
# Liver Functional Status in Severe Forms of Covid-19 Disease

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**ABSTRACT**

Changes occurring in the liver can be observed with direct exposure to the virus, systemic post-inflammatory cytokine attack (cytokine storm), hypoxia, hypovolemia in shock, hepatotoxicity of drugs. The body produces interleukins (IL-1b, IL-6, IL10) and chemokines that affect normally functioning hepatocytes. Viruses have been scientifically proven to affect the ACE2 and TMPRSS2 receptors in patients with Covid-19, but in-depth studies show that if liver protectors are not taken during treatment and when the body's immune status is not controlled, liver cells are deeply affected as a result of this disease.

**Keywords:** Covid 19, SARS, MERS, interferon, intensive care, prothrombin index, polymerase chain reaction, artificial respiration, CPAP regimen.

**Introduction.** Coronavirus is an extremely dangerous infectious disease that was detected in the Huabei District of Wuhan, China, in 2019 and spread throughout the world. In China, in Wuhan city, the first three patients were identified. In patient-derived taxa, it was the SARS-Cov-2 virus from the previously known SARS-Cov virus family. Later research by Chinese virologist results in this RNA-preserving bat being identical to the disease-causing virus (92% similarity) [3,5,14].

A wide range of coagulogrammic tests have been carried out in the hemostasis laboratory, which include methods for determining the amount of prothrombin time, TAPT (time of active platelet thromboplastin), fibrinogen, which provides information about the total number, aggregation and coagulation joint condition of platelets that contribute to the vascular-platelet joint of the hemostasis system. The use of standardized thromboplasty made it possible to calculate according to the international normalized treatment system for patients receiving anticoagulant therapy [1,4,15].

The laboratory has an orthophenanthroline test (OPhR), which helps to improve the effectiveness of treatment work used in the Prevention of intravascular coagulation processes, DVS-syndrome and thromboses, which determines the amount of soluble fibrin in Plasma[5,7, 9, 11].

The purpose of the work: is to study the condition of the liver in patients with severe form of Covid 19 and prevent the deepeningding of pathological complications.

**Research materials and methods:**

From 2021 year of 1 st to August – 2021 year 31 st October and 1 June 2022 - 1 August 2022, the main group was selected 126 patients with severe forms of Covid-19 and the control group 25 patients. The monlywastreat in CPAP mode and hospital for at least 10 days. The results of their medical examination, blood, urine analysisremember. USEand CT results. Medicines and recommendations that they are taking. In the clinical-biochemical laboratory, a number of blood planks were examined and used to diagnose certain diseases. Enzymes:

Aspartate transaminase (AST), Alanine transaminase (ALT). Indicators of the exchange of oxygen: general protein, urea, creatinine. Total bounds, unboundsbilirubin levels were found in the blood.

Semi-automatic biochemical "analyzer Mindray MR 96A" measurement and calculation results, measurement optical density based on laboratory diagnostic tests and calculation concentration one wavelength with 8 filters. Touch control system, multi-language interface and the device does not require any special skills for simple configuration, measurement configuration and programming methods to work in Mindray.

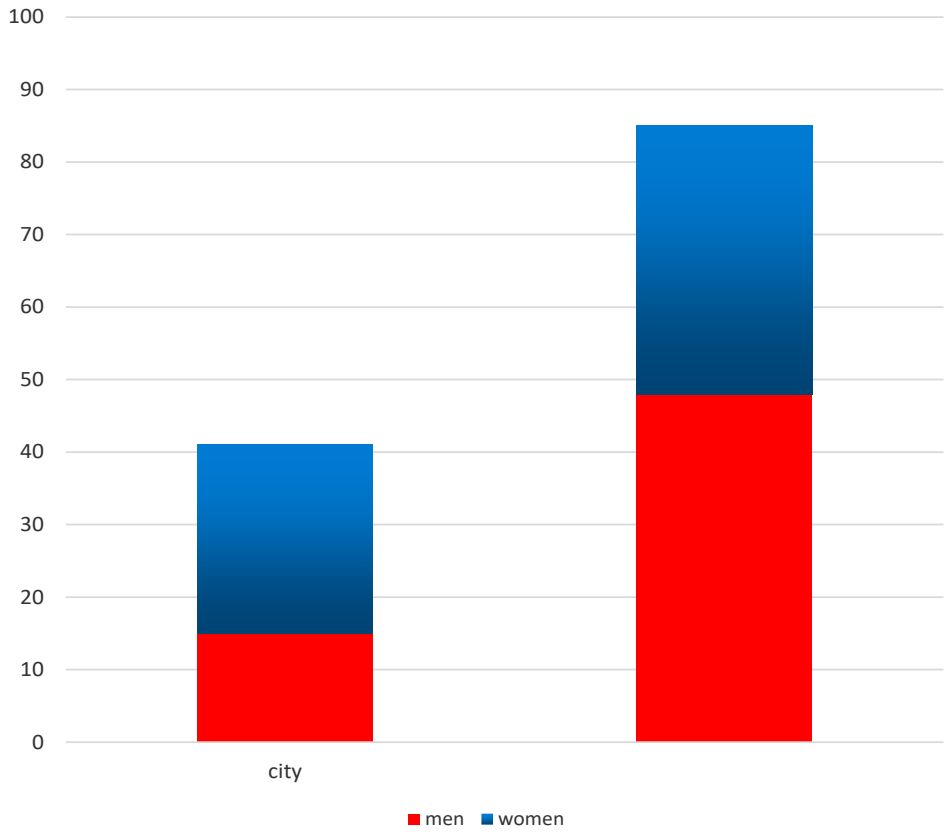
Stationary UTT device Mindray DP 9900 has a 14-inch monitor, is all-round convenient and works in real mode. Has all calculation and measurement functions.

With SIEMENS CT, X-rays move in a circle around the body. This allows for different views of the same organ or structure and provides more detail. The X-ray data is sent to a computer, which interprets the X-ray data and displays it as a two-dimensional image on a monitor. New technologies and computer programs make it possible to create three-dimensional images. The data obtained during the investigation were statistically processed using Microsoft Office Excel-2016 software on a Pentium-IV personal computer using statistical processing functions.

**Results of the examined patients.**

Intensive care unit of the Bukhara Regional Infectious Diseases Hospital during the months of September and October 2021 and June and July 2022 among those infected with severe forms of Covid 19, those who were treated in the intensive care unit for an average of 8-10 days and CPAP (Constant Positive Airway) Distribution of 126 patients under pressure) by city and district.

**Table 1.**




| Bukhara cityresidence | Patients from districts |
|---|---|

| Me | Women | Me | Women |
|---|---|---|---|
| 18(14.2%) | 23(18.2%) | 53(42%) | 32(25.3%) |
| Total: 41 people (32.85%) | | Total: 85 people (67.15%). | |

**Main group: table 1b.**

Control group:

| Resident of Bukhara city | | Patients from districts | |
|---|---|---|---|
| Me | Women | Me | Women |
| 2 (8.3%) | 3(12.5%) | 9 (37.5%) | 10 (41.6%) |
| Total: 5 people (20.85%) | | Total: 19 people (79.15%). | |

In the first column of the table presented in Table 1a, there were 41 (32.85%) patients from the city of Bukhara. 18 of them are men. 23 of the patients were women. It is known from the second column that 85 (67.15%) patients came from the districts of Bukhara region. Of these patients, 53 (42%) were men, and the rest, 32 (25.3%) were women.

Judging from the first table, the number of patients from the city of Bukhara is much lower than the number of patients from the district. This is explained by the fact that most of the patients from the city were treated in nearby private clinics. The conditions of the private clinics are not different from the Provincial Infectious Diseases Hospital, so the patients from the city were treated there. Most of the patients from the districts are men.

**Table 2.**
**Distribution of patients by age:**

| 45year Age patients | | 46-55year age patients. | | 56-65year age patients. | | 66year above age patients. | |
|---|---|---|---|---|---|---|---|
| 3 (2.37%) | | 21 (16.6%) | | 38 (30.02%) | | 64 (50.56%) | |
| Men | Women | Men | Women | Men | Women | Men | Women |
| 2 | 1 | 12 | 9 | 15 | 23 | 34 | 30 |
| Total: 126 patients (100%)of main group. | | | | | | | |

| 45year Age patients | | 46-55year age patients. | | 56-65year age patients. | | 66year above age patients. | |
|---|---|---|---|---|---|---|---|
| 14 (58.37%) | | 6 (24.6%) | | 4 (16.02%) | | 0 (0%) | |
| Men | Women | Men | Women | Men | Women | Men | Women |
| 8 | 6 | 3 | 3 | 2 | 2 | 0 | 0 |

Total: 24 patients (100%)of ccontrol group.

The following table shows that 3 patients under the age of 45, i.e. 2.79%. Among them, there were two male patients and one female patient. There were 15 (14%) patients aged 46-55, nine of them were male, and the remaining six were female. There were 27 (25.1%) patients aged 56-65. Eight of the patients in this series are male, and nineteen are female. 62 (57.8%) patients were over 66 years old. The majority (41 patients (38.13%)) were female patients.

Summarizing table 2, it can be said that patients with severe form of Covid-19 accounted for 58% of the total selected patients. This is based on the presence of chronic concomitant diseases in this category of patients. In addition, at this age, the side effects of the drugs used as a means of treatment are more pronounced than in other categories of patients.

**Table 3.**
**Patients with chronic diseases other than severe form of Covid-19:**

| | | | | | |
|---|---|---|---|---|---|
| Chronic ischemic heart disease | Me<br>50 patients | Total:<br>in 96 people | Which havechronic lung diseases | Me<br>6 | Total:<br>15 in the patient |
| | Women<br>46 patients | | | Women<br>9 | |
| WhichYesandchronic hypertension | Me<br>52 patients | Total:<br>in 96 people | patients withcchronic kidney diseases | Me<br>5 | Total:<br>9<br>in the patient |
| | Women<br>44 the patient | | | Women<br>4 | |
| Chronic hepatitis | Me<br>17 | Total:<br>in 28 patients | Obesity II-III level | Male<br>7 | Total:<br>in 12 patients |
| | Women<br>11 | | | Women<br>5 | |
| They have type II diabetes | Me<br>16 | Total:<br>in 27 patients | Steroid diabetes | Me<br>12 | Total:<br>in 20 patients |
| | Women<br>11 | | | Women<br>8 | |

In this table, it was found that patients with severe forms of Covid-19 have a large percentage of additional comorbidities. For example: 96 patients with chronic ischemic heart disease made up 75.84% of the total number of patients. 50 of them are male and 46 female patients. Patients with chronic hypertension are also at the top. There are 96 of them, 52 of them are male and 44 are female patients. There are 28 (22.12%) people with chronic hepatitis and cholecystitis. Of those with chronic hepatitis, 17 were men and 11 were women. There are 27 (21.8%) patients with type II diabetes, 16 of them are men and 11 are women. There are 15 (11.85%) patients with chronic lung diseases, 6 of them are men and the rest are women. There are 9 (7.11%) people with chronic kidney diseases, 5 men, 4 women. 12 (9.48%) patients have 2-3 degrees of obesity. There are 7 men among obese patients. There are 5 women. Besides these, there are 20 (15.8%) people with steroid diabetes. Among them, men make 12 people, and women make 8 people.

As summarized in the next table, patients with chronic ischemic heart disease and hypertensive patients came in a large percentage. These diseases are very severe in those infected with Covid-19. Covid 19 viruses affect the angiotensin II enzyme in blood vessel cells and cause narrowing of the vessel wall, as a result of which it leads to an exacerbation of the disease in patients with the above chronic diseases.

**Table 4.**
**Distribution of patients by fate:**

| Control group:<br>Main group: | 45 patients under the age of 45 year<br>A ge patients. | 46-55 patients in the age range.<br>46-55year age patients. | 56-65 aged patients.<br>56-65year age patients. | 66 over 66year age<br>bopatients with. |
|---|---|---|---|---|
| Cured. | 10 (41.6%) | 3 (12.5%) | 2 (8.3%) | 0 |
| Those whose treatment<br>Cured | 1(0.79%) | 7(5.5%) | 10(7.9%) | 18(14.2%) |
| Those whose treatment continued as an out patient or were transferred to another department.<br>continued as an out patient or were transferred to another department. | 4 (16.6%)<br>2(1.2%) | 3 (12.5%)<br>5(3.9%) | 2 (8.3%)<br>9(7.1%) | 0<br>27(21.4%) |
| Those who have gonehome with the consentbytheir relatives.<br>Those who have the gonehome with consenthytheir relatives. | 0<br>0 | 0<br>9(7.1%) | 0<br>17(13.4%) | 0<br>16(12.6%) |
| The dead. | 0 | 0 | 0 | 0 |
| The dead. | 0 | 0 | 2(1.2%) | 4(3.14%) |

It is clear from the table that 36 (28,4%) of the patients were cured and PCR (polymerase chain reaction) gave a negative result. 43 (33,97%) patients continued treatment on an outpatient basis or were transferred to another department. 42 (33,18%) of 126 studied patients were sent home with the consent and request of their relatives. Only 6 (4,74%) patients had a fatal outcome.

Judging from the above table, most of the patients were transferred from the intensive care unit to another unit. The death rate was 4,7%.

**Table 5.**

**Distribution of patients based on ultrasound examination.**

| | Chronic hepatitis | Gallstone disease | Pancreatitis | Kidney disease and ureteral stone. |
|---|---|---|---|---|
| **Main group** | 32 the patient (25.3%) | 15 the patient (12%) | 25 the patient (20%) | 25 the patient (20%) |
| **Control group** | 5 the patient (20%) | 2 the patient (8%) | 4t he patient (16%) | 3 the patient (12%) |

Judging from the table, 32 of our patients were diagnosed with chronic hepatitis. 15 of our patients had gallstone disease. Pancreatitis and kidney diseases out of 25. From the control group, chronic hepatitis was diagnosed in 5 patients, gallstone disease in 2 patients, pancreatitis in 4 patients, and kidney disease in 3 patients.

**Table 6.**
**Computer tomography data analysis**

| **Degree of CT** | **CT 1** | **CT 2** | **CT 3** | **CT 4** |
|---|---|---|---|---|
| **Mains** | 12 the patient(9.5) | 25 the patient (20%) | 35 the patient (28%) | 54 the patient (42.8%) |
| **Controls** | 10 the patient (40%) | 15 the patient (60%) | 0the patient | 0the patient |

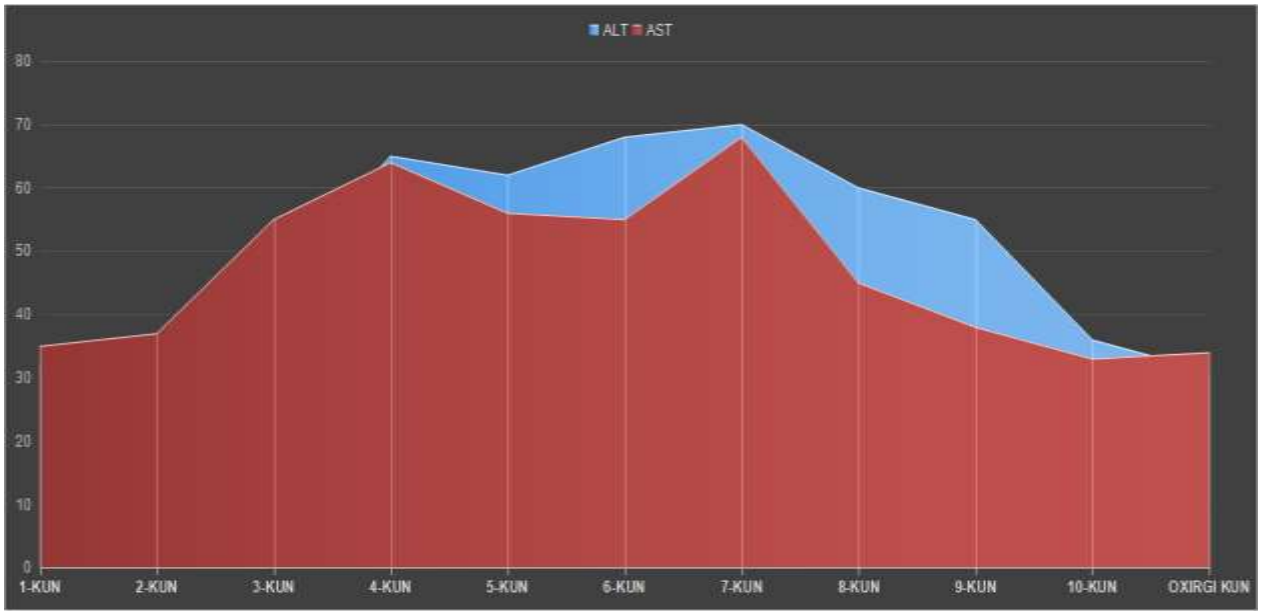
It is known from the above table that 42.8% of our patients had deep lung damage. This is not the case in the control group, because only patients with a relatively mild condition were taken in the control group.

Table 7.

| | **1-say** | **2-say** | **3-say** | **4-say** | **5-say** | **6-say** | **7-say** | **8-say** | **9-say** | **10-say** |
|---|---|---|---|---|---|---|---|---|---|---|
| **AlAT** (N=0-32e/l) | | | | | | | | | | |
| **Main group** | 32 | 35 | 45 | 65 | 63 | 68 | 77 | 60 | 55 | 36 |
| **Control group** | 30 | 32 | 30 | 32 | 30 | 33 | 30 | 28 | 30 | 31 |

| ASAT (N=0-31e/l) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Main group** | 35 | 37 | 55 | 64 | 56 | 68 | 75 | 38 | 35 | 33 |
| **Control groshe isp** | 30 | 28 | 32 | 30 | 31 | 28 | 30 | 30 | 32 | 31 |

Dynamics of AlAT\AsAT indicators during the period from the beginning to the end of treatment;




In the biochemical analysis of the blood of patients, we can see the changes of Alanine aminotransferase (ALT) and Asparaginate aminotransferase (AST), which are markers that mainly determine the activity of liver cells, hepatocytes, from the beginning of the disease to the last day of treatment. At the beginning of the disease, there is no noticeable change in these analyses, but on the 6-10th day, an increase in these indicators was observed. At the end of treatment, ALT and AST decreased to normal levels in 88% of patients. For example, when analyzed, AlAT changed from 32 e/l to 35 e/l in 1-3 days. In the next 4-5 days, this indicator was from 45 e/l to 65 e/l for AlAT. On days 6-7, it decreased from 60 e/l to 55 e/l. In the average last days of treatment, this indicator approached the norm. In the analysis of days 8-10, AlAT was determined from 55 e/l to 36 e/l. When the amount of AST was analyzed, AST changed from 35 e/l to 37 e/l in 1-3 days. In the next 4-5 days, this indicator was from 55 e/l to 60 e/l for AST. On 6-7 days, it decreased from 55 e/l to 45 e/l. In the average last days of treatment, this indicator approached the norm. In the analysis of days 8-10, AST was determined from 45 e/l to 34 e/l.

When we concluded from this table, it became clear that the indicators of ALT and AST did not change significantly at the beginning of the disease, but in the following days they increased rapidly and approached the norm in the last days of treatment.

**Table 8.**

**Dynamics of total and free bilirubin indicators from the beginning to the end of treatment:**

| **t/b** (N=0.20.5 μm/l) | **1-say** | **2-say** | **3-say** | **4-say** | **5-say** | **6-say** | **7-say** | **8-say** | **9-say** | **10-say** |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Mains** | 14 | 15 | 15 | 16 | 18 | 19 | 25 | 22 | 20 | 18 |
| **Controls** | 10 | 11 | 13 | 15 | 14 | 13 | 17 | 18 | 16 | 15 |
| **f/b** (N=0.51 μm/l) | **1-say** | **2-say** | **3-say** | **4-say** | **5-say** | **6-say** | **7-say** | **8-say** | **9-say** | **10-say** |
| **Mains** | 13 | 14 | 15 | 16 | 18 | 19 | 20 | 22 | 18 | 16 |
| **Controls** | 10 | 11 | 13 | 15 | 14 | 13 | 17 | 18 | 16 | 15 |

As can be seen from this table, in most of our total patients, that is, in 86 (68%) patients, we observed an increase in the amount of bilirubin on the first day of treatment. In the last days of treatment, this indicator approached the norm.

**Table 9.**
**Indicators of prothrombin index from the beginning to the end of treatment:**

| **PTI** (N=80 %-110%) | **1-day** | **2-day** | **3-day** | **4-day** | **5-day** | **6-day** | **7-day** | **8-Day** | **9-day** | **10-Day** |
|---|---|---|---|---|---|---|---|---|---|---|
| **The main guruh** | 133 | 125 | 117 | 61.7 | 49.7 | 52.3 | 58.2 | 52.3 | 63 | 88 |
| **Control guruh** | 10 | 11 | 13 | 15 | 14 | 13 | 17 | 18 | 16 | 15 |

PTI changed in 45 (35.7%) of our patients. Initially, this indicator exceeded the norm and changed from 133% to 125%. In the following days, it fell from 63% to 88%.

**Table 10.**
**Dynamics of D-dimer indicators from the beginning to the end of treatment:**

It can be seen that D-dimer increased sharply in 54 of our patients, that is, in 42.7% of all treated patients, by the 5-6th day of the clinic. The reason for this can be taken into account that the

| **D-Dimer** (N=250-450 ng/ml) | **1-day** | **2-day** | **3-day** | **4-day** | **5-day** | **6-day** | **7-day** | **8-Day** | **9-day** | **10-Day** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Main guruh** | 806 | 1402 | 1251 | 1234 | 1110 | 991 | 706 | 550 | 505 | 401 |
| **controls** | 406 | 402 | 551 | 534 | 550 | 591 | 706 | 550 | 505 | 401 |

patients took a large dose of anticoagulants.

**Table 11.**
**Dynamics of indicators of changes in the amount of Ferritin during the period from the beginning to the end of treatment:**

| **Ferritin (N=80-** | **1-day** | **2-day** | **3-day** | **4-day** | **5-day** | **6-day** | **7-day** | **8-day** | **9-day** | **10-day** |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **120 ng/ml)** | | | | | | | | | | |
| **The main guruh** | 156 | 146 | 130 | 128 | 117 | 108 | 126 | 139 | 157 | 162 |
| **Control guruh** | 115 | 118 | 120 | 125 | 115 | 116 | 110 | 90 | 95 | 85 |

A change in the amount of ferritin in the blood compared to the norm was observed in 88 (69.5%) patients. The level of ferritin was also 156-146 ng/ml at the beginning of the disease, and then changed to 157-162 ng/ml. On the 4-6th day of treatment, it is relatively close to the normal level.

**Conclusion:**

From August 2021 to October 2021 and from June 2022 to August 2022, the number of 126 severe Covid-19 patients, mostly on CPAP and treated in hospital for at least 10 days, has decreased dramatically by 2022. Annual difference in patient group: Women accounted for 11 of 2022 (8.69%). Men make up 6 people (4.74%).

The use of the following drugs and vaccines during treatment significantly reduced the fatal outcome: Interferon beta-1b (IFN-B1b) has antiviral and immunomodulatory effects. The drug was used in clinical trials in combination with IFN-B 1b lopinavir. In vitro studies have shown its maximum activity against the main interferons (IFN-ala, IFN-alb and IFN-Bla). IFN-Blb increases the synthesis of anti-inflammatory cytokines and has a positive pathogenetic effect. Conversely, parenteral administration of IFN-α in severe ORI may be associated with an increased risk of developing ORDS due to increased pro-inflammatory cytokines. Recombinant interferon, when administered intranasally in the form of a solution, has immunomodulatory, anti-inflammatory and antiviral effects. Its mechanism of action is based on the destruction of viral replication that enters the respiratory tract. In broncho-obstructive cases, inhalation of bronchodilators through a nebulizer is suitable: Salbutamol, Nebutamol, Nebufluzon, Fenoterol, Ipratropium bromide.

Livsan (essential phosphotidylcholine) 250 mg/ml intravenous hepatoprotector - the effect of this hepatoprotector depends on the properties of the components that make up the drug. "essential phospholipids" are complex substances containing diglyceride esters of phosphatide and unsaturated fatty acids (mainly oleic and linoleic). They are an important structural element of cell membranes and hepatocyte organoid membranes. Phospholipids regulate membrane permeability and membrane activity. Enzymes ensure normal processes of oxidative phosphorylation. The drug normalizes the biosynthesis of phospholipids and general lipid metabolism in case of damage to hepatocytes of various etiologies. It restores hepatocyte membranes by competing structural regeneration and oxidation processes. Unsaturated fatty acids are able to exert a toxicogenic effect instead of membrane lipids. Helps restore the liver, stabilizes the physical and chemical properties of bile. It restores hepatocyte membranes by competing structural regeneration and oxidation processes.

Hepa-mers: Instructions for use - acute and chronic diseases of the liver - used in hepatic encephalopathy. Contraindications Hypersensitivity to L-ornithine-L-aspartate or other components of the drug. It cannot be used in severe renal failure with a creatinine level above 3 mg/100 ml. Pharmacodynamics reduces the increase of ammonia in plasma, especially in liver diseases. The effect of the drug is due to the participation in the ornithine

cycle of urea formation (formation of urea from ammonia). Improves protein metabolism in diseases requiring parenteral nutrition. Pharmacological effects Ornithine aspartate is separated into its components - ornithine and aspartate amino acids. They are absorbed through the intestinal epithelium by active transport in the small intestine. Excreted by the kidneys.

Glutathione is a linear tripeptide with a sulfhydryl group containing L-glutamine, L-cysteine, and glycine. It is a powerful antioxidant and plays an important role in protecting body cells. Glutathione binds a large amount of lipophilic compounds (physical neutralization), prevents their addition to the lipid layer of membranes and cell dysfunction, destroys free radicals. For patients suffering from Covid-19, it is dissolved in 100 ml of 0.9% sodium chloride solution and slowly injected into the vein. 600-1200 mg per day is taken intravenously for 5-10 days in case of liver damage as a result of taking drugs.Sputnik V (Russia), Astra Zeneca (China) and Pfizer (USA) vaccines were used against Covid 19. Then the treatment program was radically changed. Excess infusion and unnecessary hormonal therapy were removed.

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