of docetaxel-treated MCF-7 cell death by 900-MHz radiation

Research Article

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Abstract: The aim of the study was to investigate the effect of high-frequency electromagnetic field of 900 MHz at 8 W input power on metabolic activity of human breast adenocarcinoma MCF-7 cells. With the aid of the colorimetric MTT assay, it was shown that there is significant change in cell culture survival exposed to docetaxel in field-free conditions in comparison with cells treated with docetaxel simultaneously exposed to high-frequency electromagnetic field.

Keywords: MCF-7 • 900 MHz electromagnetic field • Docetaxel

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1. Introduction

The biological effects of electromagnetic fields, especially in the high-frequency regions of the spectrum ranging from 30 kHz to 300 GHz is a subject that has been under thorough investigation during the last decade. A large number of studies have documented numerous biological effects due to high frequency radiation *in vivo* and/or *in vitro*. Nevertheless, there has been conflicting reports with respect to the potential hazard of high frequency radiation exposure. So far, there are no unambiguous results on the effects of high frequency electromagnetic field especially if the limit values are not exceeded. In several *in vitro* studies, it has been shown that exposure to high frequency electromagnetic fields induce cell death or influence cell proliferation [1-4]. As a biological target, the DNA molecule has received attention with respect to potential high-frequency electromagnetic field damage [5,6], because of its relevance for cell function, proliferation, viability, mutation and carcinogenesis.

High frequency radiation is non-ionizing radiation. The emitted energy required to break chemical bonds and to cause ionizations in atoms and molecules is in the eV order of magnitude. Even though the order of the photon energy of high frequency electromagnetic fields is negligible, the fraction, of the ionization energy or the energy necessary to induce direct chemical changes and break non-covalent bonds directly, indirect radiation-based effects have been discussed [7] and thoroughly reviewed by authors of the study [8].

Regarding electromagnetic fields effects on tumor promotion, some studies show a carcinogenetic effect to the induction of brain tumours [9] and others [10] suggests that high frequency electromagnetic field could not contribute to the initiation stage of tumor formation in mouse C3H10T1/2 cells. However, it may contribute to the promotion stage at the extremely high SAR (≥ 100 W/kg). A major problem in cytostatic treatment of malignant tumours is the development of the resistance of tumour cells to anticancer drugs. P-glycoprotein, the expression product of the MDR-1 gene is strongly

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