EVALUATION OF PRENOSOLOGIC STATES IN MAN IN THE ARCTIC

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Abstract. From the point of view of possible pathological changes caused by extreme climatic conditions, for circumpolar countries (USSR, Scandinavian countries, USA, Canada, members of the Antarctic Treaty) of much theoretical and practical significance, is the carrying out of investigations on prenologic diagnostics as WHO recommended.

In the most severe conditions of the Antarctic 234 polarmen from different countries were examined in dynamics with cardiological methods. Four grades of prenologic states were distinguished: adequate adaptation, state with stressed mechanisms of adaptation, inadequate and broken adaptation. On the basis of distribution of individual prenologic states a structure of health of the Antarctic micropopulation was composed.

With growing severity of climatic conditions there were regular changes in health structure: decrease in number of people with adequate degree of adaptation and increase in ones with broken adaptation. In polarmen with broken adaptation more than 50% refer to people with borderline arterial hypertension or T-wave disturbances which correspond to "northern" cardiopathy (angiopathy).

Thus, when giving the nosologic diagnosis it is necessary to take into account not only the state of the organism but also the degree of its adaptation to the environment (ecological aspect of clinical diagnosis). Besides, the results of prenologic screening are possible to be used in medical choosing of members for polar teams, in control of polarmen's health state, when planning measures for prevention of "circumpolar" pathology.


One of the most actual and hotly discussed aspects of "northern" pathology is the question of initial cardiovascular disturbances. The isolation criteria that existed do not allow us to speak about their principal differences in monomorphic structure or "northern" cardiovascular pathology and therefore leave the question of prediction and therapy open.

The latest investigations have established initial cardiovascular pathology dissimilarity according to the tendencies of the development process, hemodynamic characteristics, clinical picture peculiarities which probably account for the existing differences in its assessment, from therapeutic nihilism to the feeling of alarm. With this in view, comparative investigations of peculiarities of epidemiology, aetiology, pathogenesis, clinical picture, therapeutic tactics and prognosis of initial cardiovascular pathology in different climatic and geographical regions are of importance. For many countries, for instance the Soviet Union, Scandinavian Countries, the United States, Canada, member-countries of the Antarctic Treaty and others, the carrying out of such investigations in circumpolar regions of the Earth with extreme ecological conditions is of much theoretical and practical significance.

A number of researchers have noted an increased cardiovascular pathology rate in different countries from South to North. However, in spite of significant morbidity investigations among residents, the migrants' morbidity problem in the process of their naturalization to new social, climatic and geographical conditions is most actual. From this point of view, climatic and geographical conditions, not only of polar but of temperate climate regions, appear to be inadequate and extreme for residents of torrid, subtropical and tropical zones. This, of course, extends the geography of such investigations.

In many countries a pioneer development of regions with severe climatic conditions is going on, generally by means of newcomers from regions with more favourable climates, or through expeditions. For the
newcomers or expedition members there is exposure to a new landscape, biogeological situation, time belt, light regime, social conditions and other important ingredients of the ecological environment.

To support organism homeostasis under new conditions there are changes of various functional systems, among which a leading role is played by the blood circulation system which serves as an indicator of the adaptational-compensative reactions of the whole organism. The process of adaptation in a new ecological environment very much depends on its functioning level, the stress degree of regulatory mechanisms and cardiovascular functional reserves. Exhaustion of cardiovascular system reserves resulting in one or the other forms of pathology may occur if extreme influences are of a very intensive or lasting character, or if the regulatory apparatus is inferior.

The latest investigations show that in newcomers in different countries of the world, blood pressure become higher in the course of time as compared to that of non-migrants. Movement to severe climatic conditions in many cases contributes to a quick development of hypertension of the "northern" type characterized by hypertensive crises and high gravity of the state of patients with frequent cerebral insult complications. At the same time there are data about a comparatively high occurrence of arterial hypertension and cardiopathy in some northern regions, the proportion of borderline hypertension and hypertensive disease of the-I-stage (according to WHO classification) being about 70%.

Thus, from the point of view of cardiac pathology, migrant populations are the populations of major risk. In keeping with WHO recommendation it is expedient to apply the methods of so-called prescriptive screening. The practical application of this method in the Soviet Union is the methodology of prenosologic diagnostics. Programs of prenosologic diagnostics are carried out in regions with unfavorable environmental conditions with the aim of defining the degree of organism adaptation to environments and finding out cases of the decrease of adaptive and protective potentialities of the organism, stressed mechanism of adaptation, or with the development of premorbid disorders and chronic diseases.

If in clinical diagnosis we distinguish symptomatic, functional, morphological, aetiological, pathogenetic, nosologic and predicting aspects in prenosologic diagnosis it is through the ecological approach that there are characteristic differences. An account of ecological aspects in clinical diagnosis is of considerable significance in such clinical states as essential arterial hypertension which can serve as epiphenomenon of adaptation—adaptive hypertension as a result of hemodynamic compensation by the organism of the dysfunction of metabolic and energy exchange between a human organism and the environment.

In the most severe conditions of the Antarctic, 234 polarmen from different countries were examined in dynamics with cardiological methods: personal and clinical questionnaires with special reference to occupational injury factors, nutrition regime, motor activity, smoking, alcohol usage, salt usage, subjective meteosensitivity and genetics. Anthropometry, wrist dynamometry, wrist static endurance were also used. To determine the functional level of cardiovascular system parameters high-sensitivity non-invasive methods of electro-, ballisto-, seismo- and echocardiography were used. Tension degree for the evaluation of immediate mechanisms of heart regulation was calculated by the method of mathematic analysis of cardiac rhythm. Regulatory strategic mechanisms were estimated according to mineral corticoidactivity of adrenal glands on proportion of potassium and sodium concentration in saliva. Functional reserves of cardiovascular system was determined by physical tolerance in dynamic (PWC170-test) and hand-grip regimes. Four grades of prenosologic states were distinguished: adequate adaptation, state with stressed mechanisms of adaptation, inadequate and broken adaptation. On the basis of distribution of individual prenosologic diagnosis a structure of health of the Antarctic micropopulation was composed.

Cardiovascular peculiarities in migrants in the Antarctic are as follows: the psychoemotional tension syndrome, high meteolability, physical working capacity decrease, early changes of intracardiac dynamics (stroke volume, duration of isometric contractility phase and ejection phase), T-wave disturbances which correspond to "northern" cardiopathy.

With growing severity of climatic conditions there were regular changes in health structure: decreases of numbers of people with adequate degrees of adaptation and increases in individuals with broken adaptation. In polarmen with broken adaptations more than 50% refer to people with borderline arterial hypertension—the main prenosologic form and also a particular example of "polar tension syndrome". Besides, the combination of so-called "northern" cardiopathy with arthralgias and ossalgiae of different localization has been discovered. The role of peripheral vascular and neurological disturbances as well as osteoporosis
as a sequence of metabolic changes, hypovitaminosis and content decreases of calcium salts through use of snowwater have been shown. Moreover either cardiopathy, or algae are possible as the consequences of reconstruction of mechanisms of active and passive transport of microelements by the mucosa of the upper intestinal tract. This phenomenon is proved by concentration reductions of zink, calcium, natrium and magnesium in blood and by the presence of latent iron deficiency.

Thus, there is the possibility of combined application of prenosologic and clinical diagnostics which add to each other and serve to study peculiarities of cardiovascular pathology development among newcomers in extreme climatic and geographical regions of the Northern and Southern Hemispheres.

When giving the nosologic diagnosis it is necessary to take into account not only the state of the organism but also the degree of its adaptation to the environment (ecological aspects of clinical diagnosis). Besides, the results of prenosologic screening—a new method used by Soviet space medicine—are possible to be used in medical selection of members for polar teams, in control of polarmen's health state, when planning measures for prevention of "circumpolar" pathology in populations in polar regions in the light of WHO goal of health for all by the year 2000.

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