

The Relationship of Blood Group with Human Diseases

Kodirova Sh. A., Jabbarov O. O., Maksudova M. H., Mirzayeva G. P., Rakhmatov A. M.
Tashkent Medical Academy

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ABSTRACT

Currently, a search is underway for the relationship between predisposition to certain diseases and the presence of genetic markers in the human body that could indicate the possibility of the development of a pathological process. In this regard, the antigens of the ABO system are of particular interest. This article provides information summarizing the results of studies over the past decade aimed at establishing the relationship between the blood group membership according to the ABO system and the likelihood of developing somatic diseases.

Introduction: In recent years, thanks to medical research, many antigens in human blood that play a role in the occurrence and development of certain diseases have been studied. For example, in recent years, the importance of HLA, HBs and a number of antigens in the development of coronary heart disease, liver, joints and infectious diseases has been studied, the same conclusion was reached at the end of a study conducted by Swedish scientists. Detailed material on the results of the study is published in the scientific journal "eLife". The researchers studied the medical data of five million patients. As a result, they identified 49 diseases that are common in people of certain blood groups.

Blood groups are hereditary characteristics of blood. The blood of all people is divided into blood groups, regardless of race, gender and age. Belonging to a particular blood group of a person is his individual biological characteristic, blood groups begin to form during development in the womb and do not change throughout the rest of life. Human erythrocytes contain type A and type B antigens, and some people's serum contains alpha and beta antibodies.

In 1901, K. Landsteiner and his students discovered that the ratio of ABO determines blood groups, and in 1930 the scientist was awarded the Nobel Prize.

The discovery of the AB(IV) group by Decastello and Sturli in 1902 and the result of these studies formed the basis for the name of the ABO system. Antigens of the ABO system are glycoprotein molecules located on the cytoplasmic surface of erythrocytes by their chemical structure. There are hundreds of antigens in the erythrocyte envelope, which differ from each other by the presence of different glycans [1,2]. According to sources, the antigens of the ABO system are present not only in the erythrocyte membrane, but also in the secret-producing epithelium of the salivary glands, gastrointestinal tract, gonads, respiratory system. The soluble form of these antigens has also been found in oral fluid, semen, and other biological secretions [2,3]. Also, as a result of medical research, the presence of carbohydrate compounds (ABO, Lewis, Secretor) in blood group antigens and their relationship with infectious and oncological diseases is also being studied. The obtained results and

conclusions enable an individual approach to the diagnosis and treatment of patients [3,4]. In the system related to ABO, there are 2 types of antigens: A and B.

It is their presence or absence that determines the blood group:

1. O (I) blood type — antigens A and B are absent.
2. A (II) blood group — erythrocytes produce only antigens A.
3. B (III) blood group — only B-antigens are isolated.
4. AB (IV) — contains antigens A and B.

Also, depending on their size, plasma may contain alpha (anti-A) or beta (anti-V) antibodies. They are a combination of proteins that fight foreign antigens and stimulate the immune response.

1. Type A (II) – there are anti-V antibodies in the serum.
2. Type B (III) – there are anti-A antibodies in the serum.
3. Ring O (I) — both anti-A and anti-V are ubiquitous.
4. AB (IV) — neither anti-A nor anti-V.

Scientists have also studied the distribution of these blood groups on Earth. According to statistics, 40% of the world's population has the first group, 32% - the second, 22% - the third and only 6% - the fourth group. Among countries, blood type V (III) occurs in 10% of the population of England and 50% of the population of India. Also, in different years, the scale of the meeting between the peoples was studied. For example, in Russians, group 0 (I) was 33.5%, and (II) -37.8%, V (W) - 20.5%, AB (IV -8.1%) (M.A. Umnova 1985), Uzbeks 0 (I) group 32%, A(II)-33.2%, B(W)-25.9%, AB(IV)-8.8% (S.O.Osipov 1985), and in Azerbaijan group 0(I)-37.1%, A(II) - 39.9%, , V (W) - 17.5%, AB (IV - 5.5% (A.A. Rahimov 1986)).

Japanese scientists even published information in magazines that you can find out the character of people by their blood type. According to the information presented by them, people belonging to group I are distinguished by determination and devotion, people belonging to group II are prone to mental anguish, people of group W are distinguished by creativity, careerism, and people of group IV are distinguished by curiosity, initiative, hard work.

Blood type can increase the risk of certain diseases.

Cardiovascular diseases: According to Chen et al. [5,6,12], people with group 0(I) have an 11% lower risk of cardiovascular disease and a very small risk, but the risk is higher in people from group A(II). It is known that carbohydrate compounds of A- and V-antigens are expressed in platelet glycoprotein receptors GP IIa and IIIa, as well as in the GP IIb/IIIa complex, which plays a key role in thrombosis [12,13,14]. GP IIb/IIIa receptor complex binds fibrinogen, fibronectin and von Willebrandt factor, GP IIa is a component of GP Ia/IIa complex that binds platelets to damaged endothelium. Thus, AVO antigens play a role in thrombosis, affecting the structure of platelet glycoprotein receptors, and are associated with cardiovascular diseases [7,13].

In group B (III), the risk of ischemic stroke and venous thrombosis is 30% higher. Also, the antiangiogenic property of von Willebrand factor provides a full blood supply to the brain in group 0(I), but due to the absence of this factor and factor VIII involved in blood clotting processes, vessels are damaged in groups A(II), B(III) or AB(IV), concomitant complications are more common in them (chronic disorders of cerebral circulation, dementia) [8,14]. Scientists have found that people with the second blood group are more likely to suffer from blood clotting – thrombosis, and with the first – more likely to suffer from blood clotting – thrombosis, and with the first – from blood clotting diseases. At the same time, it was known that women with the first blood type and a positive Rh factor are more likely to suffer from hypertension during pregnancy.

Diseases of the gastrointestinal tract: blood group O(I) has a higher risk of infection with *Helicobacter pylori*, a bacterium that causes stomach ulcers. One of the reasons for this is the absence of the enzyme glycosyltransferase, which attaches L-fucose to the terminal monosaccharide of substance N (the precursor of antigens A and V). Persons belonging to group O(I) have Le-b antigen in their blood, a high amount of this antigen in the mucous membrane of the stomach and duodenum increases susceptibility to *Helicobacter pylori* infection. In patients in whom blood group A (II) has a risk of developing stomach cancer and *Helicobacter pylori* – a bacterium that causes ulcers, and blood group B (III) – pancreatic, esophageal and bile duct cancer, among patients who belong to blood group AB (IV) – there was a high risk of pancreatic cancer glands.

Mental illness: in the study of S. VukPisk et al. Mental illnesses were more common in individuals belonging to the AB(IV) group, depressive (depressive) states – to the A (II) group and schizophrenia – to the O (I) group. It is explained that the origin of these cases is mainly due to a change in the enzyme dopamine-beta-hydroxylase, which converts it into norepinephrine [9,10,15]. The amount of dopamine was found to be very high in group O(I) [11] VukPisk S. et al. In studies, mental illnesses are more often of the AB(IV) group, depressive (depression) identified in individuals belonging to group A (II), and schizophrenia disease – to group O (I). It is explained that the origin of these conditions is mainly due to a change in the enzyme dopamine-beta-hydroxylase, which converts dopamine into norepinephrine [10,16].

The amount of dopamine was very high in group O(I) [11,17].

Conclusions: The results of the study show that the study of blood groups and antigens of the ABO system is of practical importance in the diagnosis of various diseases, the choice of the type of treatment or prevention of diseases.

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