TO THE ASSESSMENT OF ORGANISM AEROBIC RESERVES IN CONNECTION WITH MIGRATION

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Within the research of human adaptation to a change of permanent residence the assessment of migration impact on the migrants' health and aerobic organism reserves is of special interest. According to modern concepts the figure of maximal oxygen consumption (MOC) is an objective characteristic of human aerobic capacity. However, direct measurement of this parameter is quite time-consuming and not expedient. Moreover, during the physical working capacity test «to refusal» untrained people rarely reach the level of MOC and stop testing much earlier at the so-called symptom-limited MOC (SL-MOC). At the same time there are a number of methods that allow indirectly and quite accurately determine this figure, for example, by calculating PWC_{170} test results. Therefore, the ratio of oxygen (O_2) consumption speed at the level of individual maximum endurable testing capacity, i.e. SL-MOC, to calculated value of MOC may act as one of the characteristics of aerobic organism reserves. Obviously, the higher the index is, the higher the individual reserves and capabilities to achieve aerobic maximum are. In this context, the determined aim of this paper is to conduct a comparative analysis of organism aerobic reserves in groups of Crimean Tatars migrated to the Crimea and the ones have been living there since birth.

The research involved 45 Crimean Tatars aged 18–21. The first group consisted of 24 people, born and residing in the Crimea, the second one comprised of the ones who migrated to the peninsula at least 15–20 years. Research methods include working capacity testing, spirography, Gas analyzer research. The results of the research showed that migrants' organism aerobic reserves, according to the ratio of MOC to SL-MOC, were more than 6% ($p < 0,05$) reduced in comparison with the second group of examined. It is also interesting to note that the actual values of SL-MOC and MOC was also 16% ($p < 0,05$) and 8% ($p < 0,05$) accordingly reduced. Thus, there is a reason to believe that the impact of migration negatively affected aerobic reserves of examined. The results of the research can be further used in the diagnostics of health and in the development of individual health-preserving technologies for people who have changed their residence.

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THE CONTROL OF OXYGEN TENSION IN MUSCLE TISSUE USING BIOEFFECTIVE PULSE-FREQUENCY GENERATOR NEYROTON-01

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The article discusses the results of studying remote (non-invasive) control of oxygen tension in muscles of experimental animals using bioeffective pulse-frequency generator Neyroton-01 – a model of acoustic-electromagnetic continuum adapted to the impulse hypoxia of nerve cells. We suggest a hypothesis on the quantum mechanical (quantum theory of multiparticle and multielectron systems) nature of the «phenomenon of adaptation» encoding in the system of neuron oscillators. It was established that under the influence of the test technology, the level of pO_2 in the muscles of experimental animals decreases prior to the onset of tissue hypoxia, and then, as part of the aftereffect, there is a significant increase of pO_2 up to the level of physiological hyperoxia, which, according to the literature, is a sign of adaptation. Therefore, we can assume that we found a new and efficient method of forming the state of adaptation in the body other than the already known methods, such as high-altitude acclimatization, altitude-stepwise, barophysical and normobaric adaptations, exhausting physical exercises, etc. Results of this work suggest the real possibility of a non-invasive control of pO_2 levels in body tissues, which may be important for health care, mountaineering, physical culture and sports, space missions, as well as for the creation of new bioeffective pulse-frequency generators.

As shown by long-term studies (M.T. Shaov, 1981; O.V. Pshikova, M.T. Shaov, T.Sh. Khapazhev, 1995; M.T. Shaov, O.V. Pshikova, Kh.M.Kaskulov, 2002; O.V. Pshikova, I.S. Abazova, 2011), reduced frequency of impulse electrical activity (IEA) and increase in oxygen tension (pO_2) in experimental animals are indicative of the adaptation of their cerebral cortex nerve cells to impulse hypoxia caused by barophysiological appliances or high altitude conditions.

As a rule, the IEA frequency decreases from $10,0 \pm 0,43$ to $5,17 \pm 0,45$ pulses/s on the average, whereas pO_2 usually increases from $24,0 \pm 1,40$ to $33,4 \pm 2,20$ mm Hg. This implies that the dynamics of IEA and pO_2 is carried out within the famous Synergetic rule of Verhulst, according to which, indicator fluctuations (pO_2 and IEA) must not exceed the level of their initial value by large values (I.A. Eryukhin, 2000).

In another series of experiments it was found that at low-frequency IEA (< 10 Hz), nerve cells effectively control the cardiac activity (Z.A. Shidov, O.V. Pshikova and others, 1995) and adaptive capacity (O.V. Pshikova, 1999) of experimental animals' body: at normal (normoxic) frequency in the

range of 10,0 ± 0,43 Hz at height of 10 km (pressure chamber), ECG was recorded (4,30 beats / min) in only one animal out of seven, whereas at the adaptive frequency of IEA, making on the average 5,17 ± 0,45 Hz, ECG was recorded (20 beats/min) in five animals. Under the control of the low-frequency IEA, the critical threshold of rats' resistance to altitude (CTAR is an indicator of adaptive capacity in animals) of nerve cells increased by 2,5 km (O.V. Pshikova, 1999).

The basis for this are information links under the laws of quantum mechanics of multiparticle and multielectron systems formed between oxygenated sessions of impulse hypoxia by the acousto-electromagnetic continuum of neuron and pO_2 in the tissues of the body.

Based on the results of these studies, with the aid of radio engineering (pulse technique) means and modern computer technologies, we created bioeffective pulse-frequency generators Neyroton 01 and 02, which reproduce IEA frequencies adapted to neuron hypoxia and are able to remotely control physiological functions of the human body (M.T. Shaov, D.A. Khashkhozheva, O.V. Pshikova, 2008; M.T. Shaov, O.V. Pshikova, Z.A. Shaova, 2010), being in direct proportion to the oxygen regime in cells and tissues. This is explained by the fact that deoxygenation (hypoxia) and oxygenation (hyperoxia) processes triggered by pulse hypoxia potentiate and perpetuate the «phenomenon of adaptation» in oscillators (K^+, Na^+, Cl^-, I^-/I^+, CO_2, O_2 and ROS, RNA and others) of the neuron quantum field. As a result, communications between the oscillators caused synchronized oscillations of electric, acoustic and electromagnetic signals, i.e. data carriers, to arise in the system of acoustic-electromagnetic continuum of a neural cell; these signals are characterized by their own frequencies and propagating waves. These questions relate to the fundamental problems of biophysics and the new quantum-wave physiology (M.T. Shaov, O.V. Pshikova, 2010). Now, the fact that the low-frequency (< 10 Hz) IEA neuron oscillations are the translators of information about «the phenomenon of adaptation» (M.T. Shaov, Kh.A. Kurdanov, O.V. Pshikova, 2010) is of considerable interest; by means of these oscillations, we can create an imprinting technology for non-invasive management of physiological processes in cells and tissues of the body.

However, it is known that oxygen tension is the most important indicator of the physiological state of individual cells and organ tissues (V.A. Berezovskiy, 1975; M.T. Shaov, 1981). In this context, to find out whether it is possible to remotely control the pO_2 level by means of Neyroton technology, we conducted a series of studies on experimental animals.

Methods and objects. The gastrocnemius of a lake frog and Wistar white rats served as the object of study. Oxygen tension was recorded using high-speed highly sensitive polarograph by the method of pO_2 level determination in cells of plants and animals proposed by M.T. Shaov (1968, 1981). Polarographic platinum ultramicroelectrode was introduced into the target tissue using a special stereotactic technique. Animal's body was exposed to low-frequency IEA model adapted to impulse hypoxia of Neyroton-01 neuron.

These experiments were performed on 50 frogs and 35 rats. The results of experiments were processed using a conventional biometric method. Neyroton duration – 10 minutes, the distance to the animal – 2,5 meters. Since its frequencies are in the infrared range, Neyroton-01 influence can be extended to greater distances.

Results and discussion. The pO_2 dynamics in the gastrocnemius muscle of experimental animals under the influence of Neyroton-01 is shown in Fig. 1.

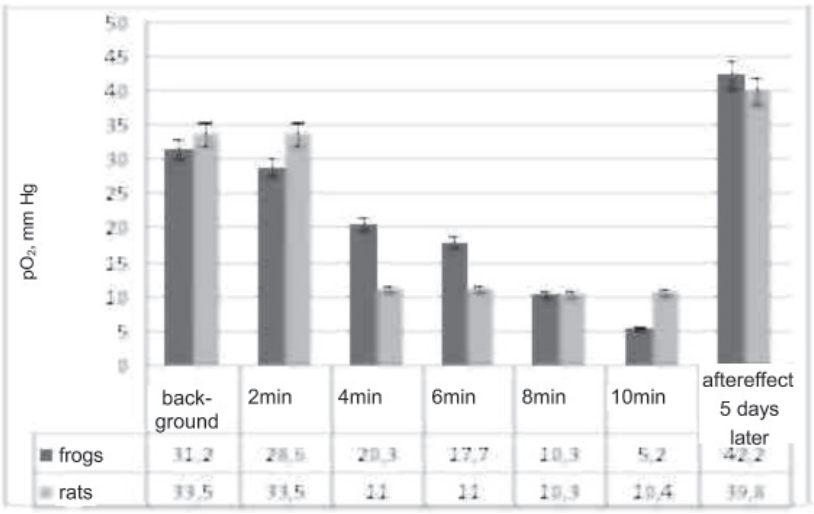

Fig. 1. pO_2 level change in muscle in experimental animals under the influence of pulse-frequency generator «Neyroton-01»

Fragments of differential oscillo- and polarograms of oxygen in the tissues are shown in Fig. 2 and 3. The background value of pO_2 in the gastrocnemius muscle of the frog was equal to the average of 31,2 ± 1,10 mm Hg; in that of a rat – 33,5 ± 1,07 mm Hg. Approximately the same data under the background conditions were obtained in the earlier studies (V.A. Berezovskiy, 1975; O.V. Pshikova, 1999 and others) during the registration of pO_2 in the muscle tissue of intact frogs and albino rats.

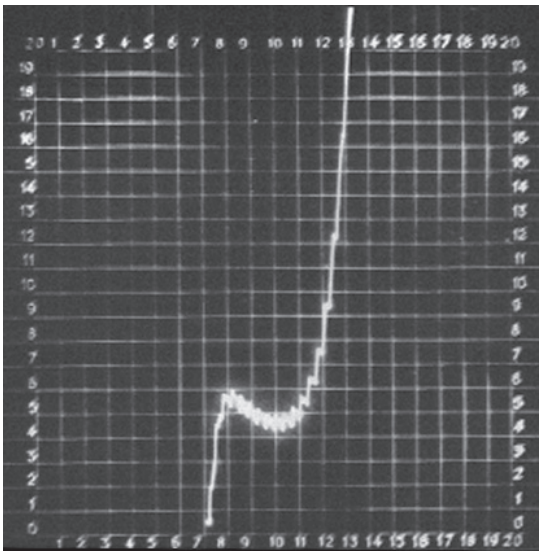

Fig. 2. Polarogram of oxygen registered in the gastrocnemius muscle of the frog prior to the impact of «Neyroton-01»; height (h) is proportional to pO_2, h = 5 cm

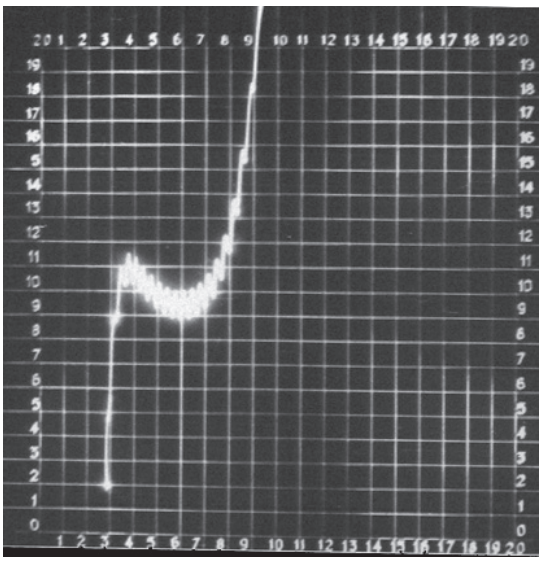

Fig. 3. Polarogram of oxygen registered in gastrocnemius muscle in frog after 10 minutes of exposure to «Neyroton-01», height (h) is proportional to pO_2, h = 8,2 cm

Under the influence of Neyroton-01, there was a gradual (stepwise) decrease in pO_2 level from 31,2 ± 1,10 to 5,20 ± 1,11 mm Hg ($p < 0,05$) in the gastrocnemius muscle of the frog. The dynamics of pO_2 in the gastrocnemius muscle of white rats was different: first (at minute 4), there was a significant drop from 33,5 ± 1,07 to 11,0 ± 1,16 mm Hg; at minute 6, 8 and 10, pO_2 level stabilized – fluctuations occured within 0,5 mm Hg.

In conditions of the aftereffect (5 days after the experiment) pO_2 level in muscle tissue significantly increased: in frogs – from 31,2 ± 1,10 (background) up to 42,2 ± 1,11 mm Hg, in white rats – from 33,5 ± 1,07 (background) to 39,8 ± 0,87 mm Hg. Such pO_2 changes are indicative of an already formed state of adaptation.

Consequently, the frequencies of the model of acousto-electromagnetic properties of a nerve cell may carry the information about the «phenomenon of adaptation».

The pO_2 level change in the muscle of experimental animals that were exposed to Neyroton-01 suggests that critical oxygen tension in living tissue depends on the animal's position in the tree of evolution – for frogs, it is 5,20 ± 1,11 mm Hg, and for warm-blooded animals (such as white rats) – 10–11 mm Hg. E.A. Kovalenko attached great importance to the definition of the critical level of pO_2 in cells and tissues for solving important problems in the pathophysiology and general hypoxicology. Furthermore, as follows from the results of this study, the kinetics of pO_2 can be indicators of adaptive reserve of an organism: the nature of pO_2 reduction in the muscle of the lake frog is logical, since it (the frog) is able to adapt to impulse hypoxia and hyperoxia (hypoxia dominates in water, whereas hyperoxia is common on land). White rat on the land does not have such an opportunity, as it is constantly exposed to ambient air that contains 145 mm Hg of pO_2 (pO_2 level for Nalchik). It is known that the constant factor cannot form a state of adaptation in the body at the molecular and cellular level (A.M. Gerasimov, N.V. Delenyan, M.T. Shaov, 1998; O.V. Pshikova, 1999). Apparently, for these reasons, the frog is able to quickly mobilize antihypoxic mechanisms and gradually reduce the level of pO_2, whereas the white rat launches its protective mechanisms somewhat later.

The overall direction of pO_2 dynamics in «cell-tissue» system is an increase of its level up to moderate hyperoxic state with small (9–10 mm Hg) excess of the initial (normoxic) values. This sudden change in pO_2 level is crucial, because in physiological conditions of hyperoxia, the tissues activate ADS, i.e. antioxidant defense system (A.M. Gerasimov, N.V. Delenyan, M.T. Shaov, 1998) and establish the oxygen regime in cells and tissues, under which the occurrence of diseases (cancer, hypertension, stroke, etc.) becomes almost unlikely, since the basis of their pathogenesis is hypoxia.

Thus, the results of these series of experiments suggest the actual possibility of remote (non-invasive) control of pO_2 level in tissues of the body,

which may have important implications for health care systems, physical education and sports, mountaneering, flights to the stratosphere and space, and creation of new areas of production in the field of Instrument Engineering, such as the release of bioeffective pulse-frequency generators based on quantum wave properties of nerve cells.

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ESTIMATION OF RISK FACTORS OF RESTENOSIS AFTER CORONARY REVASCULARISATION

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Coronary heart disease continuous to take the leading position in the world as the cause of death and early disablement of persons able to work, in spite of active introduction of modern methods of diagnostics and treatment.

Now a days in the treatment of coronary heart disease actual problem is both surgical and endovascular revascularization. Stents introduction with drug covering allows to show the priority of endovascular surgery in the chose of the methods of the coronary artery passage restoration.

In spite of the endovascular surgery progress high percents of complication stays after percutaneous coronary angioplasty.

The most often restenose of coronary arteries is takes place, which according to the statistics is developed during first 6 month after percutaneous coronary angioplasty in 20–40 % of patients [1–3], and in complicated injuries of coronary arteries it reaches 60 % [4].

The aim of the research: the estimation of coagulative factors influence and factors of inflammation on the risk elevation of restenosis.

Materials and methods of the research. 100 males of Karaganda region who unevened the procedure of stenting of coronary arteries in connection with acute myocardial infarction were examined.

Questionnaire of the patients was made paying attention to finding of risk factors of coronary heart disease: smoking, arterial hypertension and hereditary factors of cardiovascular pathology. Biochemical findings of lipid specter, coagulogramms, C-reactive protein and changing of throbocyte level were estimated.

All the patients were divided to two groups: 50 persons each. The 1st group consisted the patients with restenosis of coronary arteries determined by coronarography during 1 year after stenting in connection with the repeated episode of acute coronary syndrome; the 2nd group consisted with the patients without the signs of restenosis.

Results of research and their discussion. According to the questionnaire it was determined, that in the 1st group there were 44 % of smokers, but in the 2nd group the factor of smoking was only in 17 %. Hereditary factors to coronary heart disease was higher in the 1st group (64 %) in comparison with the 2nd group (50 %). Special attention was payed to that the arterial hypertension was more often in the 1st group too (64 %).

The signs of hypercoagulation were seen in 36 % in the 1st group, but in the 2nd group there were only 20 % of cases. Moderate level of thrombocytosis