

## BLOOD BIOCHEMISTRY

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**Abstract.** *The human body has special systems that carry out continuous communication between organs and tissues and the exchange of the body's waste products with the environment. One of these systems, along with interstitial fluid and lymph, is blood.*

**Keywords:** *blood, erythrocytes, blood density, coagulation system.*

Blood differs from other tissues by its aggregate state – it is liquid. This property is associated with its function – transport. There are two phases of blood: liquid (plasma) and dense (blood cells). And there are several functions of blood:

1. Nutrition of tissues and excretion of metabolic products.
2. Tissue respiration and maintenance of acid-base balance and water-mineral balance.
3. Transport of hormones and other metabolites.
4. Protection against foreign agents.
5. Regulation of body temperature by redistributing heat in the body.

The cellular elements of blood are in a liquid medium - blood plasma. If fresh blood is left in a glass container at room temperature (20°C), then after a while a blood clot (thrombus) forms, after the formation of which a yellow liquid remains - blood serum. It differs from blood plasma in that it does not contain fibrinogen and some proteins (factors) of the blood clotting system. The basis of blood clotting is the conversion of fibrinogen into insoluble fibrin. Erythrocytes get entangled in fibrin threads. Fibrin filaments can be obtained by long-term mixing of freshly frozen blood, winding the resulting fibrin on a stick. So you can get defibrinated blood. To obtain whole blood suitable for transfusion to the patient, capable of being stored for a long time, anticoagulants (substances that prevent blood clotting) must be added to the blood collection container. The mass of blood in human vessels is approximately 20% of the body weight. 55% of the blood mass is plasma, the rest is formed by blood plasma elements (erythrocytes, leukocytes, lymphocytes, platelets).

### BLOOD PLASMA COMPOSITION:

- 90% - water
- 6-8% - proteins
- 2% - organic non-protein compounds
- 1% - inorganic salts

### PROTEIN COMPONENTS OF BLOOD PLASMA

By salting out, three fractions of plasma proteins can be obtained: albumins, globulins, fibrinogen. Electrophoresis on paper allows you to divide plasma proteins into 6 fractions:

- Albumins - 54-62%
- Globulins:  $\alpha$ 1-globulins 2.5-5%
- $\beta$ -2-globulins 8.5-10%

- $\alpha$ -globulins 12-15%
- $\beta$ -globulins 15,5-21%
- fibrinogen (remains at the start) - from 2 to 4%.

Modern methods make it possible to obtain over 60 individual plasma proteins. Quantitative ratios between protein fractions are constant in a healthy person. Sometimes quantitative ratios between different fractions of blood plasma are violated. This phenomenon is called **DYSPROTEINEMIA**. It happens that the content of the total plasma protein is not violated. Sometimes the total plasma protein content decreases. This phenomenon is known as **HYPOPROTEINEMIA**. May develop: a) with prolonged fasting; b) when there is kidney pathology (loss of protein in the urine). Less often, but sometimes **HYPERPROTEINEMIA** occurs - an increase in the protein content in plasma is higher than 80 g / l. This phenomenon is characteristic of conditions in which significant fluid loss occurs by the body: indomitable vomiting, profuse diarrhea (in some severe infectious diseases: cholera, severe dysentery).

Plasma proteins, their concentration ranges from 5.5 – 8.5 g / 100 ml. The following fractions are distinguished: prealbumins, albumins, a1 -, a2-, b-, g- globulins and fibrinogen. The ratio of the number of proteins of these fractions is of great diagnostic importance.

1) Prealbumins perform a transport function. Thyroxine and retinol are tolerated. The content of this protein decreases with cirrhosis and chronic hepatitis of the liver, when its protein-synthesizing activity is disrupted.

2) Albumins are the most homogeneous fraction of blood proteins. The main function is the binding of water, which provides colloidal osmotic (oncotic) pressure in the blood. Albumins transport magnesium ions, calcium, bilirubin, free LC, steroid hormones, medicinal compounds such as antibiotics, barbiturates, cardiac glycosides. A decrease in the albumin content is observed with an increase in the permeability of the vessels of the glomerulus of the nephron (nephrotic syndrome) and liver diseases.

3) a1-globulins. Two proteins belong to this fraction:

Antitrypsin is an inhibitor of such proteinases as trypsin, chymotrypsin, plasmin. Its content increases with inflammatory diseases and

Glycoprotein contains about 40% carbohydrates. Transports steroids. Its content increases with inflammatory processes, decreases with cirrhosis of the liver.

The bulk of the cells are erythrocytes (36-48%). Their main protein is hemoglobin. In the process of their development, red blood cells lose the nucleus and mitochondria. Only systems that restore membrane structures and antioxidant systems remain in them. In particular, during the work of hemoglobin, a superoxide ion is formed. Leukocytes have a nucleus and mitochondria in their composition and are standard cells in which glycolysis, oxidative phosphorylation occurs and glycogen can be stored and used.

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