

СЕКЦИЯ 12. АРКТИКА И ЕЕ ОСВОЕНИЕ
(доклады на английском и немецком языках)

During investigating the issue, I have found quite an informative paper of the scientist A.V. Egoshin. Accordingly, one of the most likely scenarios determining consequences of global climatic changes, so-called a greenhouse disaster (the author of this theory is our scientist A.V. Karnaukhov).

Without using scientific terms, this theory's essence can be explained as follows: the Earth temperature will rise owing to carbon dioxide increase in the Earth atmosphere (Carbon dioxide quantity is enough great to some extent as a result of carbonate rocks decomposition).

Rapid temperature rise will cause intensive methane intake from the thawing permafrost. Given that methane is stronger greenhouse gas by 21 times, than CO₂; the Earth temperature increase will be catastrophic. If global warming follows according to the Venus scenario (consisting of 98% CO₂, the Venus temperature has increased by 400 degrees, and its temperature is about 500°C), temperature of atmospheric boundary layer of the Earth can reach 150 degrees. Even 50 °C temperature rise will adversely affect human civilization, and 150 °C temperature rise will cause death of almost all living organisms on the Earth. It should be noted that according to A.V. Karnaukhov's forecasts, temperature will increase 150 °C only in 6000 years. However, real forecasts confirm such a temperature rise in 300 years [3].

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**MEDICAL SERVICE IN THE ARCTIC CONDITIONS: CHALLENGES
AND PERSPECTIVES**

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Arctic medicine is an area of medical science that deals with functioning of the human body and its diseases in the Arctic extreme conditions in order to develop the most effective and practically acceptable measures and methods of prevention, diagnosis and treatment. Arctic medicine summarizes the achievements of various branches of theoretical and clinical medicine, including human physiology and ecology of the North.

The main objectives of the Arctic medicine are: to reveal the inner mechanisms of human body adaptation when exposed to extreme factors of the North, especially the cold and violations of photoperiod; identify the characteristics of the diseases course of organs and systems; develop methods for their treatment.

This trend in the medical research is being intensively developed over the years by the world community of scientists on the basis of theoretical generalization of world experience. The following issues have been concluded:

- In the Arctic regions human diseases have their own peculiarities in developing that are more associated with environmental factors in the region and the state of adaptation of the organism.
- Human diseases develop in the harsh conditions of the region against the background of changing some parameters of the body: a specific diet, malnutrition, vitamin deficiency, shifts the physiological functions of body systems.
- Along with the generally accepted reasons for the diseases of the North there are a number of risk factors specific for the Arctic regions. During people's life in the North the frequency of specific diseases increased.
- Low efficiency of health care in the North is due to the actual lack of education systems, taking into account the specifics of the north, the lack of evidence-based programs of primary and secondary prevention of the most socially important human diseases in the region.

Russian Government developed a strategy of development in the Arctic for the period till 2020. One of the priorities of socio-economic development of the Arctic zone is medicine. It is necessary to develop effective and practically acceptable means of prevention and treatment methods based on the study of thin human adaptation mechanisms when exposed to extreme factors. These include, in particular, violations of the photoperiod-specific geomagnetic disturbances, contrasting the variability of the weather and, of course, a permanent stress of the body in extreme conditions of the Arctic. The development of this area is not possible without a comprehensive, interdisciplinary approach, including without systematic monitoring of natural and geophysical data.

One of the urgent tasks for Arctic Medicine is the adaptation of the human body to extreme conditions. This is important not only to ensure the effective work of the personnel, but also to reduce the risk of man-made disasters, which are in the Far North may have irreparable consequences.

Distinguishing Arctic medicine as a special branch of medical science has become possible thanks to the advances in modern medical treatment in the sphere of the characteristics of diseases of the cardiovascular system, respiratory, digestive, metabolic, and other systems and organs which are affected by natural and social factors in the Arctic environment.

Development of a special branch of medical science is conditioned by a number of facts. Namely, as compared to other continents Antarctic and Arctic regions are characterized by a rhythm change daily (circadian) and within annual period. Polar day and night last for 4, and morning and evening - for 2 months. Depending on the change of light and UV radiation, diurnal and annual rhythms change dramatically in the North and South Poles. During the long polar night and winter due to the negative balance of ultraviolet radiation and ultraviolet-light-hungry, the pathogenic factor is developed through the violation of a number of physiological processes. A polar day has a pathogenic effects on human body, with its excessive brightness of light, especially dangerous for human eyes.

All the diseases that occur in the Arctic and Antarctic, can be divided into several groups:

1. diseases caused by extreme factors (cold injury, electrical accident, etc.);

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2. acclimatization physiological processes and disturbances of the functional properties of various systems, especially with a predominance of autonomic neurosis disorders;

3. various injuries related to household and work responsibilities;

4. exacerbation of chronic and latent pathological processes and states.

It should be noted that intensive development of resources in the Extreme North is a course for ecological risk and conditions high morbidity and death rate, low average longevity of the regional population. This circumstance plays an important role in peoples' migration and results in sufficient economic loss [1]. Besides, chemicals from activities in the industrialized countries are transported to the Arctic regions by atmospheric airstreams and ocean currents, causing the substances to accumulate through the food chain. This is a factor that affects the lifestyle and the health of Arctic population.

Although explorers and designers produce special protecting clothing from cold and wind for outdoor action at extreme temperatures (below - 70 °), the development of the so-called "cold injury" occurs quite often. It is characterized by the local and general pathological changes in the organism. Its symptoms are injuries of some parts of the body, as well as the respiratory tract, and, in general, hypothermia and possible freezing of the body.

In addition to the general cooling of the body by increasing the heat transfer during breathing, reaching 15 - 20%, there may be a heavy syndrome - hypothermia lungs, called "pulmonary perfrigeration". Active research on the fundamental problems of the Arctic medicine is performed by the specialists of two Tomsk Academic Research Centers - Siberian Branch of the Russian Academy of Sciences and the Siberian Branch of the Academy of Medical Sciences. Their studies have made great contribution to the development of Arctic medicine. For example, Siberian Branch of the Academy of Medical Sciences performs monitoring of the development of several diseases among the Arctic peoples, concentrating on the region's special conditions and influences. Part of this research also looks at gene – environment interactions, and at the genetic sensitivity of the indigenous people.

Interest in this issue is not weakened among the global community. This fact is dictated by the enormous natural resources of the North with the expected in the near future depletion of mineral resources in the more accessible parts of the globe. According to the most drastic forecasts in the distant future up to 1.5 billion people may migrate to the Arctic region.

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