

increasingly relevant and begins to pose a social threat to the lives of people, especially young people. To identify the features of the formation of imbalances in the micro- and macro elements among the youth of the city of Grodno and the Grodno region, observation groups of 18-30 years old with BMI = 19-24,9 and BMI = 25-30: women and men in the amount of 100 people were selected. For the study, biomaterial samples (hair) were selected according to the MBI.MN 3730-2011.

The macro- and microelement composition of the hair was determined by X-ray fluorescence analysis on a device of the type SER-01 or Elva X with the software Elvatech MCA Software and MK-RE-06. The XRD method allows express analysis of the chemical elements of the periodic table from sulfur to uranium in various media: solid, liquid, powder, to identify impurities with a concentration of 0.1 µg or more. Advantages of the method: obtaining a survey spectrum for all elements in one dimension; speed of receiving information; minimal sample preparation, without sample destruction; study of samples in various matrices; low energy consumption; the possibility of repeated measurements repeatedly.

The resulting material was processed using the statistical software package SPSS Statistics 22,0 as well as MS Excel. The median values of the content of essential elements in the biomaterial (hair) were calculated in groups of men and women with a body mass index of 19-24,9 and 25-30, the first and third quartiles. In young people aged 18-30 years, regardless of gender, with an increase in BMI = 25-30, there is an imbalance of vital essential elements: calcium, potassium, zinc, copper, iron. In the group of women, the most pronounced imbalance in calcium, zinc, copper. In the group of men, the most pronounced imbalance in potassium and iron. In the group of women, the accumulation of heavy metals such as mercury and cadmium are more intensive, and in the group of men, lead accumulates more intensively. All this contributes to the violation of metabolic processes in the body, which is possibly expressed in an increase in body mass index of both women and men. In the group of men with an increased body mass index, there are statistically significant correlations of element concentrations with BMI only according to the nonparametric Kendall and Spearman criteria. According to Kendall, there is an inverse relationship with BMI concentration of sulfur at a significance level of 0,05. With increasing BMI, the sulfur concentration decreases. According to Spearman, the inverse dependence of sulfur concentration on BMI is confirmed with a significance level of 0.01. There is also a direct dependence on the BMI concentration of lead in the body at a significance level of 0.05. In the Pearson group of women, there is a statistically significant (significance level 0,05) inverse correlation between the concentration of manganese in the biomaterial (hair) and body mass index. Thus, the lower the BMI, the more Mn accumulates in the body. According to Kendall and Spearman, the inverse dependence on the body mass index of manganese concentration at a significance level of 0,01, tin concentration at a significance level of 0,05 is statistically significant.

Conclusion

A non-invasive method (X-ray fluorescence) for determining the imbalance of bio elements and as a result of metabolic disturbances at an early stage of formation will allow for preventive measures and thereby maintain health at a young age.

PERIPHERAL BLOOD MEMORY T-CELLS SUBPOPULATIONS IN PATIENTS WITH SECONDARY COMPLICATIONS IN CHRONIC HCV INFECTION

U. Ivuts, S. Lykashik, M. Zafranskaya

Belarusian State University, ISEI BSU,

Minsk, Republic of Belarus

Belarusian Medical Academy of Postgraduate Education,

Minsk, Republic of Belarus

Belarusian State Medical University,

Minsk, Republic of Belarus

ivuts.ulyana@gmail.ru

In this work, we studied the subpopulation composition of peripheral blood memory T cells in patients with chronic HCV infection with extrahepatic complications - cryoglobulinemia.

Keywords: immunological memory, chronic hepatitis C, memory T cells.

Chronic HCV infection is characterized by a long-lasting infectious and inflammatory process in the liver tissue, which, ultimately, leads to the development of liver cirrhosis. However, in some cases, against the background of the disease, extrahepatic complications of the infection develop, including diseases such as mixed cryoglobulinemia, vasculitis, autoimmune thrombocytopenia, etc. [1]. The exact mechanism leading to the

production of cryoglobulins during HCV infection has not yet been established. Recent hypotheses include prolonged antigenic stimulation, superantigenic and polyclonal properties of HCV, which lead to chronic stimulation of mononuclear cells and activation of B cells [2]. The aim of the study was to assess the peripheral blood memory T-cells subpopulations in patients with chronic HCV infection.

The study included patients with chronic HCV infection with the presence of cryoglobulinemia (n = 13). The comparison group consisted of healthy donors (n = 13). The material for the study were samples of whole venous blood. To determine the expression of the main surface markers of lymphocytes, blood was stained with 2 panels of monoclonal antibodies: CD45-FITC / CD4-RD1 / CD8-ECD / CD3-PC5 and CD45-FITC / CD56-RD1 / CD19-ECD / CD3-PC5 (BeckmanCoulter, USA). The following monoclonal antibodies were used to determine the subpopulation of memory T cells: CD8-FITC, CCR7-PE, CD45RO-ECD, CD4-PC5, CD3-PC7 (Beckman-Coulter, R & D Systems, USA). The main populations of memory T cells were studied: naive memory T cells (nT) - CD3 + CCR7 + CD45RO-, central memory T cells (CM) - CD3 + CCR7 + CD45RO +, effector memory T cells (EM) - CD3 + CCR7- CD45RO +, terminally differentiated effector memory T cells (TEMRA) - CD3 + CCR7-CD45RO-. Data was recorded on an FC 500 flow cytometer (Beckman Coulter, Germany). To determine statistically significant differences, the non-parametric Mann-Whitney test was used. The results were presented as median, 25th and 75th percentiles.

Statistical processing of data in patients with cryoglobulinemia compared with healthy donors revealed a tendency to decrease in the number of naive memory T cells due to a statistically significant decrease in nT CD4 + from 54,25 (45,39 ÷ 59,58) by 28,85 (9,9 ÷ 43,95), (p<0,05). A tendency towards an increase in the number of terminally differentiated memory T cells due to a statistically significant increase in TEMRA CD4 + from 10,80 (10,25 ÷ 13,01) to 34,05 (21,50 ÷ 47,37), (p < 0,05). Thus, changes in the peripheral blood memory T-cells subpopulations in HCV-positive patients with the presence of cryoglobulinemia suggests that these subpopulations of lymphocytes may play a role in the formation of extrahepatic complications.

BIBLIOGRAPHY

1. *Ferri, C.* Hepatitis C virus syndrome: A constellation of organ- and non-organ specific autoimmune disorders, B-cell non-Hodgkin's lymphoma, and cancer // Sebastiani M, Giuggioli D, Colaci M, Fallahi P, Piluso A, Antonelli A, Zignego A. L. World // J. Hepatol. – 2015. – № 3. – C. 327–343.

2. *Hajdarova, Y. M., Kurmanova, G. M.* Sindrom krioglobulinemii pri gepatite s // Vestnik KazNMU. – 2012. – № 2. – S. 203–204.

CHARACTERISTICS OF $\gamma\delta$ T-LYMPHOCYTES IN PATIENTS WITH HEPATITIS C VIRUS INFECTION

A. Kalacheva¹, S. Lukashyk², D. Nizheharodava^{1,3}

¹*Belarusian State University, ISEI BSU,
Minsk, Republic of Belarus*

²*Belarusian State Medical University,
Minsk, Republic of Belarus*

³*Belarusian Medical Academy of Post-Graduate Education,
Minsk, Republic of Belarus
sasha.kalacheva.97@mail.ru*

As a result of liver damage, the proportion of viral hepatitis is 40% or more, with an average of 21 years in 20% of patients developing cirrhosis of the liver, and in 8% hepatocytic carcinoma is formed. A deep understanding of the pathogenesis of diseases and the role of $\gamma\delta$ T lymphocytes in this process will improve therapy and come closer to an individual therapeutic approach.

Keywords: $\gamma\delta$ T-lymphocytes, hepatitis C virus infection, isopentenyl pyrophosphate.

$\gamma\delta$ T-lymphocytes are specialized T-lymphocytes which place an intermediate position between the cells of innate and adaptive immunity [1]. The functions of T cells with a $\gamma\delta$ T cell receptor are distinguished: cytotoxicity, immunoregulation, presentation of antigens, and repair of damaged tissues and organs [2]. The determination of the composition and functions of $\gamma\delta$ T cells should be an integral part of immune status analysis in patients with hepatitis C virus (HCV) infection for development of novel approaches to disease prognosis and treatment.

The quantitative and functional characteristics of $\gamma\delta$ T lymphocytes were investigated in 31 patients with HCV-infection, 52,0 [42,2÷57,7] y.o.: group 1 – patients with HCV-infection, fibrosis stage 0–3 scores (n=24) and group 2 – patients with HCV-infection hepatitis C, fibrosis stage 4 scores – cirrhosis (n=7) using methods of