Beyond Light: Cellular Effects of 2.45 GHz EMF. Preliminary Results on Yeasts

Boyana Angelova[1], Meglena Kitanova[2], Momchil Paunov[1]

[1] *Department of Biophysics and Radiobiology, Faculty of Biology, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria*
[2] *Department of Genetics, Faculty of Biology, Sofia University "St. Kliment Ohridski", Sofia, Bulgaria*

Correspondence: m_paunov@uni-sofia.bg

In recent years, the use of various wireless communication devices that generate electromagnetic fields (EMF) has significantly increased. Most of them are worn near or on the body (phones, fitness bracelets, etc.), while implanted devices gain more and more applications, especially in medicine. All this leads to high public concern regarding possible health risks. For a clearer understanding of the effects of EMF on the body, a thorough knowledge of the mechanisms of action at the cellular and subcellular level is necessary. The safety of wireless devices is evaluated mainly by the specific absorbed rate (SAR) which itself is defined by the heating of the tissues. However, in addition to thermal, non-thermal EMF effects on living systems have been reported such as increased oxidative stress, changes in cell viability, peroxidation of lipids, disruption of cell membrane integrity, even genetic disorders. There are just few studies of the biological effects of EMF acting near to its source.

The aim of our study was to define the effects of 2.45 GHz near-field EMF, widely used in commercial devices, on yeast cells as a model system. Baker's yeast suspensions were absorbing 20 W/kg SAR in the near-field EMF, generated by half-dipole antenna, during 40 minutes periods, repeating up to 8 hours. Cell membrane permeability was tested by following the release of nucleotides measuring the absorption at 260 nm of the extracellular medium. Cell antioxidant activity was determined by applying the trolox equivalent antioxidant capacity method. DNA damage was traced by alkaline comet assay. For discerning non-thermal from thermal effects, yeast suspensions, incubated at the maximal temperature reached during EMF exposure, were used as control. There were no statistically significant differences in the examined parameters between EMF-treated and control suspensions therefore non-thermal biological effects of EMF should not exist at the applied experimental conditions.

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