

CURATIVE EFFECT OF GENERAL GEOMAGNETIC THERAPY

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Abstract—Constrictions of two magnetic therapy devices with constant and pulsed magnetic fields and results of biology and medical experiments are presented.

I. INTRODUCTION

The phenomenon of magnetism and therapeutic action of magnetic fields are well known for a long time. However, the aspects of possibility and efficiency in applying for medical purposes a constant magnetic field of low and lowest intensity (less than 1 micro tesla) remain under development [1]. The clinical and experimental studies have proven the presence of biological effects of the magnetic field at the geomagnetic activity level, which occur both on subcellular, cellular, organ levels and organismic one.

The influence of a constant magnetic field at the geomagnetic activity level on various functional parameters of the neuroendocrinal, cardiovascular, immune and a number of other systems of an organism has been determined. There is information with regard to the influence of this factor on the microcirculation, processes of inflammation and peroxidation of lipids.

The influence on an organism of a constant magnetic field at the geomagnetic activity level is characterized by intensification of inhibition processes in the central nervous system and by reduction of the speed of nerve impulse conduction throughout the periphery, accompanied by sedative effect and functional calm of organs and tissues. The development of the endocrine system training and adaptation has been determined. A constant magnetic field of the specified parameters provides eliminating vasospasm and improving microcirculation, stimulates erythropoiesis as erythrocytes acidity resistance rises and oxygen utilization in the tissues.

The influence of this physical factor on inflammation processes is characterized by anti-edematous action thanks to the reduction of hydration capability of the tissue.

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Weakening of the alterative component owing to the change in the "heparin - mast cells" system with the

reduction of their degranulation has been marked. Possibility of the magnetic field influence on proliferation processes has been proved.

There is special interest in the influence of a constant magnetic field at the geomagnetic activity level on the indices of natural immunity of an organism. There are reasons to believe that the essential role in the therapeutic action of a magnetic field belongs to the increase in the immunobiological resistance of an organism.

It has been determined that the influence of magnetic fields stimulates the intensity of phagocytosis by changing the activity of alkaline and acidic phosphatase of macrophages, processes of oxidative phosphorylation and glycolysis. The increase in the level of endogenous tissue serotonin under the action of a constant magnetic field on an organism can be also considered as a mechanism of modulation of immunobiological reactivity by activating the pituitary-adrenal system that causes change in the lymphoid tissues.

Taking into account the abovementioned mechanisms of action of constant magnetic fields, the use of this curative factor in the complex therapy of patients with various diseases incites interest.

II. MATERIAL AND METHODS

In order to assess the therapeutic action of constant magnetic fields at the geomagnetic activity level, a device "Geomag" has been designed, which consists of a case made as a couch, and reflectory and magnetic units [2]. The reflectory and magnetic units are installed inside the case of the couch. The magnetic unit consists of panels with constant magnets placed on their planes, while the reflectory unit consists of a board with cone-shaped reflectors placed on its plane.

The cone-shaped reflectors convert a constant magnetic field to an alternating magnetic field with frequency of more than 10 GHz that is near to the electromagnetic field of a man concerning its frequency and amplitude. The magnetic induction on the bed of a patient is 5 to 40 micro teslas more than the field of the Earth (50 micro teslas) depending on the height at which the magnetic unit is installed.

In order to assess the efficiency of the biological and clinical influence of geomagnetic fields, experimental and clinical researches have been performed.

A number of experimental researches on 56 white laboratory rats of both sexes with modeling of immobilization stress have been carried out. The weight

of a specimen varies between 250 and 350 gr. All the researches have been fulfilled according to the European convention for the protection of vertebrates animals used for experimental and other scientific purposes.

The immobilization stress simulation consisted in placing rats inside a non-metallic (plastic) cage, which does not allow the animals making free movements. The animals stayed in the cage during one day. Documentation of the presence of stress reaction took place after the sacrifice of the animals with the help of histological research of their adrenal glands (disappearance of lipids in the adrenal cortex).

After modeling the immobilization stress, the animals were placed on the device "Geomag" (induction of 40 micro teslas) for a single exposure during 30 minutes, 3 hours, and 6 hours after completed the experiment, as well as for 3 hours daily during 5 days. In order to assess the efficiency of the action of magnetic fields, the concentration of middle weight molecules in the blood serum and tissue concentration of malonic aldehyde were determined.

The clinical researches involved 37 males between 18 and 60 years of age (on the average 38.6 ± 4.3 years of age), who suffered exacerbation of peptic ulcer of the duodenum without any serious concomitant pathology. 25 patients (67.6 %) had relapsing disease with 1 to 2 exacerbations per year. The size of the ulcer varied between 5 and 17 mm (on the average 8.5 ± 1.2 mm). 15 patients received monotherapy, that was the patients did not additionally take medicine and physiotherapeutic procedures. The procedures of general geomagnetic therapy took place daily and lasted 20 minutes. The control group included 30 males, who stayed in the same hospital and received similar treatment, but without magnetotherapy. As for the age structure and clinical indices, the patients of the control and basic groups were comparable. Control endoscopic researches were performed before the treatment and then every 7 to 10 days up to the complete cuticularization of the ulcer. A comparative assessment of the periods of the duodenal cap ulcer cuticularization in the basic and control groups has been done.

III. RESULTS AND DISCUSSIONS

The experiments on animals who underwent immobilization stress have shown a sharp increase in the concentration of middle weight molecules in the blood, practically in three times (from 0.154 ± 0.07 up to 0.447 ± 0.07 standard units correspondingly, $p < 0.05$). Thereat, 5 days after the stress exerted, no normalization of the level of endotoxemia occurred: the concentration of middle weight molecules remained increased.

On the background of therapy by constant magnetic fields at the geomagnetic activity level with a single exposure for 30 minutes and 3 hours no positive changes in the concentration of middle weight molecules occurred, though a tendency for the endotoxemia decrease after a 3-hour influence has been revealed. After a 6-hour therapy session the concentration of middle

weight molecules decreased by almost 1.5 times (0.374 ± 0.07). After a therapy course, the index of endotoxemia became practically normal (0.174 ± 0.06 standard units).

Thus, the therapy using the device "Geomag" provides a faster decrease in the concentration of middle weight molecule intoxicants in the blood of the animals that underwent the immobilization stress. This improvement can be connected with accelerated disintoxication and excretion of metabolism intoxicants because of the improvement of the liver and kidneys functions. The accelerated excretion of middle weight molecule substances will insure a faster recovery of cellular metabolism and normalization of the indices of organism homeostasis.

The main factor of cell and membrane damage is activation of the processes of membrane lipid peroxidation. The animals that underwent the immobilization stress had practically a twofold increase in the basal concentration of malonic aldehyde (MDA) - the final product of lipid peroxidation - from 19.8 ± 2.1 up to 38.4 ± 2.7 nmoles/g, $p < 0.05$. These data are evidence of a sharp activation of lipid peroxidation processes with exhaust of endogenous antioxidants. The action of geomagnetic fields during 30 minutes did not influence on the apparent activation of lipid peroxidation, whereas the extension of the exposure for 3 to 6 hours provided less growth of MDA level. After the course of a 5-day treatment with 3-hour exposure sessions, the normalization of the studied index (22.5 ± 2.1 nmoles/g) has been marked. That is to say that the action of geomagnetic fields insured normalization of lipid peroxidation processes and hence kept cell membrane integrity and raised cell resistance to stress damage.

The use of general geomagnetic therapy for the treatment of patients with peptic ulcer of the duodenum proved that in the basic group of the patients the period of the ulcer cuticularization lasted 175 ± 2.4 days, whereas in the control group the endoscopic remission took place after 25.2 ± 2.1 days. The periods of ulcer cuticularization at the patients who received monotherapy were practically similar in comparison with the group of the patients who received geomagnetic therapy and medicinal treatment of peptic ulcer.

Hence, using in complex therapy procedures with action of a constant magnetic field at the geomagnetic activity level produced by the device "Geomag", the remission of disease occurred firmly earlier. Thanks to the applied treatment, ulcers of all 37 (100 %) patients cicatrized.

The results of the endoscopic researches have shown that cicatricial-ulcerative changes in the duodenal cap after the remission of the disease in the group of the patients, who received treatment with the use of the method of general geomagnetic therapy, were low-grade in comparison with the control group. No side effects in the course of the treatment by applying a constant magnetic field of a specified intensity have been detected. The case follow-up revealed the absence of disease relapses after the treatment during one year.

Thus, the results of the experimental and clinical researches have shown that the influence of a constant magnetic field at the geomagnetic activity level provides an accelerated organism disintoxication thanks to a faster neutralization of metabolism intoxicants in the liver and their accelerated excretion by the kidneys.

High efficiency of the offered method is confirmed by the clinical researches conducted. The absence of side effects, good tolerance and possibility of its combination with medicine treatment allow recommending a wider use of the method of general geomagnetic therapy for the treatment and follow-up care of patients with various diseases and under different pathological conditions after negative impact of adverse factors of the ambient environment.

V. THE DEVICE FOR THERAPY BY A PULSED MAGNETIC FIELD

In order to obtain therapeutic effect, the action of two collinear pulsed magnetic fields of specified frequencies differing in the order of magnitude is used [3].

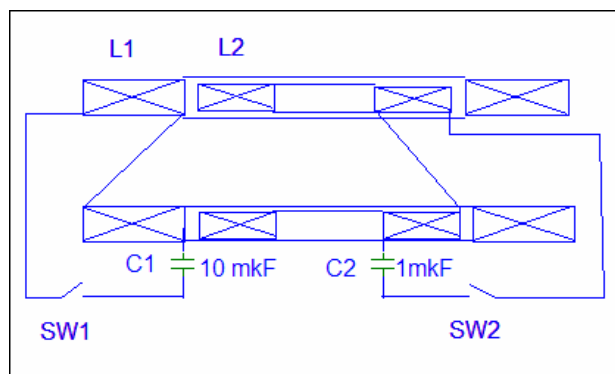


Fig.1

The fields are produced with discharge of the condensers through the coils, Fig.1. Damping decrement in the discharge circuit of the "slow" field (L1 C1) must be near-critical. In the discharge circuit of the "fast" field (L2 C2) the damping, decrement is significantly lower than critical and the change of the field in time is given by a damped sinusoid. The "fast" magnetic field excites in the conducting medium significant whirling current that runs perpendicularly to the magnetic field. The interaction of this current with "slow" magnetic fields results in mechanical influence on the medium specified by the Lorentz force. Having specified permeance values of biological media of 0.5 s/m, size of the area of influence of 10 cm, frequency of change of the "fast" field of 1 MHz and induction of the magnetic field of 1 tesla, the force of influence on the environment will be 0.07 MN.

Thus, the offered device produces in a biological medium electric influence as well as discernible mechanical action. This mechanical effect is essential when stimulating unstriated muscles of the superior

urinary tracts with the purpose to remove calculi or their fragments. Cytotoxic effect on malignant cells in the cell culture under action of combined fields is also evident.

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