Phospholipid composition change of lymphocytic membranes under influence of the hepatitis B virus and alcohol substitutes

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Summary. Phospholipid composition change of lymphocytic membranes under influence of the hepatitis B virus and alcohol substitutes

The purpose of our research was to reveal change of the contents of various fractions general and lymphocytes membranes phospholipids under influence of a HBV-infection and substitutes of alcohol.

Lipid spectrum of lymphocytes membranes phospholipids was determined at 50 healthy persons, 50 patients with acute viral hepatitis and 62 patients with toxic hepatitis.

Under influence of the HBV-infection there is a decrease of the contents free cholesterol, phosphotidilholin and phosphatidialanolamin, but the level of triglicerids, free fatty acids, cholesterol ethers and lisophospholipids raises. The decrease of the absolute contents general phospholipids and free cholesterol was marked. The influence of substitutes of alcohol was shown by the low contents of free fatty acids, cholesterol ethers and raised contents of lisophospholipids, phosphotidilholin, phosphatidialanolamin in lymphosites membranes.

Keywords: HBV-infection, alcohol substitutes, phospholipid composition change of lymphocytic membranes under influence of the hepatitis B virus and alcohol substitutes.

One of the places in the structure of liver diseases is occupied by toxic hepatitis [2]. Despite the introduction of new methods of laboratory and instrumental diagnostics in modern hepatology, the decoding of etiology and pathogenesis of acute and chronic liver diseases at the cellular and molecular level remains relevant [3,4].

At the end of 2006, the number of patients with acute toxic hepatitis associated with the use of alcohol-containing household chemicals increased significantly. In the Tver region the greatest number of patients was in the cities Rzhev, Konakovo, Kimry, Kashin, Bezhetsk. It was found that the cause of toxic hepatitis was the alcohol preparation polyhexamethylene guanidine hydrochloride.

It is known that changes in the lipid composition of immunocompetent cells, which can occur under the influence of various chemicals, lead to changes in the functional ability of cells [8]. Inflammatory processes in the body caused by various bacteria and viruses are based on the processes of membranes and cells destruction that determine the nature and outcome of the disease [1].

The aim of our study was to determine the peculiarities of changes in the various fractions content of lymphocytic membranes phospholipids under the influence of the hepatitis “B” virus and alcohol substitutes.

Materials and methods

We examined 62 patients with toxic hepatitis associated with the use of alcohol-containing household chemicals (Tox Hep), 50 patients with acute viral hepatitis B (AVH B) and 50 healthy individuals aged 29 to 55 years. Patients with toxic hepatitis were hospitalized in the cities Bezhetsk and Konakovo, and AVH B in the infectious diseases department of the Tver regional hospital N1. All patients were analyzed lipid spectrum of lymphocytes. Blood for the analysis was taken at the height of the disease for 10-15 days from the date of receipt. For separation of individual fractions of the cellular elements of whole blood using a separation density gradient — ficoll-verografin [7], with subsequent washing of the erythrocytes impurities of 0.84% solution of Ammonium chloride.

The serum lipid spectrum by method V.K. Makarov et al. [5] was detected with definition of percentage separate lipid fractions densitometrely with usage of densitometer Shimadzu CS – 9000 (Japan). The following fractions of phospholipids entered into composition of lipidogram: common phospholipids (PL) - lisophospholipids (LPL), sphingomielin (SM), phosphatidilholin (PH), (PE) was investigated. The outcomes of a contents of each lipid expressed in percentage, concerning a level of common phospholipid. The matching of groups was carried out with application of a computer program Biostat.

Results and discussion

The level of lysophospholipids in lymphocytic membranes phospholipids (PL) fractions between patients with toxic hepatitis and AVH B GPB the significantly different was found (table. 1). The lysophospholipids (LFL) content in hepatitis of toxic and viral etiologies were higher than in healthy persons (P<0.001), but in patients with AVH B this level was significantly higher than in patients with toxic hepatitis. The relative content of sphingomielin (CM) in patients with toxic hepatitis was reduced, while a significant difference on this basis between healthy persons and patients with AVH B could not be detected. The values of phosphatidyleholine (PH) and phosphatidylethanolamine (PE) in toxic hepatitis were higher than those in patients with acute viral hepatitis B (P<0.001). However, in healthy persons, the value of PE was significantly lower than in patients with toxic hepatitis, and the content of PH was significantly higher.

The level of lysophospholipids in lymphocytic membranes in toxic hepatitis was significantly lower than in acute viral hepatitis B, while in healthy persons the absolute content of LPL was lower than in toxic hepatitis and AVH B (table. 2).
Table 1. Spectrum of lymphocytic membranes phospholipids of healthy persons and patients with acute viral hepatitis B and toxic hepatitis

<table>
<thead>
<tr>
<th>Phospholipids</th>
<th>Phospholipids indicators (M ± m) in rel. %</th>
<th>Patients with AVH B (n = 50)</th>
<th>Patients with toxic hepatitis (n = 62)</th>
<th>P1</th>
<th>P2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPL</td>
<td>11,1±0,3</td>
<td>28,1±0,5</td>
<td>13,2±0,4 ***</td>
<td>&lt;0,001</td>
<td>&lt;0,001</td>
</tr>
<tr>
<td>SM</td>
<td>18,6±0,4</td>
<td>21,2±0,4</td>
<td>16,3±0,3 ***</td>
<td>&lt;0,01</td>
<td>&gt;0,05</td>
</tr>
<tr>
<td>PH</td>
<td>48,2±0,9</td>
<td>36,3±0,6</td>
<td>44,6±0,7 ***</td>
<td>&lt;0,001</td>
<td>&lt;0,001</td>
</tr>
<tr>
<td>PE</td>
<td>20,1±0,3</td>
<td>14,4±0,6</td>
<td>25,4±0,5 ***</td>
<td>&lt;0,001</td>
<td>&lt;0,001</td>
</tr>
</tbody>
</table>

Note: P1 - reliability of the phospholipids differences in patients with AVH B and the patients with toxic hepatitis; P2-reliability of phospholipids indicators differences in patients with AVH B and healthy persons; * differences of phospholipids indicators differences in patients with toxic hepatitis and healthy persons (* - p<0,05, ** p<0,01, *** p<0,001).

Table 2. Spectrum of lymphocytic membranes phospholipids of healthy persons and patients with acute viral hepatitis B and toxic hepatitis

<table>
<thead>
<tr>
<th>Phospholipids</th>
<th>Phospholipids indicators (M ± m) in mg%</th>
<th>Patients with AVH B (n = 50)</th>
<th>Patients with toxic hepatitis (n = 62)</th>
<th>P1</th>
<th>P2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPL</td>
<td>10,6±0,3</td>
<td>22,7±0,7</td>
<td>18,3±0,3 ***</td>
<td>&lt;0,001</td>
<td>&lt;0,001</td>
</tr>
<tr>
<td>SM</td>
<td>17,7±0,5</td>
<td>17,1±0,6</td>
<td>22,6±0,3 ***</td>
<td>&lt;0,01</td>
<td>&gt;0,05</td>
</tr>
<tr>
<td>PH</td>
<td>46,0±0,8</td>
<td>29,3±0,4</td>
<td>61,9±0,6 ***</td>
<td>&lt;0,001</td>
<td>&lt;0,001</td>
</tr>
<tr>
<td>PE</td>
<td>19,1±0,2</td>
<td>11,6±0,5</td>
<td>35,2±0,7 ***</td>
<td>&lt;0,001</td>
<td>&lt;0,001</td>
</tr>
</tbody>
</table>

Note: P1 - reliability of the phospholipids differences in patients with AVH B and the patients with toxic hepatitis; P2-reliability of phospholipids indicators differences in patients with AVH B and healthy persons; * differences of phospholipids indicators differences in patients with toxic hepatitis and healthy persons (* - p<0,05, ** p<0,01, *** p<0,001).

Sphingomyelin level in patients with toxic hepatitis was higher than in patients with acute viral hepatitis B and healthy persons. Significant differences in the content of phosphatidylycholine were found. So in patients with toxic hepatitis, this figure was in 2 times higher than in patients with acute viral hepatitis and healthy persons. The greatest difference between these diseases of phosphatidylyethanolamine content in the lymphocytic membranes was revealed. The value of phosphatidylyethanolamine in toxic hepatitis was more than 3 times higher than in acute viral hepatitis B and 1,8 times higher than in healthy persons. Patients with AVH B had a significant decrease in the level of PE.

Features of the lymphocytic membranes phospholipid spectrum patients with toxic hepatitis compared with the patients with acute viral hepatitis B absolute content of total lyso phospholipids were lower, on the one hand, and higher levels of sphingomyelin, phosphatidylycholine and phosphatidylyethanolamine on the other. These differences in the lymphocytic membranes phospholipid composition can be explained by immunopathological processes in acute viral hepatitis B and more active involvement of lymphocytes in this pathology than in toxic hepatitis.

Conclusions

Under the influence of hepatitis B infection, there is a decrease in the content of PH and PE, but the level of LPL increases.

The influence of alcohol substitutes has manifested with a low content of LPL and increased of phosphatidylycholine and phosphatidylyethanolamine content.

The revealed features of the influence of hepatitis B infection and alcohol surrogates on the lymphocytic membranes are show that under the influence of the virus and alcohol surrogates there is a violation of lymphocytic membranes structure. However, changes in the phospholipid composition are multidirectional, which must be taken into account when carrying out therapeutic measures.

**Literature**


