THYROID MALIGNANT TUMORS INCIDENCE IN MINSK AND MINSK REGION IN 2007–2016

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Thyroid malignant tumors are among the most common diseases of the endocrine system. This is due to a variety of functional and structural disorders of the thyroid and a wide range of damaging factors as well.

Keywords: thyroid, malignant tumors, metastasis, autoimmune thyroiditis, manifest hypothyroidism, thyroid carcinomas.

Thyroid cancer is the most common oncopathology of the endocrine system, averaging about 1–3 % in the structure of incidence of all malignancies. Nowadays, there is a tendency to increase the incidence of thyroid cancer, due to both the consequences of the Chernobyl accident, and other factors, in particular the lack of iodine, as well as other trace elements in water, soil and air.

The required information for the incidence of disease analysis in different population groups of the Republic of Belarus for the period 2007 through 2016 was obtained considering the data of Republican Scientific and Practical Center for Medical Technologies, Informatization, Administration and Management of Health (RSPC MT) of Ministry of Health of the Republic of Belarus. For each year of observation, the analysis of primary and general morbidity of the population of the Republic of Belarus with thyroid tumors was carried out.

During the considered time interval, the highest incidence rates were revealed in Minsk in 2016 (7598,8 per 100 thousand populations), the most favorable situation in Brest and Grodno regions (5097,3 and 4545,5 per 100 thousand populations, respectively). Based on the data obtained, it is possible to note a stable tendency to increase the incidence in Minsk (R_2 = 0,9477). Based on the analysis, we also observed an annual increase in the primary incidence of thyroid cancer in Minsk. The peak incidence was in 2016 (16,8 per 100 thousand people). A more favorable situation can be noted in Grodno region (867,5 per 100 thousand people), where the rate of primary morbidity for the studied period of time is relatively constant.

The results of the research allow to make following conclusions: during the observation period, the morbidity and the contribution of thyroid tumors in oncological morbidity of population of the Republic of Belarus has increased significantly; a specific region play an important role in the risk of of the thyroid gland cancer having a background environment with the presence of carcinogenic factors as well as population-genetic causes.

The main difficulties in timely diagnosis are due to the fact that the tumor can exist for a long time under the guise or against the background of other thyroid diseases. This circumstance emphasizes the urgency of the problem and the need for a detailed study of the causal and predisposing factors to the occurrence of tumors of this localization. Thyroid diseases require close attention, both from medicine and from the environment, which is a science whose main goal is to reduce the negative consequences of human life.

ANALYSIS OF CHEMICALLY MODIFIED HEMOGLOBIN USING PROTEOMIC METHODS

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Currently the use of oxygen transport enhancers by athletes is one of the most important problems of doping control. This applies not only to such manipulations as autohemotransfusion, but also to the use of new developments in the field of hematopoiesis stimulants, as well as various types of alternative blood substitutes. This work is devoted to the formation of analytical approaches to the development of a highly sensitive method for determining modified forms of hemoglobins in blood using liquid chromatography - high resolution mass spectrometry.

Keywords: bovine hemoglobin, glutaraldehyde, high performance liquid chromatography, mass spectrometry, proteomics.

A widely known area of development in the field of alternative blood substitutes is the use of natural oxygen carriers, in particular hemoglobins of various origin, as the basis [1, 2]. To impart the necessary properties to these substances, base proteins undergo chemical modification, polymerization, crosslinking with various biologically active molecules and various encapsulation options. Such a variety of structural variants makes it difficult to identify them in biological fluids (in particular, in the blood) using classical biochemistry methods and creating a universal determination technique.

Applied biochemistry uses bottom-up and top-down proteomic approaches. These approaches allow not only to determine the qualitative and quantitative protein composition of complex biological matrices, but also to identify the nature and sites of biomolecule modifications resulting from both post-translational and artificial chemical modification. In this regard, proteomics methods are recommended by the World Anti-Doping Agency as the main methods for determining prohibited substances of protein nature and manipulations related to their use.

Research methods

Chemical modification of bovine hemoglobin (bHb) was carried out using glutaraldehyde (HA) in a final molar ratio of 1/20-1/50. The obtained modified hemoglobin was subjected to fractionation using centrifugal filter devices with various protein cut-off limits. Enzymatic hydrolysis of the samples of the starting and modified bovine hemoglobin was carried out after pretreatment with tributylphosphine and an alkylating reagent iodoacetamide. The hydrolysis was carried out using trypsin, as well as a mixture of Glu-C and Asp-N endoproteases.

The analysis of hemoglobin hydrolysates and top-down proteomic studies were performed using liquid chromatography - high resolution mass spectrometry on an Agilent 1290 Infinity ultra-high-performance liquid chromatograph and an Agilent 6550 iFunnel Q-TOF quadrupole-time-of-flight mass spectrometer (Agilent Technologies, USA).

Results and discussion

In the course of the studies, the nature and sites of modification of the α- and β-subunits of bovine hemoglobin with glutaraldehyde were studied.

During chromatographic separation using the top-down method, peaks of individual hemoglobin subunits were obtained, as well as a peak corresponding to the heme group dissociated from the protein. The research results showed the full detectability and sufficient intensity of the selected peptides in samples containing the target hemoglobin.

The results will be used to develop a method for hemoglobin-based blood substitutes determining for the laboratory stage of the doping control.

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BIOLOGICALLY ACTIVE ACTION OF AMINO ACIDS AND THEIR APPLYING IN THE CLINIC

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Keywords: amino acids, the biological role of amino acids, drugs.

Currently, more and more pharmaceutical companies are focusing their attention on amino acidbased drugs.

Amino acids in the body play an important role in building material for the synthesis of specific tissue proteins, enzymes, peptide hormones and other compounds. Based on amino acids, drugs have been created that are used as antihypertensive agents (captopril, enalapril, lisinopril, fosinopril), immunomodulators (thymogen) and hormone analogues (oxytocin, okreotide, desmopressin). Mono-preparations of amino acids: glutamic acid, gamma-aminobutyric acid, glycine, arginine, methionine, ornithine, taurine, etc. - they are prescribed for the treatment of many pathological processes, as well as for health and preventive purposes, especially for patients belonging to different risk groups. Also, amino acid solutions are used for parenteral nutrition [1].