

THE ROLE OF MAGNETIC NOISES AND DIELECTRIC AND MAGNETIC PROPERTIES OF ENVIROMENT ON THE INVESTIGATION OF BIOLOGICAL EFFECTS IN COMBINED MAGNETIC FIELDS

Sheykina N.V., Bogatina N.I., Linnik A.S., Pogorelov S.V., Timanyuk V.O.

Department of Biophysics and Information Technology

National University of Pharmacy,

B. Verkin Institute for Low Temperature Physics & Engineering

National Academy of Sciences of Ukraine

sheykina@ukr.net

Introduction. It is known that the results were not well reproducible in the investigations in combined magnetic fields.

Aim of the work. So the aim of the work was to create artificial combined magnetic field with well reproducible characteristics and to investigate the role of external factors on the results of the investigation of its influence on biological effects.

Materials and methods. We used both μ -metal shield and the superconductive shield with warm volume for shielding the external magnetic field of the laboratory and create artificial combined magnetic with well reproducible characteristics field inside of them.

Results and discussion. The measurements of spectral density of magnetic noises dependence on the frequency for μ -metal shield and the superconductive shield with warm volume showed the principal difference in their magnitude in spite of their common form of dependence. The fact may be very important for the observation of biological effects of combined magnetic field. The resonance peak at cyclotron frequency of the ion investigated cannot only widen as we observed before but it can disappear at all. Especially it is important for the direction in which the threshold of the effect observed is very small. More over such a noise may cause the phase transition in the near membrane water and the transition may cause other biological effects.

We showed that the electric dipole or magnetic dipole of the environment may distort the initial magnetic and electric field of the biological object and cause the

biological effects in it. The magnitude of the effect depends on the distance between the object and the object and on the symmetry of location of the object relatively the environment non-biological subject.

Conclusions. All these facts have to be taken into attention during the treatment in combined magnetic field tuned to the cyclotron frequency of the ion investigation.

REGULATION OF BIOLOGICAL PROCESSES AND DECREASING OF CONCENTRATION OF BIOLOGICALLY ACTIVE COMPOUNDS BY MEANS OF WEAK COMBINED MAGNETIC FIELD

Sheykina N.V., Bogatina N.I., Linnik A.S.

Department of Biophysics and Information Technology

National University of Pharmacy

B. Verkin Institute for Low Temperature Physics & Engineering

National Academy of Sciences of Ukraine

sheykina@ukr.net

Introduction. In our previous works, we investigated the biological effects in various combinations of magnetic fields (static and combined ones). The object of investigation was the gravitropic reaction of roots. Usually roots exhibit positive gravitropism and grow in the direction of the gravitational vector, while shoots respond negatively and grow opposite to the gravitational vector. We were the first who demonstrated that the application of a weak combined magnetic field (CMF) with the alternative component tuned to the formal cyclotron frequency of calcium ions to static component of CMF can change root gravitropism from a positive direction to negative one. CMF is comprised of a permanent magnetic field and a collinear to it alternating magnetic field.

Purpose. In this work to prove that Ca^{2+} ions play an important role in the gravitropic reaction we changed the concentration of Ca^{2+} ions in the water solution