

STUDYING OF INFLUENCE OF THE LOW-FREQUENCY ELECTROMAGNETIC FIELD ON DNA MOLECULES IN WATER SOLUTIONS

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ABSTRACT. Influence of a low-frequency magnetic field on the DNA water solutions was investigated. It became clear that the variation magnetic field with a frequency of 9 Hz has the greatest impact on the DNA water solutions. Methods pulse a nuclear magnetic resonance of spectroscopy change of time of backs – a spin relaxation of the conditioned water in comparison with control is revealed. In IK – a range of water were observed change of strips of absorption of the conditioned water in the field of deformation and valent fluctuations OH – communications.

Key words: electromagnetic fields of the low frequency, DNA,

Now rather large number of reliable experimental data about not thermal effects of electromagnetic fields of the low frequency (EMP LF), and also about extremely high sensitivity to electromagnetic fields of live organisms of the most various classes – from monocelled to the person [1-2] collected. The particular interest is attracted by biopolymers on the basis of nucleic acids. By numerous experiments it is established that in a molecule of DNA transfer of a charge on long distances is possible, and also emission of photons at excitement or after excitement of a molecule of DNA [3] is possible. Earlier in a series of works we showed possibility of regulation (activation and inhibition) functional metabolic properties of biosystems of various types by means of EMP LF [1]. The low-frequency electromagnetic field was used for change of speed of course of a number of important bioprocesses: reparations of separate sites of DNA with the revealed somatic mutations; generation of active forms of oxygen by neutrophils.

Relevance of work is connected with possibility of use of molecules of DNA as a carrier of information and creation of new types of molecular devices. Studying of action of superlow-frequency electromagnetic radiation on water solutions of nucleic acids was the purpose of this work.

According to a goal the following problems were solved: DNA allocation from a various biological material; carrying out the polimerazny chain reaction

(PCR) for the purpose of receiving short ампликонов; processing of water solutions of nucleic acids and them ампликонов EMP LF; removal of ranges of a hemilyuminestsention of model solutions of nucleic acids; definition of extent of influence of EMI LF on the DNA water model solutions.

Nucleic acids (DNA, RNA) integral blood of the person were object of research. Ампликона received from the control panel, length of ампликонов made about 410 couples of нуклеотидns. DNA from biological tests allocated by means of reactants of commercial sets of Амписенс – "DNK-sorb-V" (Moscow). For carrying out PTsR used an амплификатор of the rotor type "Rotor Gene" (Australia). The program of amplification included an unbraiding of double spirals of DNA, annealing of primers, cycling and chain elongation for accumulation of short pieces of DNA.

Radiation of solutions of nucleic acids and ампликонов by means of EMP LF carried out in a special glass vessel at the room temperature. Time of radiation made 10 minutes. Processing of water solutions of nucleic acids and them ампликонов was carried out by superlong electromagnetic radiation at frequencies from 5.5 - 8.5 Hz with a step of 0,1 Hz, from 9 – 15 Hz with a step of 1 Hz and from 15,5-16,5 with a step of 0,2 Hz. Thickness of the irradiated sample ~ 2 mm. The source of superlow-frequency signals which represents the generator of signals of G3 – 118 was applied to radiation. Intensity of a field in the location of a sample made 30 - 100мкТл. Instability of frequency in the range from 3 to 30 Hz reached 0,2%.

After each processing of a sample by means of EMP LF ranges of a hemilyuminestsention of the received solutions of ампликонов within 10 minutes for each allocated frequency were removed. Used Lum-5773 measures intensity of light arising in chemical and biological samples in work, values of intensity of a luminescence correspond to a light stream, i.e. quantity of photons in unit of time.

Nuclear magnetic resonances ranges of the received water solutions of ампликонов were removed on a pulse

nuclear magnetic resonance JEOL JNM-ECA 400MHz spectrometer. Shooting of ranges was carried out at the corresponding resonant frequency of kernels of a deuterium – 61.4 MHz. Shooting parameters: 6.7 with (acquisition time), 20 with (relaxation delay), 5.6 microsec (X-, 0.15 Hz (resolution).

During the made experiment dependence of intensity of a hemilyuminestention on radiation frequency set is received by DNA. It is established that the frequency of 9 Hz has the greatest impact on DNA solutions, in comparison with control intensity increased by 2-2,5 times.

Assuming that radiation of EMP LF leads to change of conformation of a molecule of DNA [4 - 5], for allocated DNA were removed a nuclear magnetic resonance ranges before EMP LF radiation.

The main restriction of the theoretical models describing possible mechanisms of action of EMP LF on biological objects, locality of initial parcels as a result of which all range of possible resonant mechanisms was reduced only to action on concentration of several ions was.

According to the point of view of V. V. Novikov by the constructive approach to the theoretical analysis of effects of effect of EMP LF can be had at the accounting of collective interactions of external electric and magnetic fields with ensemble of a large number of ions [2 - 3].

The system of interacting ions probably leads to formation of the loaded polyionic structures – clusters and to their interaction with EMP LF. These structures can possess property of the electrochemical accumulator transforming energy of external electric field, and also part of energy of the environment in energy of chemical reactions, at operating action on these processes of weak components of the field providing their coherence. It is obvious that low-frequency EMP can carry out only

operating function, making redistribution of total energy between solution components.

Thus initiation of chemical reactions of type of condensation of amino acids is a consequence of decrease in a barrier of energy of activation at the expense of the ionic organization of structure of solution, i.e. EMP LF can carry out function of the selective catalyst. According to this concept a number of restrictions on possibility of resonant selective action of such fields on biological systems is removed. The considerable number of new researches of fundamental properties of water solutions and their sensitivity to weak physical factors confirms a hypothesis of a defining role of the water environment as primary target of weak influences.

We believe that change of a gidratny cover of DNA under the influence of a low-frequency electromagnetic field, probably, also leads to restoration of N-communications, formation of stitchings and as a whole to DNA reparation that will be coordinated with opinion of authors [6 - 7].

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