

Discussion issues of terminology in the field of modern traditional  
medicine.

I. Energy and information

M.Yu. Gotovsky, Yu.F. Perov

(Center for intelligent medical systems "IMEDIS", Moscow)

Modern medical terminology should be recognized as one of the most extensive and complex in terms of concept and content in comparison with other areas. This is due to the fact that it contains not only purely medical concepts, but also includes terms used in other sciences: biology, chemistry, physics, psychology, cybernetics, etc., which is several hundred thousand words and phrases. The constant increase in the volume of medical and biomedical information leads to the emergence of many new terms, the annual number of which, according to some information, is more than a thousand.

The unity and correctness of the used medical terminology in the field of new and newest methods of diagnosis and treatment is more than relevant. Especially, recently, when publications in scientific literature, conference proceedings, monographs and textbooks testify to a fairly widespread practice of arbitrary interpretation of some terms, ignoring the established fundamental concepts and recommendations, the use of incomprehensible abbreviations [1]. At the same time, there is always a not entirely justified introduction into the medical vocabulary, and not only into it, of foreign language borrowings, along with sometimes not always appropriate Russification of English terms.

The specificity and the resulting differences in terms used in traditional and clinical medicine are not always amenable to accurate identification, which creates inevitable difficulties in achieving unity in understanding the terms describing these phenomena. Many terms used in traditional medicine bear the imprint of hypotheses, theories, points of view and those concepts that are not always perceived by specialists working in other fields, which causes both controversial interpretations and not always fair criticism on their part. And if even within the framework of domestic medicine it is not always possible to achieve unanimity in the interpretation and interpretation of this or that phenomenon, then what then can we say about the discrepancies that are observed between scientific directions and schools of different countries.

At the beginning of the XXI century, there is an intensification of the integration processes of traditional Eastern and Western medicine. The methods and approaches of Eastern medicine, which are based on ideas and knowledge, empirically accumulated over many centuries, are gaining more and more recognition among doctors of European schools. The versatility and consistency of methods of diagnostics and treatment of traditional Eastern medicine make it possible to use them in almost all branches of modern medicine and by doctors of different

specialties. However, for Western doctors, many concepts and terminology of Eastern, for example, Chinese, medicine present certain difficulties, since it is based on schools and directions that differ from Western medicine. This situation is a significant obstacle to the integration of many directions in traditional medicine, and the terms play an important role here, many of which are consonant with those used in Eastern medicine. And if in other fields of science, for example, in chemistry, there are constantly published recommendations of the International Union of Pure and Applied Chemistry (IUPAC), then in the field of traditional medicine there are very few such recommendations. Existing English and other foreign thesauri are not applicable in our country. Meanwhile, special requirements are imposed on medical terminology,

However, according to our information, there is currently the only domestic edition in which to one degree or another all the terminological aspects related to medical activities in the field of traditional medicine are touched upon [2]. It is obvious that in one collection of articles it is almost impossible to touch upon all the issues related to the latest developments in the field of traditional methods of diagnosis and treatment. This situation was the reason for writing this first of a series of articles that are supposed to be published. The presented article sets out exclusively the position of the authors themselves in relation to the currently most widely used terms and concepts in the field of traditional medicine.

In the field of traditional medicine, there is the use of the phrase "energy information medicine", most often associated with the methods of traditional diagnostics, homeopathy, bioresonance therapy and information radio wave diagnostics and therapy. Along with the term "energy-informational medicine", there are synonyms: information-energy, information-wave, vibration medicine, as well as related terms: energy-informational preparations, energy-information systems, energy-informational interactions [3-6]. Development in the 1980s – 90s. acupuncture, electropuncture, bioresonance therapy contributed to the emergence of the general term "energy-informational medicine", reflecting the unity of information and energy processes occurring in a living organism. The explanation of these diagnostic and therapeutic methods is given using the methods and concepts of control systems theory and information theory. Considering this group of terms from modern positions, it seems appropriate to divide them into those related to factors of external influence on the body, terms that describe the nature of internal processes in the form of reactions (reactions) of the body to external influences, and generalizing terms that define the entire direction as a whole.

When substantiating the term "energy-informational impact", the works of A.S. Presman, in which the mechanisms of biological action of electromagnetic fields (EMF) are considered [7, 8]. All these links are devoid of any basis, since A.S. Presman in one of his monographs

considers "... the legitimacy of the concept of information (and not energy) interaction of EMF with biological systems" (italics ours, authors) [7, p. 255]. In another, later edition - "... the biological effects of weak fields, unexplained by their energetic interaction with the substance of living tissues, can be caused by information interactions of EMF with cybernetic systems of the body that receive information from the environment and, accordingly, regulate the processes of vital activity of organisms" [8, with. ten].

From the standpoint of thermodynamics, a living organism, regardless of the level of its organization, is an open (nonequilibrium) system and exchanges matter, energy and information with the environment. The first two types of interactions are carried out in the form of flows of matter, fields and radiation, while the third - informational - can exist only in the presence of the first two. In the first case, matter enters the object, while the effect of radiation is characterized by the transfer of energy in the form of energy flows. The nature of such interactions with any objects, both physical and biological, has its own specifics. The criterion for the impact on biological objects for a substance is the quality (chemical characteristic), the amount and duration of its interaction with the object. Energy and information interactions in the form of a substance always accompany each other: the body, for example, together with food, receives both the information contained in the molecular structure of the substances that make up food, and the energy of molecular bonds, which is released when they are broken and provides the energy requirement of metabolism [ nine]. Other ways of interaction are typical for EMF and radiation, which are evaluated according to other parameters - energy, frequency, nature and duration of exposure. In those cases when the energy of EMF or radiation is high, this is an energy interaction, and with extremely low energy characteristics, it is informational. The fundamental difference between an informational action and an energy one lies in the fact that the energetic one changes the internal energy of the organism, while informational - affects the processes of regulation and management in it. The energy absorbed by the biological system, without significantly increasing its general level, is at the same time a carrier of information, acting as a signal that causes a response at the expense of its own energy resources.

The results of numerous studies lead to the conclusion that the effects of the action of physical factors of low intensity, unexplained by their energetic effect on the body, can only be due to informational action. The information action is based on the idea that the organism of animals and humans perceives factors of low, intensities in the same way as changes in the environment (illumination, photoperiodism, temperature, barometric pressure, etc.).

In this capacity, as a rule, there are such factors that, while not possessing a vital action in themselves, i.e. the body can do without them, promote orientation and help it to adequately respond to changes

environment. Such an action of physical environmental factors serves as a source of information that determines the specificity of further response reactions of the organism.

The main features of the information action are that the end result is not uniquely dependent on the energy of the acting factor - its intensity. There are several main types of informational action, among which signaling, regulating and destabilizing actions can be distinguished [10-12].

The signaling action occurs when the values of the acting factor, comparable to the level of natural sources, and is perceived by the body as a signal carrying certain information. The signaling effect is observed only in whole organisms and is characterized by a number of features. The first feature is that in response reactions the value of the radiation intensity after reaching the threshold level does not play a significant role further, since only the presence of an acting factor with certain parameters is biologically significant. In this case, there is a trigger effect typical for biological systems, which consists in the transfer of the system from one state to another when a certain threshold is reached. Since the biological effect at the first stage is achieved, realized and / or realized, there is no need to further increase the signal intensity. The information provided by the signaling action is considered here solely as a trigger. Various ways of its further use by the body are possible - from dispersion to accumulation (summation) and preservation, depending on its biological significance.

The second feature is the small value of the latent period of reactions, mainly behavioral, which are used by the body for its spatial and temporal orientation. In its complete form, the informational effect has been proven for the low-frequency part of the EMF - variations of the geomagnetic field, which are used for navigation purposes by some species of animals (insects, birds), although the possibility of their additional orientation by the Sun or gravity cannot be ruled out.

Thus, the signaling effect of EMF is manifested in a change in the behavior of animals (motor activity, orientation in space and time), and a person may experience various subjective sensations. This determines the body's ability to perceive weak informational signals of EMF from the environment and, in accordance with their significance, to change the regulation of vital processes. Finally, the EMF itself can serve as an irritant for the development of conditioned reflexes, both in animals and in humans.

The regulatory action is observed in biological objects of various levels of the organization and is characterized by the ability to change their functional state. A distinctive feature of the regulatory action is the dependence of the presence of the response itself, its direction (sign) and magnitude only on the parameters of the current EMF (frequency, presence and type of modulation, etc.) and the absence of an unambiguous relationship with the radiation intensity.

The regulatory action explains the dependence of certain biological reactions on the frequency of EMF modulation, noted in many studies. This type of informational action of EMF is quite limited in terms of the magnitude of responses to radiation, it can have a reversible effect on the regulatory processes in the body, but is not able to disrupt or stop them.

The destabilizing effect is that when exposed to EMF fluctuations of any non-equilibrium process increase, as a result of which a multidirectional response of biological reactions is observed. This multidirectionality is due to the fact that the initial state of any biological object is not the same (standard), and under the influence of EMF, the response to radiation is directed in the most probable direction. As a result, there is an increase in the average deviation (variance) of any investigated indicator of the biological response in comparison with the initial state of the object. This multidirectionality is the reason for the frequent non-reproducibility, which is mistakenly considered as the uniqueness of the responses of biological objects, which are observed when using low-intensity factors.

It should be noted that both destabilizing and regulatory actions are, in fact, different sides of the same process. A kind of confrontation between the two effects of biological action - regulation and destabilization - occurs as a result of differences in the ability of individual responses of each object to move in one direction or another from the initial state. An increase in the number of biological objects involved in the study reduces the variability and uncertainty of the overall response to EMF, thereby increasing the reproducibility of the radiation effect.

At the same time, there are some methodological circumstances that impede the reproducibility of biological effects under informational exposure to EMF. In the overwhelming majority of studies of the biological effect of EMFs, they are aimed at obtaining traditional average values of individual parameters for assessing the state of an object as a result of irradiation. However, averaging the indicators obtained in experiments under the influence of low-intensity factors is not always justified. The emergence of nonlinear effects, which are often observed in biological responses, can lead to the loss of meaningful information about the nature of the regulation rearrangement, for example, a change in sign or a relationship between individual recorded parameters. However, such indicators can and do serve as a sensitive criterion in assessing the biological action of low-intensity factors, which is of independent importance. This irreproducibility is especially clearly observed in studies aimed at objectifying the biological and clinical effects, for example, of homeopathic medicines, as evidenced by numerous studies such as pro and contra. Thus, in real conditions, both regulation and destabilization take place, while the final result of their joint influence on the body, which determines the response

biological response is the sum of their actions.

Consequently, the combination of energy and informational action of low-intensity factors, in our opinion, is, although quite common, but initially erroneous and contradicts the opposite mechanisms of their biological action. Moreover, the principle of complementarity, which was formulated by N. Bohr, concerning the separation of physiological and mental phenomena, is currently not rejected, since there is no objective evidence of the existence of "information" energy [13, 14]. The representation of information as energy in energy-informational medicine is understood as a metaphor and is quite rightly emphasized, that "... in biological research, the path of information transmission (in physical and technical terms - a communication channel) was invariably clearly traced and information carriers were identified up to their molecular structure using high-tech methods" [15, p. 597]. It should be added that such carriers can also be physical factors of various nature - electric, magnetic fields and electromagnetic radiation in a wide frequency range - up to visible light, as well as acoustic ones.

Considering the problem of the biological action of low-intensity physical factors in the aspect of their informational action, it should be noted that it begins with values that are the minimum threshold of sensitivity for the body and is  $\sim 10^{-12} \text{ W / m}^2$  [10, 11]. Unlike the informational one, the energy effect starts from  $\sim 10 \text{ W / m}^2$ , and its maximum level for biological objects is determined by the lethal effect. Naturally, for informational action at such intensities, the very concept of "dose" of the absorbed power of an acting factor is little interpreted, while for energetic action it is more than real and has long been used in physiotherapy as a "therapeutic dose".

The number of definitions of the concept of "information" is large, and their detailed analysis is given in a number of monographs, which consider various aspects related to the fields of application, but, however, not all the conceptual diversity of this term [16]. Here it should be emphasized once again that the transmission of information to the system using a signal has a certain specificity, which is associated with the fact that "... if energy and material flows, figuratively speaking, feed the system, then the flows of information carried by signals organize its functioning, control her" [17, p. 40].

In accordance with this, the features of information interactions of the pre-mental level can be briefly formulated as follows [17, 18]:

- the result of information interactions is not unambiguous depending on the energy of the active signal;
- the interaction is carried out asymmetrically, as a result invariance of influencing and perceiving systems (the "transmitter" of the signal and the "receiver" cannot be reversed);
- a system that perceives information in a thermodynamic sense

is an open, non-equilibrium system.

Signals in information interactions are characterized by very low energy values - at or less than thermal noise. Hence the notorious "problem  $kT$ " (ie  $\hbar\nu \ll kT$ , where  $\hbar\nu$  is the EMF energy quantum,  $\hbar$  -Planck's constant,  $\nu$  is the frequency). In this regard, it is assumed that the processes of absorption of EMF energy, although they take place, but their nature at low intensities does not have direct biological significance, since the thermal energy of molecular motion in the form of noise completely dominates the energy arising from the action of the field. Problem  $kT$  originated in as a result of the fact that, as it turned out, the mechanisms of information impact of EMF are more difficult for research and interpretation than energy.

For a long time, the concept of "noise" has been associated with the idea of interference that can degrade the functioning of any system, but recent research shows that the presence of noise can be beneficial. The environment and internal environment of the body are sources of noise, which, like a random quantity, interferes with the process of transmitting, receiving or transforming information, which leads to the loss of part of it. If noise is considered as random signals that interfere with the perception of information, then the functioning of the body's defense systems is aimed at increasing the value of the signal-to-noise ratio [19]. There are several ways to improve this ratio due to the mechanisms of spatial or temporal summation of information signals carried by EMF, which are quite realizable in biological objects.

Spatial summation becomes possible if information signals are simultaneously perceived  $N$  by the number of elementary independent "Receivers", which, for example, can be cells or other structures of the body. Temporary summation is carried out when  $N$ -fold repeating information signals. In both cases the total signal-to-noise ratio increases by  $N$  times, which, with a sufficiently large number  $N$  ( $N \gg 1$ ) allows you to "receive" information signals with an intensity below the level of thermal noise. With the joint interaction of spatial and temporal summation, the signal amplification can reach tens and even hundreds of times. The implementation of such ways of increasing the signal-to-noise ratio in the body can significantly increase its sensitivity to low-intensity EMF.

However, noise, which was previously considered an unwanted interference, can also play a positive role, thereby increasing the signal-to-noise ratio, which is realized in such an effect as stochastic resonance. The phenomenon of stochastic resonance consists in increasing the power of the external EMF signal as a result of the input (pumping) of energy from the broadband internal noise of the object, and at a certain optimal noise level, the maximum effect is observed.

The term "resonance" in this case is not used in the generally accepted sense, but reflects the non-monotonic (resonant) dependence of the reaction of a biological object to the effect of an external EMF signal on the intensity of internal noise. The Role of Noise Oscillations Needed to Implement the Stochastic

resonance, can perform both external and internal thermal noise of a biological object. The main properties of stochastic resonance depend both on the characteristics of the noise (spectral composition) and on the informational component of the EMF signal (random, harmonic, modulated or without modulation).

The general principle of stochastic resonance as applied to threshold systems can be presented in the following form. In the absence of noise, the signal magnitude is insufficient to reach the threshold and implement a response, while with the appearance of noise, the threshold is crossed, and this happens in a random way. As a result, the response of a biological object can also be random. On the other hand, when exposed to a periodic signal, stochastic synchronization can occur, i.e. capture by the system of the frequency of the external EMF, which occurs as a result of the regulating and destabilizing components of the information action of low-intensity fields. Stochastic resonance is one of the latest theoretical concepts that is quite applicable to explain the mechanisms of information interactions between EMF and biological objects.

At the heart of others mechanisms, explaining information interaction, the concept of "biogenic magnetite" lies, which explains the sensitivity to the magnetic field of animals and humans by the presence in their tissues of accumulations of iron oxide - biomineralization. The phenomenon of such sensitivity is explained by the ability to capture the direction of the Earth's magnetic field using a ferromagnetic material of biological origin.

- biogenic magnetite. The most common material of magnetic inclusions in tissues is magnetite  $\text{Fe}_3\text{O}_4$ , which accumulates inside cells in the form of particles (ferromagnetic crystals) ranging in size from tens to hundreds of nm. The magnetic moments of all atoms of ferromagnets are oriented in parallel, as a result of which the magnitude of the magnetic moment of the crystal is equal to the arithmetic sum of all the magnetic moments of the atoms. Ferromagnetic crystals react to changes in the external magnetic field millions of times more than diamagnetic or paramagnetic materials of the same volume.

As a result of the studies performed, the localization of magnetite deposits in organs and tissues of animals and humans was clarified [21]. The discovered crystals of magnetite within the same biological species were the same in size. For example, in the human brain, 1 g of tissue accounts for at least  $5 \times 10^6$  crystals of magnetite, which are evenly distributed in the cerebellum, basal ganglia and midbrain.

Magnetite crystals located in the tissues of the body are able to respond to changes in the magnetic component of the EMF in two ways. One of the proposed mechanisms is that biogenic magnetite present in body tissues can interact with EMF through magnetoacoustic resonance. The energy of interaction of magnetite crystals with the magnetic component of the EMF is  $10^3$ - $10^7$  times more than the magnitude kT at



body temperature, and the field in the tissues is converted into mechanical vibrations in the same frequency range [22]. A serious objection to this hypothesis is the fact that the damping of mechanical vibrations in tissues can be very significant, and therefore the effect of EMF is not biologically significant. However, as a result of the fact that magnetite is distributed in the body in the form of formations less than one micron in size, each of these crystals can be a kind of "receiver" of EMF. In this case, for numbers located in tissues of the crystal organism, the signal-to-noise ratio would become  $N$  times higher, which would significantly increase the sensitivity to EMF of low intensities, more precisely to their magnetic component.

Biogenic magnetite plays an important role in the life of animals, providing them with the opportunity to use geomagnetic fields for navigation during seasonal migration. Biogenic magnetite in humans is most likely a rudimentary receptor formation lost in the process of evolution, which has now lost its functional significance. However, the existence of such structures in the body is an additional justification for explaining the mechanisms of human high sensitivity to low-frequency EMF of low intensities.

In conclusion, it can be stated that, despite the multiplicity of points of view, the authors share the opinion about the acceptability of using the term "information impact" in traditional medicine and related fields [23].

#### Literature

1. Akzhigitov G. Paradoxes of medical terminology // Med. newspaper. - 2003. - No. 48.
2. Terminological aspects of medical and pharmaceutical activities in the field of traditional medicine and homeopathy. - M.: Scientific-practical center of trad. honey. and homeopathy of the Ministry of Health of the Russian Federation, 2000. - (Series "Scientific works"; V.1).
3. Makarov K.A., Dubrovin D.A., Momot D.A. An introduction to information energy medicine. - SPb.: Publishing house of SPbMI im. acad. I.P. Pavlova, 1992.
4. Gerber R. Vibration medicine. - M.: Publishing house KOR, 1997.
5. Loshchilov V.I. Information-wave medicine and biology. - M.: Allegro-press, 1998.
6. Yusupov G.A. Energy information medicine. - M.: Publishing house "Homeopathic Medicine", 2000.
7. Pressman A.S. Electromagnetic fields and wildlife. - M.: Nauka, 1968.
8. Pressman A.S. Electromagnetic signaling in wildlife (facts, hypotheses, ways of research). - M.: Sov. radio, 1974.
9. Miller J. The individual as a system that processes information // Information and biological systems concept. - M.: Mir, 1966. - S. 279-304.
10. Plekhanov G.F. Three levels of biological action mechanisms low-frequency electromagnetic fields // Biological mechanisms and phenomena of the action of low-frequency and static electromagnetic fields on living systems. - Tomsk: Publishing house of Tomsk. University, 1984. - S. 3-8.
11. Plekhanov G.F. The main patterns of low-frequency

electromagnetobiology. - Tomsk: Publishing house of Tomsk. University, 1990.

12. Kudryashov Yu.B., Perov Yu.F., Rubin A.B. Radiation biophysics: radio frequency and microwave electromagnetic radiation. - M.: FIZMATLIT, 2008.

13. Bohr N. Biology and Atomic Physics // Atomic Physics and Human cognition. - M.: Publishing house of IL, 1962. - S. 27-38.

14. Simonov P.V. Physiological and psychological: principle complementarity // Zh. higher. nerve. active - 2000. - Vol. 50, No. 4. - S. 587-589.

15. Bazyan A.S., Shuikin N.N. Patents and psychics // Vestn. RAS. - 2006. - Vol.76, no. 7. - S. 596-602.

16. Chernavsky D.S. Synergetics and Information: Dynamic Theory information. Ed. 3rd, add. - M.: Book House "LIBROKOM", 2009.

17. Melik-Gaikazyan I.V. Information processes and reality. - M.: The science. Fizmatlit, 1998.

18. Kuznetsov N.A., Lyubetsky V.A., Chernavsky A.V. About the concept information interaction. 1: pre-psychic level // Information processes. - 2003. - T. 3, No. 1. - S. 1-22.

19. Gotovsky M.Yu. Electrical noise in biological systems and the effect of external low-intensity electromagnetic fields in bioresonance therapy // Zh. theoretical and practical. medicine. - 2004. - Vol. 2, No. 3. - P. 269-271.

20. Gotovsky M.Yu., Perov Yu.F., Chernetsova LV. Bioresonance therapy. - M.: IMEDIS, 2008.

21. Kirshvink J.L., Walker M.M. Particle size in magnetic magnetoreceptors // Biogenic magnetite and magnetoreception. New about biomagnetism: In 2 volumes. Vol. 1. / Ed. J. Kirshvink, D. Jones, B. McFadden. - M.: Mir, 1989. - S. 319-333.

22. Kirschvink JL, Kobayashi-Kirschvink A., DiazRicci JC, Kirschvink SJ Magnetite in human tissues: A mechanism for the biological effects of weak ELF magnetic fields // Bioelectromagnetics. - 1992. - Suppl. 1. - P. 101-113.

23. Bessonov A.E., Kalmykova E.A. Information medicine. - 2nd ed., add. - M.: VIRU, 2003.

Author's address

Ph.D. Gotovsky M.Yu.

Gene. Director of LLC "CIMS" IMEDIS "

info@imedis.ru

---

Gotovsky, M.Yu. Discussion issues of terminology in the field of modern traditional medicine. I. Energy and information / M.Yu. Gotovsky, Yu.F. Perov // Traditional medicine. - 2009. - No. 3 (18). - S.56-62.

[To favorites](#)