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REACTIVE RESPONSE OF NEUTROPHILIC GRANULOCYTES OF THE PERIPHERAL BLOOD IN PATIENTS WITH CHRONIC HEPATITIS C

Abstract. *The study of reactive response of neutrophilic granulocytes in 31 patients with chronic hepatitis C showed that the reactive response of neutrophils increases by 61, 22%, and is confirmed by a growth of neutrophils shift index by 56.25% and the index of relative number of neutrophils and monocytes by 16.0%.*
The reactive response of neutrophilic granulocytes in patients with chronic hepatitis C increased too, which contributes to an increase of immunological reactivity by 30.07%.
Key words. *hepatitis C, neutrophilic granulocytes.*

Introduction. Hepatitis C virus (HCV) establishes numerous connections with the immune system, causing a large number of diseases mainly autoimmune diseases such as mixed cryoglobulinemia, glomerulonephritis, arthritis, thyroiditis, and others. On the other hand, in the course of hepatitis C there is a large number of autoantibodies in the blood circulation. In our opinion, it is due to the fact that, in addition to hepatocytes, blood mononuclear cells (monocytes, macrophages), B-lymphocytes and polymorphonuclear leukocytosis are susceptible to HCV too. Infection of these immunocompetent cells determines numerous immunological disorders, occurring in more than half of patients with chronic hepatitis C [1, 2].

Objective: to establish a reactive response of neutrophilic polymorphonuclear granulocytes of the peripheral blood in patients with chronic hepatitis C.

Materials and methods. During 2014-2015 at the infectious department of Chernivtsi Regional Hospital we conducted the clinical and laboratory examination of 31 patients with chronic hepatitis C involving paraclinical methods. Patients of both sexes (21 male patients and 10 female ones), aged 26-63 years, who were to be treated in hospital were included in the experiment. The average age of the patients was 44,55 ± 1.14 years. Among them, 15 (48.39%) were older than the average age, and 16 (51.61%) younger than the average age. The control group consisted of 30 healthy individuals (21 (70%) male patients and 9 women), aged 46,81 ± 2.41years. All the patients were taken the whole peripheral venous blood that was mixed in a clean sterile tube with an anticoagulant EDTA-K2 × 2H2O. The counting of the absolute and relative number of major populations of immune cells was carried out according to the recommendations set out in the "User's Guide" on the operation hematology analyzer [3, 4].

The statistical analysis was performed on the computer IBM Pentium-IV, the package Microsoft Excel Professional for Windows XP and the software Stat Plus Professional 2009.

Results and discussion. If there was an insufficiency we had a negative pressure and the value with "+" indicated an increased function of reactivity of neutrophilic granulocytes. The value of results that was within 1-33%, corresponded to the first degree of disorders in reactive response of neutrophilic granulocytes (NG), 34-66,7% to the II degree, more than 66,7% - III degree of disorders in reactive response of NG [5, 6].

To establish the reactive response of NG the values of absolute and relative number of major populations of immune cells in peripheral blood of patients with chronic hepatitis C (CHC) are required.

Patients with chronic hepatitis C had reduced

Table 1

The absolute and relative number of major populations of immune cells in peripheral blood of patients with chronic hepatitis C

№	The population of immune cells	Units of measure-ment	Patients with chronic hepatitis C (n=31) M±m	Virtually healthy people (n=30) M±m	The degree of immune disorders	P
1	agranulocytes	%	29,91±0,31	32,36±1,18	-I	<0,05
		$x \cdot 10^9$/l	1,23±0,07	1,58±0,17	-I	>0,05
2	Lymphocytes	%	26,35±0,25	27,50±0,91	-I	>0,05
		$x \cdot 10^9$/l	1,08±0,03	1,34±0,17	-I	>0,05
3	Monocytes	%	3,55±0,05	4,86±0,45	-I	<0,05
		$x \cdot 10^9$/l	0,15±0,01	0,24±0,02	-II	<0,05
4	Granulocytes	%	70,09±0,73	64,86±1,81	+I	<0,05
5	Neutrophilic granulocytes	%	68,19±0,67	62,63±1,61	+I	<0,05
6	segmented neutrophils	%	64,45±0,61	59,53±2,89	+I	>0,05
7	stab neutrophils	%	3,74±0,11	3,10±0,52	+I	>0,05
8	Eosinophilic granulocytes	%	1,90±0,10	2,23±0,17	-I	>0,05
9	Leucocytes	$x \cdot 10^9$/l	4,11±0,27	4,88±0,97	-I	>0,05
10	platelets	$x \cdot 10^9$/l	168,17±10,09	202,37±2,02	-I	<0,05
11	red (blood) cells	$x \cdot 10^{12}$/l	4,34±0,45	4,73±1,01	-I	>0,05
12	Haemoglobin (Hb)	g/l	137,58±11,17	121,75±2,17	+I	>0,05
13	Increased erythrocyte sedimentation	mm/h	10,52±0,77	6,08±0,31	+III	< 0,01
14	Average age of the patients	years	44,55±1,14	46,21±2,41	-	> 0,05

by 8.19% number of agranulocytes due to a decrease by 36.90% of relative number of monocytes, the monocyte absolute number decreased by 60.0% and the absolute number of platelets decreased by 20.34%. At the same time the relative number of granulocytes increased by 8.06% due to an increase of neutrophilic granulocytes by 8,88%. Such changes of absolute and relative number of immunocompetent cells confirm the presence of inflammation, as evidenced by the growth of ESR by 73.03%.

A significant prevalence of the absolute and relative number of granulocytes over such values as agranulocytes by 2.34 and 2.34 times (in contrast by 2.01 and 2.00 times) indicates the activation of immunocompetent cells that are involved in nonspecific immune defense of the body.

Determining the non-specific reactivity is important in competent evaluation of the immune status. Neutrophilic agranulocytes, as the largest population of immunocompetent cells, form the first line of nonspecific protection against the penetration of microorganisms into the body [7]. They contribute to the synthesis of biologically active substances (lysozyme, interferon and other cytokines) and to formation of the immune response. Based on the above, we studied the reactive response of the peripheral blood neutrophilic granulocytes in patients with CHC [8,9].

It is shown that the index of reactive response of neutrophilic granulocytes in patients with chronic hepatitis C increases by 61.22%. Due to an increase of neutrophils shift index by 56.25%, the index of neutrophilic granulocytes and monocytes increases by 16.0%. The established index of reactive response of neutrophils indicates the compensation of endogenous intoxication, which developed in the body of patients with chronic hepatitis C, and the growth in the index of neutrophils and monocytes ratio confirms the predominance of the microphage system components over the macrophage function in the reactive response. The decrease of the absolute number of leukocytes and ESR ratio by 61,54% confirms the body's intoxication

Table 2

Reactive response of neutrophilic granulocytes in patients with chronic hepatitis C

Immuno-hematology parameters	Units of measurement	Patients with chronic hepatitis C (n=31) M±m	Virtually healthy people (n=30) M±m	The degree of immune disorders	P
Index of reactive response of the neutrophilic granulocytes	S.U.	4,24±0,31	2,63±0,25	+II	<0,05
Neutrophil-lymphocyte ratio	S.U.	2,59±0,18	2,38±0,17	+I	>0,05
Index of neutrophil shift	S.U.	0,058±0,006	0,032±0,002	+III	<0,05
Index of leukocyte shift	S.U.	2,34±0,17	2,08±0,16	+I	>0,05
Granulocyte-lymphocytic index	S.U.	3,76±0,19	4,09±0,17	-II	>0,05
neutrophils and monocytes ratio	S.U.	19,21±0,27	16,56±0,42	+I	<0,01
Leukocytes and ESR ratio	S.U.	0,39±0,04	0,63±0,04	-II	<0,05
leukocyte index	S.U.	1,66±0,10	1,47±0,07	+I	>0,05
Lymphocytic index	S.U.	0,39±0,04	0,39±0,04	-	>0,05
non-specific reactivity index	S.U.	40,90±0,43	43,30±069	-I	<0,01
immunological reactivity index	S.U.	7,96±031	6,12±0,15	+I	<0,01

due to the autoimmune processes, but with a predominance of infection.

An increased reactivity of neutrophilic granulocytes, involved in the formation of the immune response at all stages improves immunological reactivity of patients with chronic hepatitis C by 30.07%, which is a further positive sign of the disease.

Conclusions. 1.The reactive response of neutrophilic granulocytes increases by 61,22 % in patients with chronic hepatitis C which is confirmed by an increase of neutrophils shift index by 56.25% and the index of neutrophilic granulocytes and monocytes by 16,0 %.

2. The nonspecific immune defense in patients with chronic hepatitis C involves mononuclear and polynuclear phagocytes, but the immune response is dominated by polynuclear neutrophilic leukocytes confirming the prevalence of microphage system in the nonspecific defence of the body of patients with chronic hepatitis C.

3. Growth of the reactive response of neutrophilic granulocytes in patients with chronic hepatitis C is due to an increase of immunological reactivity by 30,07 %.

Prospects for further research. The results are the basis for establishing a general immune reactivity of patients with chronic hepatitis C.

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