РОЛЬ ФЕРРИТИНА И ЛАКТОФЕРРИНА У БОЛЬНЫХ β-ТАЛАССЕМИЕЙ

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Аннотация: *цель исследования: изучение количества гепсидина и других железосодержащих белков у больных с β-талассемией для уточнения особенности их в дифференциальной диагностике, прогноза заболевания и, следовательно, в лечении. Полученные данные показали, что уровень трансферрина по сравнению с результатами лактоферрина низкие. Лактоферрин у больных транспортирует железо больше чем трансферрин. В этом обмене как гуморальный регулятор можно использовать показатели гепсидина, которые изменяются в зависимости от состояния больного и от генетических форм β-талассемии.*
Ключевые слова: *β-талассемия, железо, лактоферрин, трансферрин, гепсидин.*

THE ROLE OF FERRITIN AND LACTOFERRIN IN PATIENTS WITH β-THALASSEMIA

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Abstract: *the purpose of the study: to study the amount of hepcidin and other iron-containing proteins in patients with β-thalassemia to clarify their features in differential diagnosis, prognosis of the disease and, consequently, in treatment. The data obtained showed that the level of transferrin compared to the results of lactoferrin is low. Lactoferrin in patients transports iron more than transferrin. In this exchange, hepcidin indicators can be used as a humoral regulator, which vary depending on the patient's condition and on the genetic forms of β-thalassemia.*
Keywords*: β-thalassemia, iron, transferrin, lactoferrin, hepcidin*

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Beta thalassemia is caused by decreased synthesis beta polypeptide chains as a result of either a mutation or a deletion in the beta globin gene, resulting in impaired hemoglobin A synthesis. Mutations or deletions can lead to partial loss (beta + allele) or complete loss (beta 0 allele) of beta globin function. There are two genes for beta globin, and patients may have heterozygous, homozygous, or compound heterozygous mutations.In addition, patients may be heterozygous or homozygous for abnormalities in 2 different globin genes [1].

İn iron overload, deposition of iron in the heart muscle can lead to heart failure. Hemosiderosis of the liver is characteristic, which leads to a violation of its function and cirrhosis of the liver. As a rule, the use of iron chelators is necessary.

Iron is one of the elements of the human body. It is part of such biologically active substances as hemoglobin, myoglobulin, etc [2]. Despite the fact that iron is abundant in the environment, most of its compounds, which significantly reduces the degree of its availability to cellular structures and for this reason, deficiency or excess of iron is a common medical and biological problem. At the same time, an excess of free iron leads to local tissue damage due to increased activity of free radical formation, as well as activation of bacteria that use the host's iron.

The role of a universal humoral regulator of iron metabolism is performed by hepcidin. Hepcidin has pronounced antibacterial properties. Like other antibacterial peptides, hepcidin is able to rupture the bacterial membrane, which occurs due to its structure of spatial separation of hydrophilic (positively charged) and hydrophobic (negatively charged) side chains.

Incorrect humoral regulation of hepcidin is detected in various diseases with anemia. Ferritin (SF) was originally isolated from the spleen. Mucosal cells synthesize the ferritin precursor apoferritin (molecular weight 450 kDa), which forms ferritin upon interaction with iron hydroxide phosphate [3]. Ferritin is also involved in the process of iron deposition, which accumulates mainly in the liver, spleen, and bone marrow [4]. If the amount of parenterally administered iron exceeds the capacity of the ferritin depot, then excess iron accumulates in the liver as part of

hemosiderin, which is a derivative of partially degraded ferritin [5]. Lactoferritin (LF) is one of the components of the body's immune system, takes part in the system of innate humoral immunity, regulates the function of immunocompetent cells and is a protein of the acute phase of inflammation. The most studied function of lactoferrin is the regulation of iron content in the body.

The iron-transferrin complex penetrates into the cytosol, where an iron atom is released, and transferrin is removed from the cell, remaining capable of repeated and multiple binding of iron ions [6]. However, it is possible that transferrin has an even more important function than transport. This protein is able to specifically recognize hemoglobin-synthesizing reticulocytes, and this recognition ability ensures that the iron contained in it is delivered only to those cells that specifically require iron [7]. Thus, literature data show that hepcidin, together with other iron-containing proteins, can be considered a principal iron-regulatory hormone, a key mediator in hereditary blood diseases, and a “bridge” between natural immunity and iron metabolism.

The purpose of the study: to study the amount of hepcidin and other iron-containing proteins in patients with β-thalassemia to clarify their features in differential diagnosis, prognosis of the disease and, consequently, in treatment.

Materials and Methods The amount of iron-containing proteins hepcidin, ferritin and lactoferrin was studied in 65 patients with genetically verified β-thalassemia. Of these, 38 people were carriers of homozygous and 27 carriers of heterozygous , aged 2 to 25 years. 50 people of similar age and gender without β-thalassemia were the control group.

We used a set of diagnostic methods: determination of serum iron with the test of the company "Human" (Germany); enzyme immunoassay for determining the total amount of serum transferrin, ferritin. Determination of hepcidin using tests of the company (Cloud-Clone Corp; Eliza) USA. Differences were assessed using Student's t-test. The critical level of significance was $p<0.05$.

Results. According to our data, in homozygous patients with β-thalassemia, an increase in serum iron to 37.5±0.13 μmol/l was noted. Among 27 patients with β-thalassemia, changes in iron metabolism were not so pronounced. The amount of serum iron was 33.4±1.2 μmol/l. Heterozygous β-thalassemia, compared with the homozygous form, causes mild impairment of erythropoiesis and is not associated with a serious risk of iron overload. The most informative indicator of iron stores in the body is serum ferritin. Serum ferritin levels rise much earlier than serum iron. The level of serum ferritin in homozygotes was 114.0±0.47. This indicator was 1.8 times higher than in the control group. Another indicator of hepcidin iron metabolism in homozygous patients with β-thalassemia during the fall of hemoglobin was high 100.025±25.04 (norm 60.0±8.5) $p<0.05$. In these cases, the body's need for erythropoiesis prevails over control due to excess iron. If the condition worsens in homozygous patients (when the total hemoglobin has not yet reached a critical level), the content of hepcidin can increase sharply, reaching values of 1500-1800 pg / ml. We also observed significant changes in heterozygous patients with β-thalassemia. The content of hepcidin increased by 3.5 times during the worsening of the condition of the patients and reached 213.04±96.12 pg/ml, and during the crisis it decreased significantly.

The data obtained showed that in fact the level of transferrin compared to the results of lactoferrin is low. Lactoferrin in patients transports iron more than transferrin. In this exchange, hepcidin parameters can be used as a humoral regulator, which vary depending on the patient's condition and on the genetic forms of β-thalassemia.

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