
Blood Types or groups

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A antigen



B antigen

Red blood cell



Blood type A



Blood type B



Blood type AB
Universal recipient




Blood type O
Universal donor

Blood Types or groups

When blood transfusions from one person to another were first attempted, immediate or delayed agglutination and hemolysis of the red blood corpuscles often occurred, resulting in typical transfusion reactions that frequently led to death.

Soon it was discovered that the bloods of unusual people have different antigenic and immune properties, so that antibodies in the plasma of one blood will react with antigens on the surfaces of the red corpuscles of another blood type. At least 30 commonly occurring antigens and hundreds of other rare antigens, each of which can at times cause antigen antibody reactions, have been found in human blood corpuscles, especially on the surfaces of the cell membranes. Two particular types of antigens are much more likely than the others to cause blood transfusion reactions. They are the **A-B-O system** of antigens and the **Rh system**.



Blood Types or groups

A-B-O Blood Type

The membrane of the human red corpuscles contains a variety of antigens called **agglutinogens**. the most important and best known of these are the **A** and **B** agglutinogens and individuals are divided into 4 blood groups, **A**, **B**, **AB**, **O** on the bases of the agglutinogens present in their red corpuscles.

Type **A** and **B** agglutinogens are glycoproteins. Antibodies against agglutinogens are called **agglutinins**.

Agglutinin against **A** and **B** agglutinogens are called agglutinins. Agglutinin against **A** and **B** agglutinogens are inherited. Agglutinins are present in plasma.



Blood Types or groups

Type	erythrocyte agglutinogens (antigen)	plasma agglutinin (antibody)
A	A	anti-B (β)
B	B	anti-A (α)
AB	A, B	NILL
O	-----	anti-A (α) anti-B (β)

Blood typing of the ABO system involves placing sera containing a known agglutinin (α , β) on a microscope slide and mixing it until a small quantity of the blood clumping and clot is formed.



Blood Types or groups

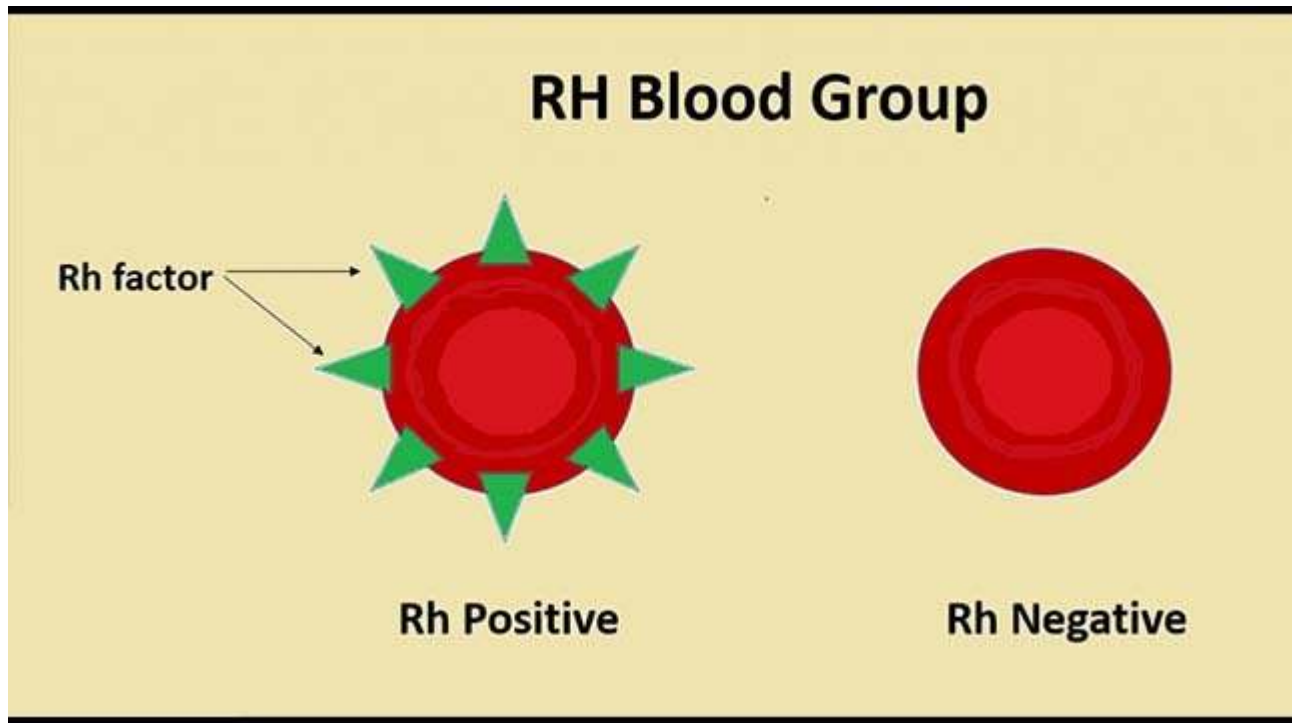
The bloods of donors and recipients are normally classified into four major A-B-O blood types, **depending upon** the presence or absence of the two agglutinogens, the **A** and **B** agglutinogens.

- When neither **A** nor **B** agglutinogens are present, the blood is a type **O**.
 - When only type **A** agglutinogen is, the blood is a type **A**.
 - When only type **B** agglutinogen is, the blood is a type **B**.
 - When both **A** and **B** agglutinogens are, the blood is type **AB**.
 - When type **A** agglutinogen is not present in a person's red blood corpuscles, antibodies known as **anti-A** agglutinins develop in the plasma. Furthermore, when type **B** agglutinogen is not present in the red blood corpuscles, antibodies known as **anti-B** agglutinins develop in the plasma.
Agglutinogens: An antigenic substance that stimulates the formation of specific agglutinins, which can cause agglutination of corpuscles that contain the antigen or particles coated with the antigen, which stimulates the formation of an agglutinin in blood serum.
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Blood Types or groups

Rhesus factor (Rh factor):



Blood Types or groups

The **Rh** factor named as **Rhesus factor** because it was discovered in **Rhesus monkey**, is a system composed of many antigens.

✓ The **Rh antigen** also called **D antigen**, and its antibody is called **anti-D**.

✓ If the **Rh** factor is present on the red blood corpuscles membranes is called **positive**, (the individual has agglutinogens **D**); if absent, the blood is said to be **negative**.

✓ Antibodies to the **Rh** factor are not normally present in the plasma of **Rh-negative** blood.



Blood Types or groups

Hemolytic disease of new-born (erythroblastosis fetalis):

When a **Rh-negative** mother carries an **Rh- positive** fetus, small amounts of fetal blood leak into the maternal circulation at the time of delivery, and develops **anti-Rh** agglutinins during the postpartum period. During the next pregnancy the mother's agglutinin cross the placenta to the fetus. When the anti **Rh** agglutinins cross the placentas to an **Rh- positive** fetus, they can cause hemolysis (hemolytic disease of the new-born erythroblastosis fetalis).

It is usually possible to prevent this issue by giving single dose of **anti-D** (RhoGAM) during the postpartum period. This prevents active antibody formation by the mother.

