

MICROWAVE IRRADIATION EFFECTS ON DRUG BLOOD CELLS UPTAKE

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The transient permeabilized state of the cell membrane, named the “cell electroporation” can be used to increase cells uptake of drugs that do not readily pass cell membrane, thus enabling their cytotoxicity. A method for cell electroporation could be microwave (MW) irradiation. The viability tests of the human leukocytes under 2.45 GHz MW exposure with/without the bleomycin (BL) in the cell cultures are presented. The MW were generated as 10 ms pulses at 50 Hz repetition rate into a experimental set-up consisting mainly of the following units: a 2.45 GHz generator of adjustable output power in the range of 0-50 W and a travelling wave rectangular waveguide applicator containing a 35 mm Petri dish with 2 ml cell cultures. Five minutes and 25 minutes MW exposure of 25 W/kg increases bleomycin cytotoxicity by a factor of 1.28 (Fig. 1) and 1.7 (Fig. 2), respectively. Also, the effects 2.45 GHz microwaves on endocytosis of platelets isolated from healthy volunteer heparinated blood are presented. The fluid-phase endocytosis was monitored by the uptake of a fluorescent non-permeant molecule called Lucifer Yellow (LY). For the quantification of the fluorescence, the platelets were washed twice, sonicated and a protein dosage was performed for every sample. We observed an increase of endocytotic rate (from 1.15 fold to 4 fold when the cells are exposed at SAR values of 25 W/kg). The controls were performed under identical experimental conditions especially regarding the temperature increase.

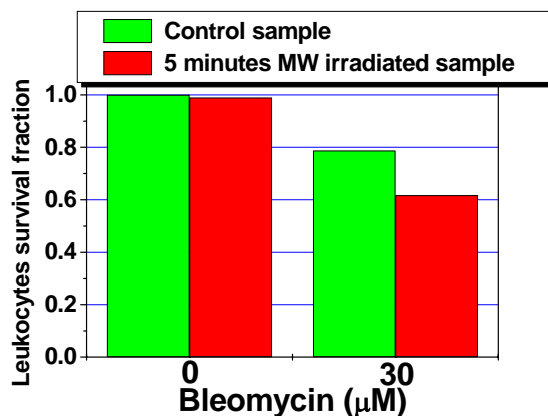


Fig. 1: The effects of 5 minutes MW irradiation (2.45 GHz and SAR of 25 W/kg) or/and bleomycin upon leukocytes survival fraction

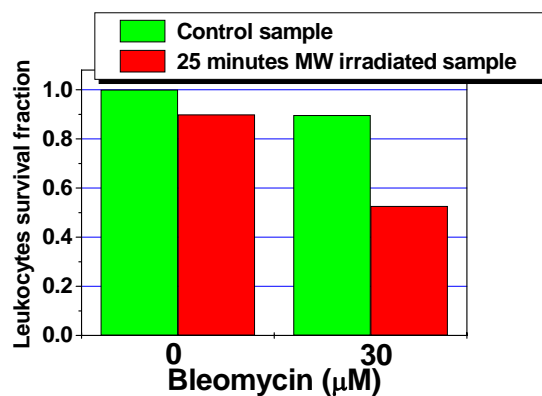


Fig. 2: The effects of 25 minutes MW irradiation (2.45 GHz and SAR of 25W/kg) or/and bleomycin upon leukocytes survival fraction