Application of theoretical dosimetry in magnetotherapy

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The therapeutic use of physical factors is based on obtaining one or several well-defined therapeutic effects. At the same time, the use of alternating magnetic fields (MF) in physiotherapy, including those with a pulsed nature of the signal, is complicated by possible side, non-therapeutic effects that appear as a result of treatment. Recently, the scope of therapeutic application of variable MFs has significantly expanded and shifted to a lower frequency region, where frequencies with greater therapeutic efficacy began to be used.

The characteristics of the MF variables form the value of the therapeutic dose, which determines the required therapeutic effect of the exposure. Correct determination of the dose is difficult due to limited information on the quantitative ratios in the absorption and distribution of variable MF in the human body - dosimetry. Despite the sufficiently thoroughly studied therapeutic effect of variable MFs, including pulsed ones, the issues of dosimetry, in relation to their therapeutic use, remain unresolved so far. Dose setting on exposure is

difficult, because there are no subjective sensations of the patient, for example, heat, as is used in ultra-high-frequency therapy.

For this purpose, it seems expedient to use numerical dosimetry methods to estimate the average dose of variable MF within the framework of the expected therapeutic effect. In our studies, the program "SEMCAD X" * was used, which is based on the finite difference time domain (FDTD) method, modified for the problems of modeling low-frequency MF. As human models

detailed numerical models of man (man and woman) based on magnetic resonance imaging of the whole body were used. This approach makes it possible to assess the nature of the absorption of the energy of a pulsed magnetic field in the tissues of the human body in the frequency range used in exogenous bioresonance therapy (BRT) - from 10 to 1000 Hz.

The radiation source was a frame localized in the neck and upper chest, which is most often used in the BRT method. In the calculations, a pulsed MF with a fixed frequency of 465 Hz was used.

The preliminary results obtained made it possible to obtain a qualitative characteristic of the impact in the form of a structure of distribution in the cross section of the human body of currents generated by a pulsed MF with a frequency of 465 Hz. The quantitative assessment was obtained in the form of a scale of values of induced currents in various tissues. According to the data obtained, the theoretical values for the induced currents were in the range from 0.5 to 0.04 mA / m^2.
The obtained values do not exceed the maximum permissible values for this frequency range and signal structure, according to the recommendations of the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

It was found that the use of numerical methods of theoretical

dosimetry in the therapeutic application of pulsed magnetic fields, including for exogenous BRT, is possible. This approach allows one to evaluate various types of exposure to a patient with pulsed MF to achieve a therapeutic effect with control of exposure levels.

We express our gratitude to prof. N. Kuster (IT'IS Foundation, Zurich, Switzerland) for providing SEMCAD X v.14.4 software for research.