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Biological effects of ultrashort electric pulses in a Neuroblastoma cell line: the energy density role.

Claudia Consales *(1), Caterina Merla(1), Barbara Benassi(1), Adeline Muscat(2), Tomás Garcia-Sanchez(2), (3), Franck M. André(2) ,Carmela Marino(1), Lluis M. Mir(2)

(1) Division of Health Protection Technologies, ENEA-Italian National Agency for New Technologies, Energy and Sustainable Economic Development, Rome, Italy; e-mail: claudia.consales@enea.it, caterina.merla@enea.it, barbara.benassi@enea.it, carmela.marino@enea.it

(2) Laboratory of Vectorology and Anticancer Therapies, Université Paris-Saclay, UMR 8203, CNRS, Gustave Roussy, 94805, Villejuif, France; email : Adeline.MUSCAT@gustaveroussy.fr, fr.andre@gustaveroussy.fr, Luis.MIR@cnrs.fr

(3) Department of Information and Communication Technologies, Universitat Pompeu Fabra, Barcelona Spain; email: tomas.garcia@upf.edu

Extended Abstract

Despite the numerous literature results about biological effects of electromagnetic field exposure, the interaction mechanisms of these fields with organisms is still a matter of debate. Extremely low frequency magnetic fields can modulate redox homeostasis and, in particular, we showed that 24 hours exposure to 50 Hz, 1 mT has a pro-oxidant effect and downregulates miR-34b/c expression, by hyper-methylating their promoter in neuroblastoma cell line SH-SY5Y [1,2].

Here we investigated the role of the total accumulated electromagnetic energy density deposited by this 24 hour, 50 Hz, 1 mT exposure in inducing the mentioned effects. We exposed SH-SY5Y cells to single electric pulses of a duration in the range of microseconds or nanoseconds depositing the same energy as in our previous experiments. Under these conditions, we did observe no change in ROS production, miR-34b/c expression, neither apoptosis induction.

We then explored the involvement of the electric component present during the chronic 24 hours 50 Hz 1 mT exposure. Exposing for 24 and 48 hours cells to an individual electric field of the same amplitude as the one induced by the 50 Hz 1 mT magnetic field, no ROS formation was observed.

Finally, we characterized SH-SY5Y response to single microsecond and nanosecond electric pulses at growing levels of deposited energy density. We observed *egr-1* and *c-fos* significant activation independently on the cell electroporation threshold and cell fusion at the highest electric pulse intensity.

These results contribute to a deeper comprehension of molecular effect induced on SH-SY5Y by microsecond and nanosecond electric pulse stimulation.

References

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