Report-2013 of Russian National Committee on Non-Ionizing Radiation Protection for WHO EMF International Project

SCIENTIFIC DATA

Federal Medical Biophysical Center in 2013 started the research project: "The electromagnetic field as a non-specific stimulus of the central nervous system" (the principal investigators - **Prof. Svetlana Lukyanov and Dr. Oleg Grigoriev)**. The purpose of this project: study of fundamental regularity and mechanisms of the biological response of the central nervous system to the EMf exposure of non-thermal intensity. Funding - *Federal Medical Biological Agency of Russia (Ministry of Health)*.

Dr Elena Sarapultseva and Dr Julia Igolkina from the *Obninsk Institute of Nuclear Power Engineering of the National Research Nuclear University "MEPhI"* Human exposure to RF-EMF radiation is mainly attributed either to 1 GHz sources such as mobile phones and telecommunication devices or to 10 GHz sources, including radars and satellite communication. The prolonged exposure to low-intensity RF-EMF radiation currently represents the major concern of EMF-protection. The recommended maximum allowed levels (MAL) of human exposure to EMF dramatically differ between countries. In Russia the MAL value is 10 $\mu W/cm^2$, which is substantially lower than those Europe. The existing risk estimates of EMF radiation heavily rely on the results of numerous *in vivo* and *in vitro* studies in mammals. Although these studies have provided important information regarding the effects EMF radiation, quite often they are very laborious and, besides, their sensitivity may not be high enough for detecting the effects of low and, in some cases, intermediated doses. Given the fact that these are the main doses of concern, the development of more sensitive experimental models for evaluating germline effects of EMF radiation is clearly needed. Has analyzed the effects of acute and chronic low-intensity RF-EMF with EFD from 10 to 50 $\mu W/cm^2$ on the morphology of unicellular protozoa ciliates *Spirostomum ambiguum* and also on the survival, fecundity and reproductive success of *Daphnia magna*. The time of acute or prolonged (4 days) exposure ranged from 3 to 600 min for ciliates and from 6 to 24 h for Daphnia. The results of this study showed the two species were remarkably sensitive to influence of low intensity radiofrequency radiation. The negative effects of RF-EMF irradiation either from 1 GHz or to 10 GHz sources were detected following exposure over the relatively period of time, often regarded as "safe" for the different aquatic organisms. The dose-response for the two species was not linear where the magnitude of effects of irradiation on the analyzed. Taken together, our data show that protozoa and crustaceans represent useful models for the analysis of the effects of RF-EMF. The results of this study also provide further insights into the unknown mechanisms underlying the in vivo effects of RF-EMF.

Professor Igor Belyaev, *Laboratory of Radiobiology, Institute of General Physics, Russian Academy of Science,* has made research "DSB, apoptosis and preleukemic clones in human stem hematopoietic cells exposed to EMF from mobile phone". Exposure to electromagnetic fields (EMF) has consistently been associated with the increased risk for childhood leukemia which arises from hematopoietic stem cells by induction of mutations, most frequently by specific preleukemic gene fusions. All these mutations require DNA double-strand breaks (DSB) to occur. We have studied whether exposure from mobile phone induce DSB in CD34+ umbilical cord blood (UCB) hematopoietic stem cells (HSC) analysis of DSB co-localizing proteins γH2AX and 53BP1. UCB CD34+/CD34- cells were exposed to EMF from GSM900 test-mobile phone (0.4 mW/kg, 4 mW/kg, 40 mW/kg). In general, no DSB or apoptosis has been detected. However, a statistically significant effect of EMF exposure on CD34- cells extracted with NH_4Cl and exposed at 4 mW/kg. Importantly, significant increase in RNA expression was observed after exposures at 4 mW/kg and 40 mW/kg. EA2-PBX and AML-ETO gene fusions were found by RQ-PCR after exposure at 40 mW/kg in preliminary experiments. The follow up experiments may provide information on EMF-

sensitive genes. It would be especially important to validate whether oncogenes, and oncogenic gene fusions are induced in stem cells.

Center for Electromagnetic Safety and the Samara Branch of the Research Institute of "Radio" carried out the study of electromagnetic pollution in Moscow (principal investigators **Dr. Oleg Grigoriev and Prof. Yuri Spodobaev**). This study was funded by the Department of Nature and Environmental Protection of Moscow. There have been new scientific evidence on the state of the electromagnetic environment in the environment of the city of Moscow. The value of the electromagnetic field, which is characterized mainly by the irradiation conditions of the population in the range of 300 MHz to 3 GHz, are about 1 μW/cm^2. Allocated land areas with values that exceed a multiple of background. It has been determined that there are large gradients in the distribution EMF. This paper presents a plan for monitoring the electromagnetic radiation in the modern metropolis. An algorithm for geo-environmental monitoring technologies for the dependence of the radiation on the mode of operation of the source providing forecasting the spatial distribution of the levels of electromagnetic fields for typical and extreme combinations of modes of sources.

Dr. Viktor Gulbin from T*he RadioProtection Center of OJSC "EMC of Concern "Vega",* developed the carbon-containing composition, which gives additional property to different materials – to absorb electric-magnetic radiation in UHF range. It can be used as the direct filler material entered in concretes, plaster mixtures, gyps-cardboard, ceramics, polymers, wooden-chip- and wooden-fiber panels, as well as coats on constructive elements' surface (plates, building blocks, decorative breaks and porous blocks), or as coats on surfaces of solid heat- and sound-insulating materials, in order to obtain radio-protective filler materials (foam glass- or polymer pellets, fibers, fragmented paper and other surfaces).

PUBLICATIONS

In 2013 has published new monograph of Yuri Grigoriev and Oleg Grigoriev *"Cellular Communication and Health. Electromagnetic environment. Radiobiological and hygienic problems.The prognosis of hazard", Moscow, 2013, 565 p.*

THE MAIN ASPECTS OF PUBLIC CONCERN

EMF sources were approaching the area residential development. Most often people complain about the classes 6-110 kV power transmission line. Small buildings for small businesses are building very close to the power line.

New apartment buildings built near transmitting the centers in many major cities - where the area was a ban on the building until 2012. The reason is that a mandatory procedure for obtaining building permits in Rospotrebnadzor (Russian Federal Consumer Rights Protection and Human Health Control Service) was abolished in 2011.