

Belarus in 2017 uses 192 Cobalt-60 radionuclide sources for a precise delivery of high conformal volumetric dose distributions. The 192 radiation sources located in the radiation head divided to 8 sectors of 24 sources, which can be operated independently to create the complex dose patterns with extremely high gradients. The maximum radioactivity of cobalt-60 at a loading of 6600 Ci (approximately 244 TBq).

Since high-absorbed dose values are delivered in one or several (up to 5) fractions, to ensure the safety and accuracy of such treatments, it is critically important to develop and to strictly follow the dedicated quality assurance programme for the stereotaxic gamma device. The medical physicists of the Radiotherapy Engineering and Medical Physics Department at N. N. Alexandrov National Cancer Centre of Belarus have developed that programme, which is approved and implemented to the clinical use of the Centre.

The developed guidelines for the control of the technical characteristics of the Gamma-knife and its radiation safety systems are a guarantee for safe and accurate dose delivery during radiotherapy sessions. Those guidelines contain a list of characteristics to be monitored, methods of their assessment and forms of protocols of periodic control.

In particular, the following systems of the Gamma-knife machine that ensure radiation safety are necessary to be checked: information boards, visual checks of the adapter frame integrity, video surveillance and surveillance systems, warning sound signals, door interlocks at the entrance to the treatment room, emergency switches, radiation background indicator, source of emergency power supply, emergency switches, accuracy of the focus, the manual control system of the couch. More than 200 quality assurance procedures were already performed by the experienced medical physicists using the developed quality assurance programme.

The development of the new quality assurance programme for the stereotactic gamma machine Gamma-knife gave the staff of the Radiotherapy Engineering and Medical Physics Department the possibility of more accurate assessment of the absorbed dose delivery to cancer patients and thus increase the level of their radiation safety.

## **ANALYSIS THE CARDIOVASCULAR SYSTEM DISEASES PEOPLE DISTRICT MOLODECHNO V. CHIST**

---

**A. Vishnevskaya-Sushko, N. Kozelko**

*Belarusian State University, ISEI BSU,  
Minsk, Republic of Belarus  
linasmith2810@gmail.com*

The cardiovascular system diseases are the most common human disease, including both adult and pediatric population. Every year is dominated by diseases such as cardiovascular disease, atherosclerosis, coronary heart disease, hypertension, heart failure, valvular heart disease, myocarditis, cardiomyopathy and pericarditis.

The cardiovascular system diseases are multifactorial etiology and develop in interaction between people and their environment, which define the social, economic and environmental determinants.

*Keywords:* cardiovascular system, cardiovascular system diseases, morbidity, circulatory disease.

In our time, the problem of public health is growing every day. Of particular importance is the anthropogenic factor, namely the adverse effect of working conditions. These people have high blood pressure and oxygen deficiency.

Cardiovascular disease includes coronary artery diseases such as angina and myocardial infarction (commonly known as a heart attack). Other cardiovascular system diseases include stroke, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, heart arrhythmia, congenital heart disease, valvular heart disease, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, and venous thrombosis [1].

The cardiovascular system diseases have a multifactorial etiology and develop as a result of complex interactions between a person and his environment, which is determined by social, economic and environmental determinants. It is noticeable that the lifestyle of people in the development of cardiovascular system diseases plays a big role.

The influence of occupational factors on the cardiovascular system is mediated indirectly through changes in the nervous-endocrine system, the blood system, and the respiratory apparatus.

The cardiovascular system diseases are mainly spread among the disabled population, especially among women (10 cases out of 17 for 2016, 7 cases out of 15 for 2015). For 2015 and 2016, there were no fatalities among women of working age, all were in incapacitated age. This number increased from 7 to 10 people, i.e. on 3 persons [2, 3].

According to the data for 2016 in comparison with 2015 in the v. Chist, the number of male deaths from diseases of the cardiovascular system decreased by one case, in disabled age decreased from 7 cases to 4 (for 3 cases), at working age increased from 1 to 3 (for 2 cases). The number of deaths from diseases of the female population in the disabled age increased from 7 to 10 (for 3 cases), in the working age the figures of deaths from the diseases of the cardiovascular system were not recorded [2, 3].

Analysis of the data showed that the number of male deaths from cardiovascular diseases decreased by one case. In the disabled age decreased from 7 cases to 4. In working age increased from 1 to 3 [2, 3].

The death toll of the cardiovascular system of the female in the disabled age increased from 7 to 10. At the working age, mortality from cardiovascular diseases was not recorded [2, 3].

In the first place, the structure of the causes of death is the diseases of the cardiovascular system, mainly diseases of the circulatory system. An overview of the mortality data of the population of the village of Chist, from diseases of the cardiovascular system is the main cause of death of the population, significantly affecting the labor and vital potential of society, and the demographic security of the state.

The diseases of the cardiovascular system are basically distributed to women and of disabled age.

#### BIBLIOGRAPHY

1. Global Atlas on Cardiovascular Disease Prevention and Control / Shanthi Mendis [et al.] // World Health Organization in collaboration with the World Heart Federation and the World Stroke Organization, 2011. – 164 p.

2. Смертность лиц трудоспособного возраста по полу Чистинского врачебного участка за 2015, 2016 года: утв. Чистинской участковой больницей 31.09.2016. – Чисть. – 8 с.

3. Структура смертности по возрасту и полу Чистинского врачебного участка за 2015, 2016 года: утв. Чистинской участковой больницей 31.09.2016. – Чисть. – 15 с.

#### CHARACTERISTIC AND POSSIBLE TARGETS OF ACTIVITY OF IMMUNOMODULATORS OF PLANT AND FUNGICAL ORIGIN

---

**T. Yerchinskaya, N. Ikonnikova**

*Belarusian State University, ISEI BSU,*

*Minsk, Republic of Belarus*

*sofnat@mail.ru*

*tanya.erchinskaya@mail.ru*

On the basis of the literature data, an idea is formed of compounds capable of influencing the effectiveness of the immune response. Among them - it was shown that polysaccharides of plants and fungi turned out to be substances with high biological activity. Other therapeutic effects of natural immunomodulators-fungal and plant metabolites, such as anti-inflammatory, antibacterial and antiviral properties, anti-hypoglycaemic and antitumor activity, are known.

**Keywords:** immunomodulating properties, biologically active substances, fungal polysaccharides.

Possible mechanism of modulating effect of fungal and plant-derived polysaccharides with respect to the organs of the immune system is the ability to influence the production of cytokines, the expression of adhesion molecules. Preparations based on polysaccharides of vegetable and fungal origin have no side effects and are characterized by low toxicity, in comparison with other chemotherapeutic agents, which gives them significant advantages in the development of immunomodulating, antitumor and wound healing agents.

The main active substances with immunostimulating activity are polysaccharides of plants and fungi.

The mechanism of action of plant immunomodulators is the ability to activate the phagocytic activity of neutrophilic granulocytes and macrophages, stimulate the production of IL. Echinacea promotes the transformation of B-lymphocytes into plasma cells, improves the function of T-helpers [1].

Also immunomodulating properties are *eleutherococcus spiny* (*Eleutherococcus senticosus* Maxim. Or *Acanthopanax senticosus*). *Eleutherosides B and D* cause an increase in T-killer activity. In vitro, the liquid extract of *Eleutherococcus* induces production and enhances the effect of IL-1 and IL-6 in laboratory and clinical studies.

Studies conducted in the late 90s of the twentieth century confirmed that fungi such as *Lentinus edodes*, *Pleurotus ostreatus*, *Ganoderma lucidum*, *Schizophillum commune*, *Flammulina velutipes*, *Tremella faciformis* etc. influence the activity of macrophages and stimulate the immune system [2].