

Modulated 900 MHz Exposure Condition Characterization for the Study on Immune System of Mice and Preliminary Results

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INTRODUCTION

Theoretically, MW and RF radiations may exert various specific effects directly on immunocompetent cells and their co-operative regulatory mechanism, or they may influence neurohormonal regulation of the immune system. Both the possible specific interactions of MW/RF and the concomitant stress reaction trigger various adaptation mechanism that may or may not be beneficial for the host's immunity. Experimental evaluation of the response of the immune system have been performed through several different assay: they include measurements to determine both quantitatively and qualitatively the response and the correlation of the immune cells. In the last decade, immune cells (lymphocytes) have been observed in terms of cytogenetic damage or biomonitoring, and finally to assess the functional damage. The immune system is highly complex and provides an effective surveillance against proliferation and growth of cancer cells. Several data are present in the literature showing how much the MF exposure attest the immune system, but the result are often contradictory. A non standard TEM cell has been set up to study possible effects by exposing mice to a modulated EM field which reproduces the real exposure to MTEs, taking care to simulate the worst case with respect to daily exposure times. A week exposure is considered a right time to stimulate and develop the Antigen-Antibody reaction.

OBJECTIVE

The exposure condition must be determined with accurate dosimetric procedures. In order to evaluate EMF effects on such biological system, the experimental protocol and the endpoint have to be selected and defined in terms of exposure time and animals' sacrifice time and cell culture assay.

MATERIAL AND METHODS

A long TEM cell has been set up for *in vivo* exposures. A grating allows air flux inside the cell. Average SAR dosimetry has been performed with four mice phantoms, by

thermal measurements and power balance inferences. The exposure system efficiency is 0.35 (W/kg)/W. Numerical simulations have assessed the SAR distribution in simple mice models, showing a maximum in the tail base region confirmed by thermal measurements. A preliminary study on effects of GSM electromagnetic field on immune response in treated animals was performed. C57BL/6 mice were injected with the antigen (hen egg lysozyme + CFA) and exposed to 0.26 W/kg, 1.4 W/kg and sham EMF at the frequency of 915 MHz, GSM modulated, 2 hours/day, 7 days. In this experiment animals have been exposed 2 h/day for a week. The 2 hours/day simulate a real daily use of mobile phones; the total period of a week is in relation to the time needed by immune system for its response to the injected antigen (see below).

The immune response was evaluated in terms of antigen-stimulated lymphocytes (from tail base lymphonodes) proliferation and IFN- γ and IL-2 production.

RESULTS AND CONCLUSION

No significant EMF effects have been observed. New experiments in different exposure conditions are planned to derive a dose-response curve. An electronic model of the mouse will be developed to obtain a detailed analysis of SAR distribution inside the targets.

REFERENCE

- [1] L. Ardoino, G. D'Inzeo, G.A. Lovisolo, D. Asta, S. Mancini, R. Pinto, and C. Marino, "TEM cell exposure system operating at 900 MHz for *in vitro* and *in vivo* experiments," in *Book of Abstracts of the BEMS 22nd Annual Meeting*, 10-16 June 2000, Munich, Germany.