

and commensals, are involved in several pathogenetic mechanisms. The integrity of intestinal microbiota can be influenced by some external factors, including the use of antibiotics, radiation, changes in the GIT, changes in the diet, psychological and physical stress. Psychological stress can directly affect the composition of the microflora, in particular with a noticeable decrease in lactic acid bacteria. GIT changes caused by stress factors make the conditions of the intestinal medium less favorable for survival, adhesion and replication of lactic acid bacteria [2].

Classical transmission of CNS-intestine-microbial signals works through central regulation of satiety. Changes in the nature of the diet as a result of CNS control of food intake can affect the availability of nutrients for the intestinal microbiota and its composition. Signal saturation proteins are key molecular mediators that provide this control. CNS can affect intestinal microbiome through the nerve and endocrine pathways both in direct and indirect ways. The autonomic nervous system and the hypothalamus-pituitary-adrenal axis that maintain the connection between CNS and internal organs can modulate intestinal physiology, for example, motility, secretion and permeability of the epithelium, as well as systemic hormones, which in turn affect the environment in the biotopes of microbiota residence and the host-microbial interaction on the mucosa. Stress causes defects in the epithelial barrier and subsequent activation of cells on the mucosa has been experimentally shown.

Long psychological stress also leads to a significant reduction in the production of mucin and the reduction of the presence of acid mucopolysaccharides on the surface of the gut mucosa, which facilitates the colonization of the intestine by pathogenic microorganisms. The balanced intestinal microflora is important not only for the maintenance of intestinal homeostasis, but also for regulating the functionality of the immune system with a direct effect on the intestinal system – the brain.

Thus using of probiotics can be useful for improving bowel homeostasis and preventing the development of dysbiosis associated with physical and psychological stress states.

Conclusions. Microbiome controls the canonical aspects of CNS, immunity and behavior in norm and in pathology. Nevertheless, the details of the role of microbiome in CNS disorders are unknown. The microbiome study has a perspective for prognosis and therapy associated with CNS disorder. Probiotics and functional foods can affect the action of the intestinal microbe on the central nervous system and the brain function. Along with the diet, they can restore intestinal homeostasis to improve cognitive or emotional function, and can be used to prevent, treat neurological disorders and to maintain the function of the immune system in stressful subjects.

BIBLIOGRAPHY

1. Старовойтова, С. А. Пробиотики и стресс / С. А. Старовойтова // Материалы V Межд. науч. конф. мол. ученых и студентов «Перспективы развития биологии, медицины и фармации», (Вестник ЮКГФА). – 2017. – Т. 3. – № 4. – С. 6–7.
2. Старовойтова, С. А. Иммунобиотики и их влияние на иммунную систему человека в норме и при патологии / С. А. Старовойтова, А. В. Карпов // *Biotechnology. Theory and Practice*. – 2015. – № 4. – С. 10–20.

QUALITY ASSURANCE PROGRAMME FOR THE GAMMA-KNIFE STEREOTACTIC GAMMA UNIT

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The Gamma Knife is a stereotactic gamma teletherapy machine, designed to treat pathological malformations in the cranial cavity with precisely delivered high dose values delivered during one or several treatment procedures. To ensure the safety and accuracy of such potentially a high-risk procedures, it is critically important to strictly follow the quality assurance guidelines for the stereotactic gamma machine. The development of a new quality assurance programme that included all the necessary procedures for the safe and accurate use of such a complex radiosurgery technique are critically important.

Keywords: radiation therapy, gamma-knife, medical physics, quality assurance programme.

The Gamma Knife is a stereotactic gamma teletherapy machine manufactured by the Elekta company (Sweden), designed to treat pathological malformations (benign and malignant tumors as well as other lesions) in the cranial cavity with precisely delivered high dose values delivered during one or several treatment procedures. The gamma knife of "PERFEXION" model that was installed in the N. N. Alexandrov National Cancer Centre of

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

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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].