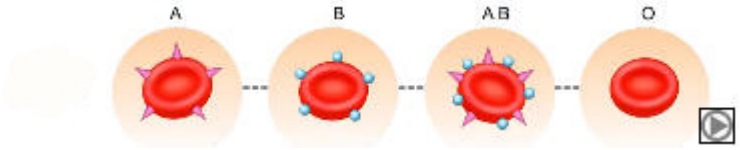
BLOOD GROUPS



Blood is classified according to the presence of different genetically determined ***glycoprotein*** and ***glycolipid antigens*** on the outer surface of ***red blood cell*** plasma membranes. These glycoprotein antigens are called ***agglutinogens***, of which there are various types. The type of agglutinogen exhibited on the surface of red blood cells determines which blood group they belong to. The two major blood groups are the ***ABO blood group*** and ***Rh blood group***. The transfusion of an incompatible blood type can be life threatening.

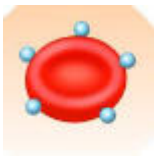
ABO BLOOD GROUPS

ABO blood groups are based on the presence or absence of ***type A*** and ***type B*** agglutinogens.

Type A

Red blood cell plasma membranes display only ***type A*** agglutinogens.

Type B



Red blood cell plasma membranes display only ***type B*** agglutinogens.

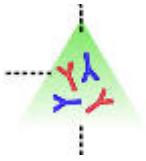
Type AB

Red blood cell plasma membranes display ***type A*** and ***type B*** agglutinogens.

Type O

Red blood cell plasma membranes display ***neither*** type A nor type B agglutinogens.

Anti-A and Anti-B agglutinins



Agglutinins are ***antibodies*** present in the ***blood plasma*** that the body produces against type A and type B agglutinogens. The body produces ***anti-A antibodies*** that bind to type A agglutinogens and ***anti-B antibodies*** that bind to type B agglutinogens. The body produces agglutinins against agglutinogens that are not expressed on the surface of its red blood cells.

So for instance, an individual with red blood cells that contain B agglutinogens would produce anti-A antibodies that bind to type A agglutinogens. An individual of blood type O would produce anti-A and anti-B antibodies. If blood with red blood cells expressing a different type of agglutinogen is transferred into an individual, a reaction is triggered. This is because the individual's plasma will contain antibodies that bind to

the 'alien' agglutinogens.

Blood type	Agglu-tinogen (antigen)	Agglutinin (antibody)	Compatible donor blood types	Inheritance (blood groups of parents
A	A	anti-B	A, O	AA or AO
B	B	anti-A	B,O	BB or BO
AB	A and B	None	A, B, AB, and O	AB
O	None	anti-A and anti-B	O	OO

Rh BLOOD GROUPS

The Rh blood group is based determined on the presence or absence of a specific ***Rh agglutinogen***. This Rh agglutinogen (historically known as Rhesus factor) is known as ***Rh factor*** or the ***type D antigen***.

Type Rh^+

Up to 85% of the population display Rh agglutinogen on their red blood cell plasma membranes and are thus as ***Rh positive*** (Rh^+).

Type Rh^-

The remaining 15% of the population lack ***Rh agglutinogen*** and are thus as ***Rh negative*** (Rh^-).

Anti-Rh agglutinins

Blood plasma does not normally contain anti-Rh agglutinins, however if blood of type ***Rh^+*** is transferred into an individual with type ***Rh^-*** blood, the individual will begin to produce ***anti-Rh antibodies***. A reaction will not be triggered during the first transfusion but the anti-Rh antibodies will remain in the blood plasma and will trigger a reaction if a second Rh^+ transfusion is given.

TRANSFUSION REACTION

It is important that donor and recipient blood types are matched during a transfusion or antibodies in the recipient's plasma may attack agglutinogens (antigens) on donor red blood cells, causing a ***transfusion reaction***.

Agglutination

When blood of an incompatible type/group is transfused into an individual, antibodies present in the recipient's blood plasma bind to the agglutinogens (antigens) expressed on the surface of the donor red blood cells. This causes the red blood cells to clump together, forming a large, cross-linked complex: a process known as ***agglutination***.

Hemolysis

The large, cross-linked complexes, formed through agglutination, activate specific proteins in the plasma membranes of the donated red blood cells. The active plasma proteins cause the red blood cells to ***rupture*** and ***leak hemoglobin*** into the blood plasma, known as ***hemolysis***, ultimately resulting in ***kidney damage***.