Experimental use of prenosological bioresonance diagnostics of limbic structures of the brain of white rats

E.V. Kudinova, S.S. Stepanov
(Omsk State Medical Academy, Center for Post-stress rehabilitation, Omsk, Russia)

The urgency of the problem

In the context of a rapidly developing ecological crisis, the study of medicobiological regularities of the impact of technogenic stress factors, the search for new diagnostic methods at the preclinical level and the development of ecological adaptive methods therapy combining in myself etiological and pathogenetic biocorrection are becoming increasingly important.

One of these promising methods is the method of nonlinear systems eat diagnostics (NLS-diagnostics) (V.I. Nesterov, 2002) due to the nonlinear nature of brain activity (L.I. inaccessible for traditional, linear, Fourier transform-based methods, thereby opening up new possibilities for assessing the central mechanisms of regulation at the level of cortical neural networks (E.A. Umryukhin, K.V. Sudakov, 1997) by the method of bioresonance diagnostics and therapy (Yu.A. . Gotovsky et al., 1996, 1998, 1999).

The specificity of the formation of a stress syndrome under the influence of a stressor is determined by which formations of the central nervous system are part of the pathological system (Kryzhanovsky G.N., 1996; Smirnov V.M., 2000). Therefore, the study of the features of the reorganization of brain structures in dominants is important neuromorphological and general biological problem (Sotnikov O.S. et al., 1994; Kryzhanovsky G.N., 1999).

The concept of diagnostics and treatment by "bioinformatic methods" is to search for pathological foci and systems with "abnormal" electromagnetic fields that are able to resonate harmoniously with "normal" electromagnetic frequencies in nerve cells in order to remove disharmonious fields that interfere with (Devyatkov N.D. . et al., 1991; Illarionov V.E., 1996). This opportunity is carried out by one of the most promising methods of bioresonance diagnostics, based on the registration and modulation of weak electromagnetic radiation from biological tissues (Betsky

O.V., 1993).

The purpose and objectives of the study

To develop and justify, from the standpoint of evidentiary medicine, prenosological m method of bioresonance diagnostics, to identify dynamic structural and functional changes in the brain of acute and chronic stress.

1. To study the formation of acute and chronic stress under the influence exogenous electromagnetic excitation on cyto-, dendro-, synapto- and angioarchitectonics of the limbic structures of the brain of various animal species.
2. To identify the structures of the brain that form the dominant foci of excitation in response to the electromagnetic effect of the external environment.
3. Determine the features of destructive and compensatory

restorative changes in neurons in the primary dominant focus of generalized excitation triggering stress syndrome.

Materials and methods

For registration and topical diagnostics associated with the formation of stress syndrome of electromagnetic changes in various parts of the brain, we used the hardware-software complex "Oberon" and the method of endogenous bioresonance therapy of stress syndrome developed by us.

In animals of group I (n = 63), BRT was not used, and in animals of group II (n = 64), BRT was carried out according to the standard scheme, using the "Oberon" complex. The main stages of BRT were as follows:

1) testing the state of the brain of animals on the apparatus "Oberon";

2) the formation of the initial data of the informational analogue of its own background radiation;

3) manufacturing of a medicinal preparation - nosode, in inversion mode;

4) carrying out bioinformatic effects on the brain using active background radiation enya nosode, cat ory was injected at 0.1 ml once a day "per os ".

Morphological study (light, electron microscopy, morphometry) of the brain of animals was performed after 14, 21 , 30, 45, 60 and 90 days, after the formation of stress syndrome. For light-optical studies, rat brains were fixed in 10% neutral formalin, embedded in paraffin, frontal sections 5–7 μm thick were prepared, and stained according to Nissl and hematoxylineosin. Light-optical histological examination of various parts of the brain (neocortex, limbic and brainstem structures) was carried out. For morphometric analysis, the numerical density of neurons and microvessels was calculated relative to a unit area (100 μm^2) at x600 magnification. For electron microscopic examination, the brain was fixed by immersion in a solution of 4% paraformaldehyde, 1% glutaraldehyde in 0.1 M phosphate buffer (pH - 7.4), treated with 1% osmium tetroxide (2 hours), dehydrated and embedded in a mixture of epon and araldite ... Ultrathin sections were prepared on an Ultracut-E ultramicrotome (Reichert-Jung), placed on unsupported grids, and contrasted with uranyl acetate and lead citrate. Viewing and photographing ultrathin sections was performed using a Hitachi-600H electron microscope. Electronic microscopic preparations were used to assess the general state of neurons, synapses, and all ultrastructural components of the vascular wall.

Experimental model

The studies were carried out in a chronic experiment on 127 sexually mature white Wistar male rats weighing 170–210 g. The experimental animals were kept under standard conditions in the vivarium of the Central Scientific Research Laboratory of the Omsk State Medical Academy. We used animals with a high and low threshold for seizure readiness of the brain. When performing the experiments, all the rules for working with laboratory animals were observed (order of the Ministry of Health of the Russian Federation No. 755 of 12.08.77). To simulate the stress syndrome, a model of reflex epilepsy was used under the action of sound stimulation with an intensity of 86 dBA and 102 dBA (Krushinsky L.V., 1960) in the kindling mode

(Kalimullina L.B. et al., 2000) with an interval between sound stimuli of 48 hours (Ryabinskaya E.A. et al., 1989). Sound is electromagnetic radiation, the brain receives information only through the senses for a narrow range of effects. The eyes react to electromagnetic radiation in an extremely narrow part of its spectrum from 350 to 770 nm. The range of electromagnetic waves of the frequency of sound perception is from 200 to 4000 Hz (Nikolaev E.I., 2001).

Within the framework of this study, the model of audiogenic convulsive states is the closest to the clinical prototype. The genes that control the sign of sensitivity to sound are recessive, but with the influence of a provoking external factor, such as electromagnetic acoustic stress, biochemical and hormonal imbalance begins (Romanova L.G., 1975). Electrical activity in the nervous system reflects all the differences in the nature of the impact: the temporal sequence of stimuli, the interval between them and their relative intensity (Nikolaeva E.I., 2001).

The choice of the experimental effect and the object of the experiment was associated with the necessity of not administering any pharmacological preparations to the animal, not using such strong stimuli as electric current and without violating the integrity of the nervous system, obtaining exogenous stress factors by the method of audiogenic kindling, which are closest to the clinical prototype, without mechanical brain damage and exogenous injection of biologically active substances and chemicals into the brain, electrical stimulation, causing severe degenerative changes in the tissue-structural elements of the central nervous system. A very convenient model for studying the relationship between excitation and inhibition and the systems of adaptive defense existing in the nervous system is the so-called reflex (audiogenic) epilepsy of rodents.

The physiological state of the nervous system, which underlies the development of various pathologies of nervous activity, with a prolonged excited state of the brain, developing under the influence of strong stimuli, leads to acute disturbances in the pathophysiology of the nervous
activity and visceral organs. However, despite all the complexity and originality of each individual case, at present it is possible to single out general patterns that underlie the implementation of the features of nervous activity. In our message, we will consider some general laws, which, it seems to us, are of fundamental importance for

the implementation of the features of nervous activity contributing to the development of stress syndrome.

The works of A.D. Speranskii found that in a number of cases, extreme (super-strong) irritations of the central and peripheral nervous systems of the most varied nature, including nonspecific irritations of the hypothalamo-pituitary region, cause the same type of changes in the nervous system itself with generalization of the process. This gave him reason to draw a conclusion about the standard forms of the body's response to the action of extreme stimuli, emphasizing the need to consider diseases of the body not only by their differences, but also by their similarity, to determine the leading links in

deployment of multilevel reactions.

One of the established mechanisms of the systemic organization of vital activity regulation processes is G. Selye's general adaptation syndrome - stress, which is a combination of nonspecific and specific reactions of the systems of neurohumoral regulation, metabolism and physiological functions. The systemic level of neurohumoral regulation of vital activity is manifested under stress in the form of an increase in the resistance of the body as a whole to the action of environmental factors, including those harmful to the body. The principle of determinism is confirmed, according to which all phenomena of nature and society, including diseases, are causally conditioned. The cause gives rise to the effect, the effect becomes the cause of subsequent changes, due to which the development of the disease proceeds. Knowledge of the etiology forms a correct understanding of the essence of the disease. Knowing the cause of the disease,

Therefore, in our experimental work, we used an integrated approach to studying the whole organism to elucidate the causal relationships that form the stress syndrome under the influence of extrasensory stimuli from the external environment.

The experimental model of stress syndrome we created on rats made it possible to study the role of various physiological states of this pathology and its correction in rats prone to audiogenic seizures arising in response to an intense sound stimulus (100-200 dB) during chronic sound stimulation (audiogenic kindling) ...

The data obtained went beyond the scope of experimental epilepsy. They concern the problem of higher nervous activity - the relationship between excitation and inhibition, as well as some general issues of pathologies of nervous activity.

Research results

Studies have shown that epileptic seizure is only one of many pathologies that develop against the background of a sharp arousal caused by stress in rats.

It was found that the influence of technogenic electromagnetic radiation (sound) provokes the development of a general adaptation syndrome. A complex of structural and functional changes in the cyto-, dendro, synapto- and angioarchitectonics of the limbic structures of the brain accompanied by energy deficiency states provoking the development of stress syndrome in animals. The central structure of the brain during the formation of a stress syndrome in response to exposure to exogenous environmental factors is the limbic structure of the brain - the hippocampus.

A general pattern of ultrastructural changes in hippocampal neurons was revealed in multivariate analysis of variance. By the 14-21 days of the experiment, there is a sharp decrease in the total numerical density of neurons 45.96% ($p < 0.001$), on the 30-45th day due to the compensatory mechanism of the developing adaptive syndrome, there is a partial recovery of the numerical density of neurons 31.32% ($p < 0.05$), from 45-60 days the total numerical neuron density 44.45% ($p < 0.05$), transition of the adaptation syndrome to the stage of decompensation, acute stress to chronic stress by 60–90

day and a decrease in the total numerical density of neurons 55.56% (p <0.05).

Feature reorganization is an selectivity defeat hippocampus, I subject to degenerative changes the all sectors, with maximum numerical density of irreversibly changed hyperchromic wrinkled with focal loss of neurons in the CA sector3, contributing to the reorganization of the CA sectorone.

Reorganization of the cytoarchitectonics of the CA sector is revealedone, due to the formation of group neuronal ensembles with increased information content of neurons and the formation of a dominant pacemaker zone in it, which triggers the development of stress syndrome, changing the integrative triggering activity of brain structures.

The maximum decrease in the total number of neurons in group I was noted in sector CA1 on the 14th day (36.4%), in sector CA2 - on the 21st day (52.2%), CA3 - on the 45th day (58.8%) and CA4 - on the 90th day of the experiment (50%). The content of irreversibly changed neurons in this group differed significantly in terms of timing. Thus, the content of hyperchromic shriveled neurons in the CA1 sector after 14 days of the experiment was 27.3%, in the CA2 sector - 56.5%, in the CA3 sector - 27.8% and in the CA4 sector - 20.0%. The maximum content of non-wrinkled hyperchromic neurons in sector CA1 was 60.0% on day 21, sector CA2
- 53.8% on the 45th day, sector CA3 - 55.6% on the 60th day and sector CA4 - 38.9% on the 30th day.

We assume that due to the formation in the CA sectorone of group neuronal ensembles with increased information content of neurons and pathological reverberation of excitation, dominant pacemaker zones appear in the hippocampus, which are involved in the formation of pathological brain systems.

We found that under stress, the hippocampus is one of the first to undergo structural and functional reorganization. Selectivity of lesions of hippocampal sectors during audiogenic stress with focal neuronal loss, maximum, in the CA sector3, and the maximum number density of irreversibly altered hyperchromic shriveled and hyperhydrated neurons contributes to the reorganization of the CA sectorone in all experimental animals.

Audiogenic threshold stimuli in the kindling mode in animals of the group without BRT have a significant damaging effect on neurons in all parts of the hippocampus. The severity of damage to the hippocampus by a decrease in the total number of neurons density (maximum value in the group) varies from 36.4% (CA1, day 21) to 58.8% (CA3, day 45), from 20.0% (CA4, 14th day) to 56.5% (CA2, 14th day).

The use of an integrated methodological approach (light and electron microscopy, morphometric analysis) made it possible to obtain a complete quantitative and qualitative characteristics of neurons and interneuronal synapses of the studied limbic structures of the brain and hippocampal sectors.

conclusions

1. For the first time with the help of BRD and histological methods of the mouth updated that hippocampus, the limbic structure of the brain responsible for perception, transformation and generation of sensory electromagnetic excitation. With exogenous electromagnetic exposure, this limbic structure of the brain undergoes the greatest structural and functional reorganization, with

the formation of a pacemaker, dominant zone of generalized excitement in the CA sectorone experimental animals.

2. A feature of the reorganization of the CA sectorone is the emergence of a dominant the primary excitation zone, due to the formation of group neuronal ensembles with increased information content of neurons and pathological reverberation of excitation, provoking the activation of secondary foci
excitations in the limbic and stem structures of the brain, triggering the stress syndrome with access to the target organs.

The results of the use of bioresonance diagnostics indicate the promising and correctness of the hypothesis, the energy-information fields of the body and the effectiveness of the proposed method for the prenosological diagnosis of the limbic structures of the brain at the energy-information level in various diseases stress syndrome. Correlation received experimental data of the MPD confirmed are proof of morphological methods, will the effectiveness of the MPD and allow, reasoned with positions of evidence-based medicine, use this method in the clinic.

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