

The background of the slide is a dense field of red blood cells, which are biconcave discs with a reddish-pink hue. In the center, there is a large, horizontal, reddish-brown oval shape. The text 'BLOOD GROUPS' is written in white, bold, uppercase letters within this oval. In the bottom right corner, there is a white rectangular box containing the text 'HAP Unit 5th'.

BLOOD GROUPS

HAP Unit 5th

Contents

Introduction

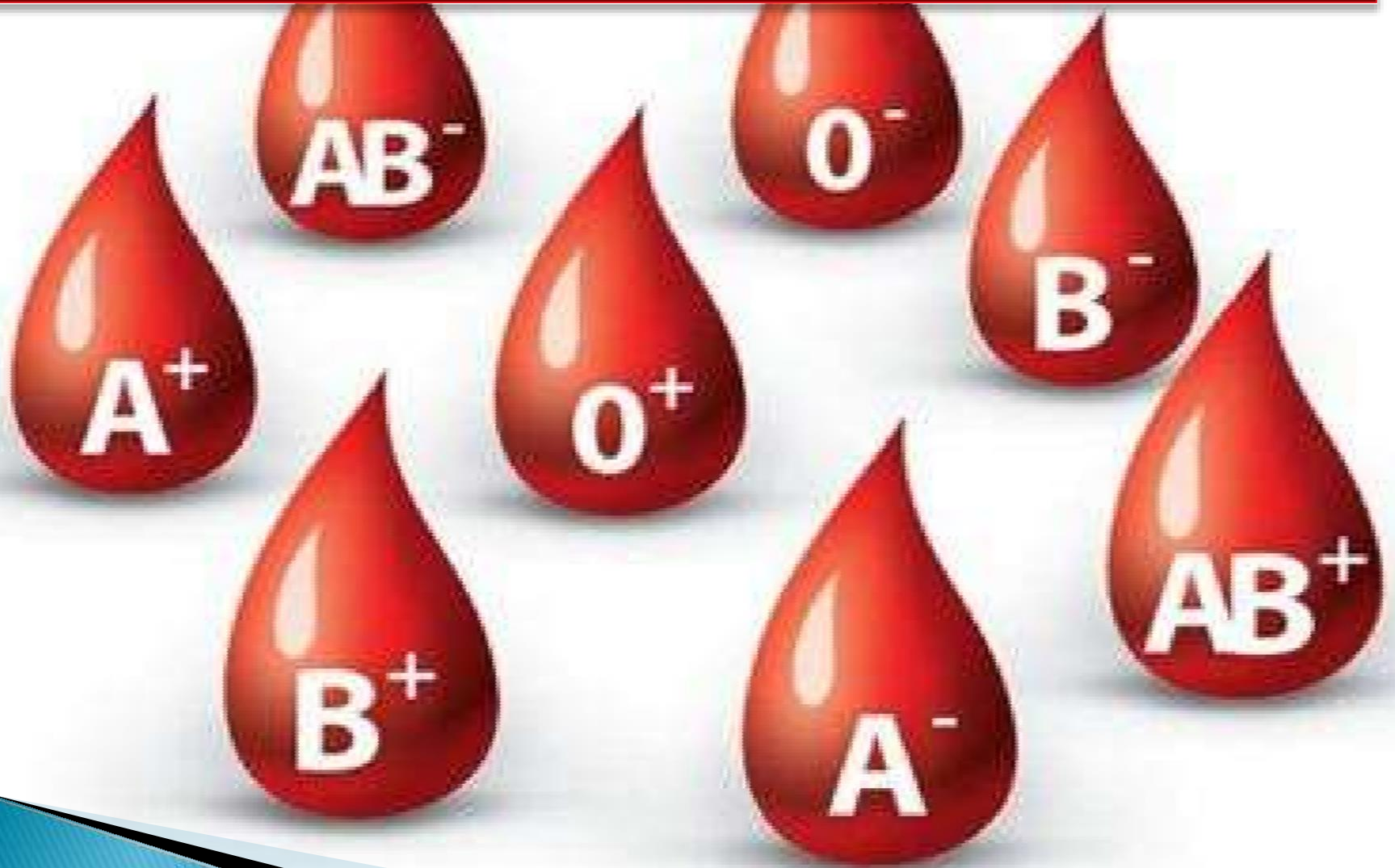
Blood group systems

- ❖ ABO blood group system
- ❖ Rh blood group system

Introduction

- ▶ A blood group also called a Blood Type
- ▶ Classification of blood is based on the presence or absence of inherited antigenic substances on the surface of red blood cells (RBCs)
- ▶ These antigens may be proteins, carbohydrates, glycoproteins, or glycolipids, depending on the blood group system.

ABO Blood Group System



➤ The **ABO blood group system** is the most important blood type system (or blood group system) in human blood transfusion.

➤ ABO blood types are also present in some other animals

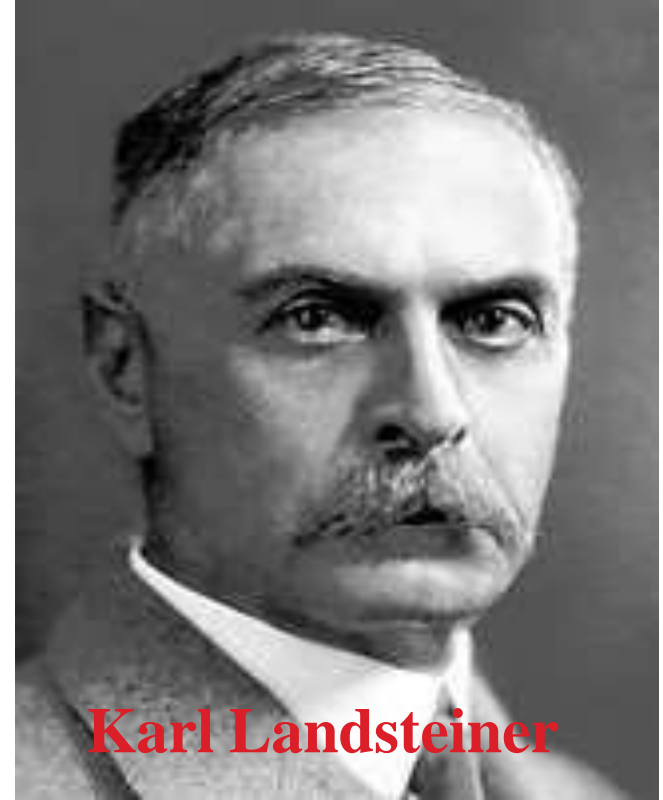
for example rodents and apes such as chimpanzees, bonobos and gorillas.

Determination of ABO blood groups depends upon the immunological reaction between antigen and antibody.

Antigens are also called agglutinogens because of their capacity to cause agglutination of RBCs.

History

- Karl Landsteiner discovered the ABO Blood Group System in 1901.
- Adriano Sturli and Alfred von Decastello who were working under Landsteiner discovered type AB a year later in 1902
- Landsteiner was awarded the 1930 Nobel Prize in Physiology or Medicine for his work.



➤ Janský is credited with the first classification of blood into the four types (A, B, AB, O) in 1907, which remains in use today.

➤ Reuben Ottenberg successfully transfused blood between two people at Mount Sinai Hospital in New York. He was the first person to record pre-transfusion testing for blood compatibility in a clinical setting.

Later in 1954 he was the first to be awarded with *Karl*

Landsteiner Award



Landsteiner Rule

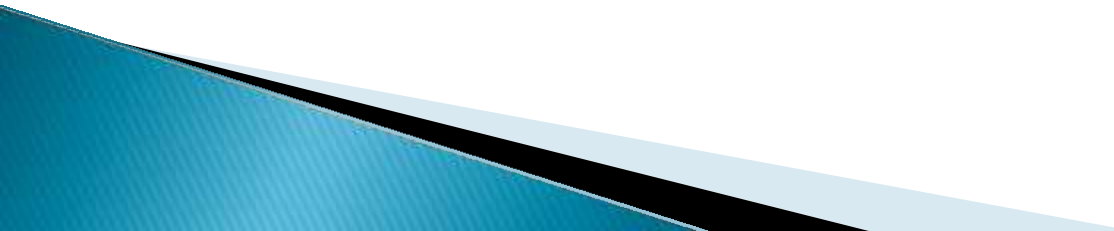
If an antigen is present on a patient's red blood cells (RBCs) the corresponding antibody will NOT be present in the patient's plasma, under 'normal conditions'.

ABO BASICS

➤ Based on the presence or absence of antigen A and antigen B, blood is divided into four groups:

‘A, B, AB and ‘O’ group.

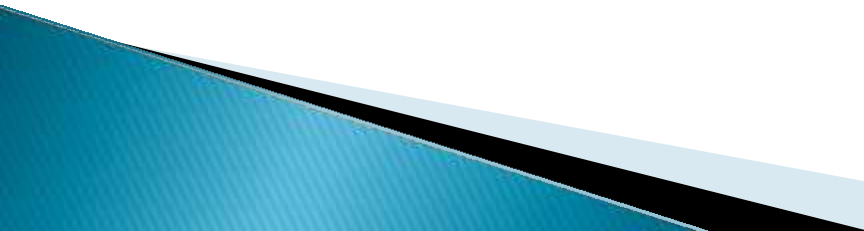
➤ Blood having antigen A belongs to ‘A’ group. This blood has β -antibody in the serum.

- Blood with antigen B and α -antibody belongs to 'B' group.
 - If both the antigens are present, blood group is called 'AB' group and serum of this group does not contain any antibody.
 - If both antigens are absent, the blood group is called 'O' group and both α and β antibodies are present in the serum.
- 

Antigen and Antibody Present in ABO Blood Group

ABO Group	Antigen Present	Antigen Missing	Antibody Present
A	A	B	Anti-B
B	B	A	Anti-A
O	None	A and B	Anti-A&B
AB	A and B	None	None

Principle of Blood Grouping

- Blood grouping is done on the basis of agglutination.
 - Agglutination means the collection of separate particles like RBCs into clumps or masses.
 - Agglutination occurs if an antigen is mixed with its corresponding antibody which is called *isoagglutinin*, i.e. occurs when A antigen is mixed with anti-A or when B antigen is mixed with anti-B.
- 

IMPORTANCE OF ABO GROUPS IN BLOOD TRANSFUSION

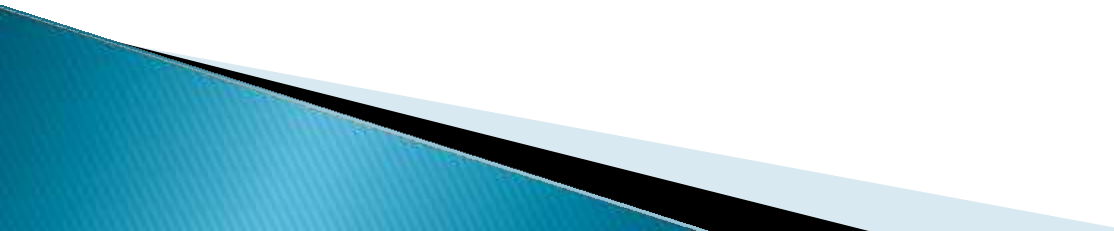
During blood transfusion, only compatible blood must be used.

The one who gives blood is called the '**donor**' and the one who receives the blood is called '**recipient**'.

While transfusing the blood, antigen of the donor and the antibody of the recipient are considered.

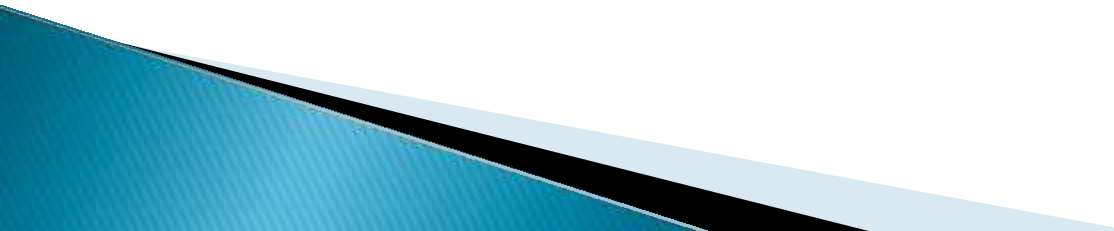
The antibody of the donor and antigen of the recipient are ignored mostly.

Thus, RBC of 'O' group has no antigen and so agglutination does not occur with any other group of blood. So, 'O' group blood can be given to any blood group persons and the people with this blood group are called '**universal donors**'.

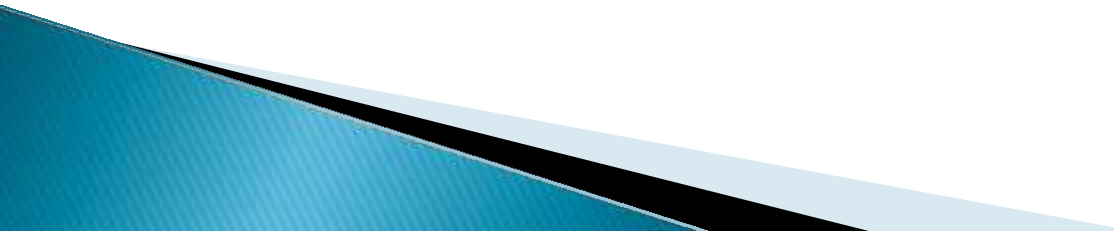


Plasma of AB group blood has no antibody. This does not cause agglutination of RBC from any other group of blood.

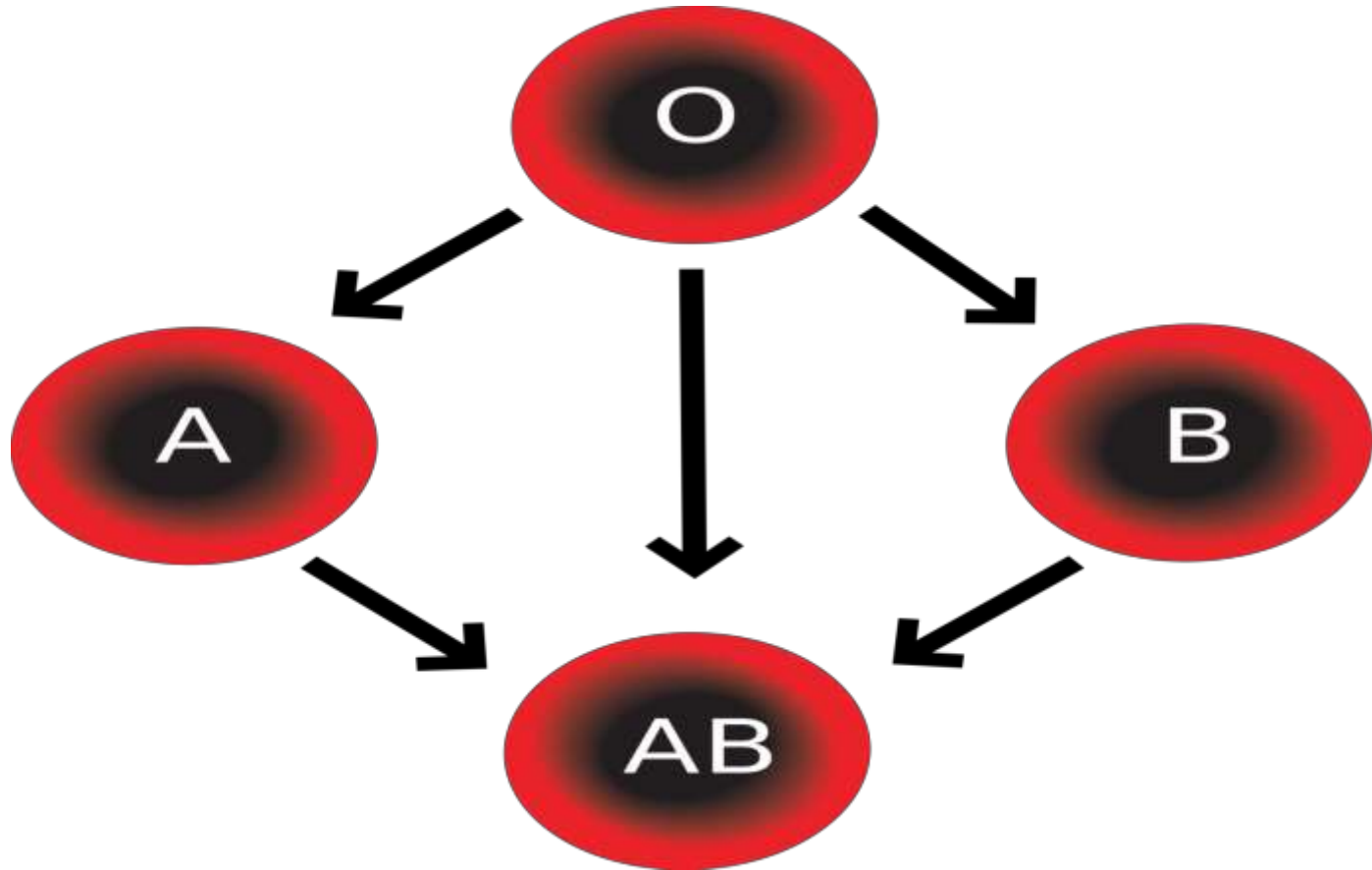
People with AB group can receive blood from any blood group persons. So, people with this blood group are called '**universal recipients**'.



In mismatched transfusion, the transfusion reactions occur between donor's RBC and recipient's plasma. So, if the donor's plasma contains agglutinins against recipient's RBC, agglutination does not occur because these antibodies are diluted in the recipient's blood.



Blood Compatibility

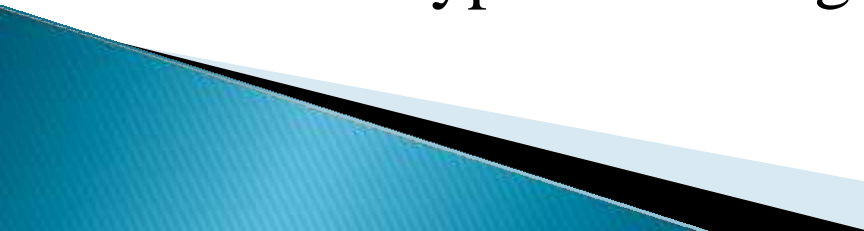


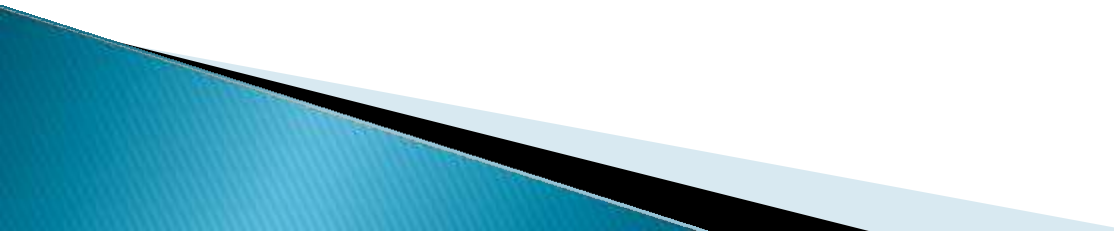
TRANSFUSION REACTIONS DUE TO ABO INCOMPATIBILITY

Transfusion reactions are the adverse reactions in the body, which occur due to transfusion error that involves transfusion of incompatible (mismatched) blood.

The reactions may be mild causing only fever and hives (skin disorder characterized by itching) or may be severe leading to renal failure, shock and death.

Rh Blood Group System


- The Rh blood group system is one of thirty-five current human blood group systems.
 - It is the most important blood group system after ABO.
 - Rh blood group system consists of 50 defined blood-group antigens, among them there are six common types of Rh antigens.
 - Each of which is called an *Rh factor*.
These types are designated **C, D, E, c, d, and e**.
- 

- The type D antigen is widely prevalent in the population and considerably more antigenic than the other Rh antigens.
 - Anyone who has this type of antigen is said to be *Rh positive*, whereas a person who does not have type D antigen is said to be *Rh negative*.
- 

➤ This antigen was discovered by Karl Landsteiner and Alexander Wiener in 1940.

➤ It was first discovered in *Rhesus macaque* and hence the name 'Rh factor'.

Erythroblastosis Fetalis (“Hemolytic Disease of the Newborn”)

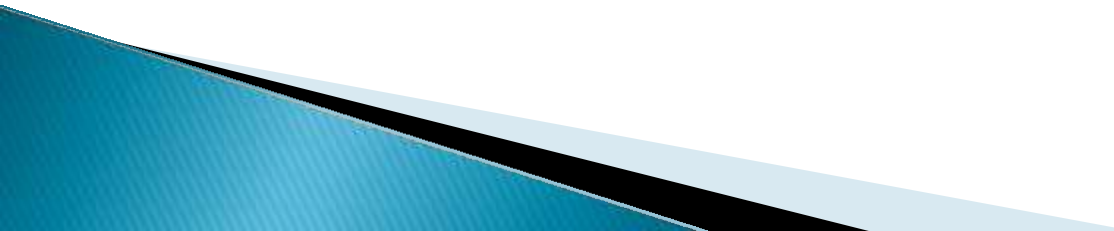
- Erythroblastosis fetalis is a disease of the fetus and newborn child characterized by agglutination and phagocytosis of the fetus’s red blood cells.
 - In most instances of erythroblastosis fetalis, the mother is Rh negative and the father Rh positive. The baby has inherited the Rh-positive antigen from the father, and the mother develops anti-Rh agglutinins from exposure to the fetus’s Rh antigen. In turn, the mother’s agglutinins diffuse through the placenta into the fetus and cause red blood cell agglutination.
- 

Symptoms and signs in the fetus:

Enlarged liver spleen, or heart

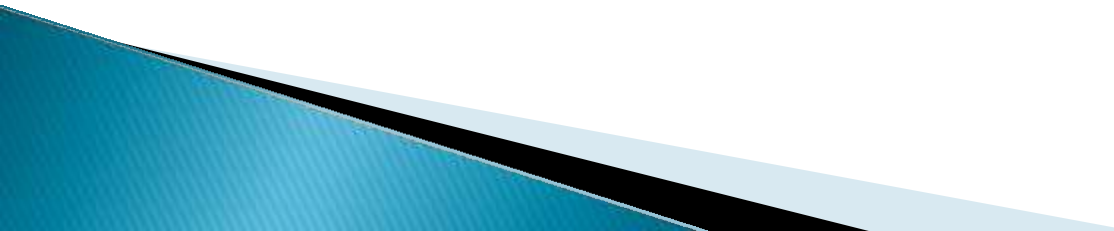
fluid buildup in the fetus' abdomen seen via ultrasound.

Symptoms and signs in the newborn:

- Anemia that creates the newborn's pallor (pale appearance).
 - Jaundice or yellow discoloration of the newborn's skin, sclera or mucous membrane.
 - Enlargement of the newborn's liver and spleen.
 - Severe edema of the entire body.
 - Dyspnea or difficulty breathing.
- 

Other Blood Group System

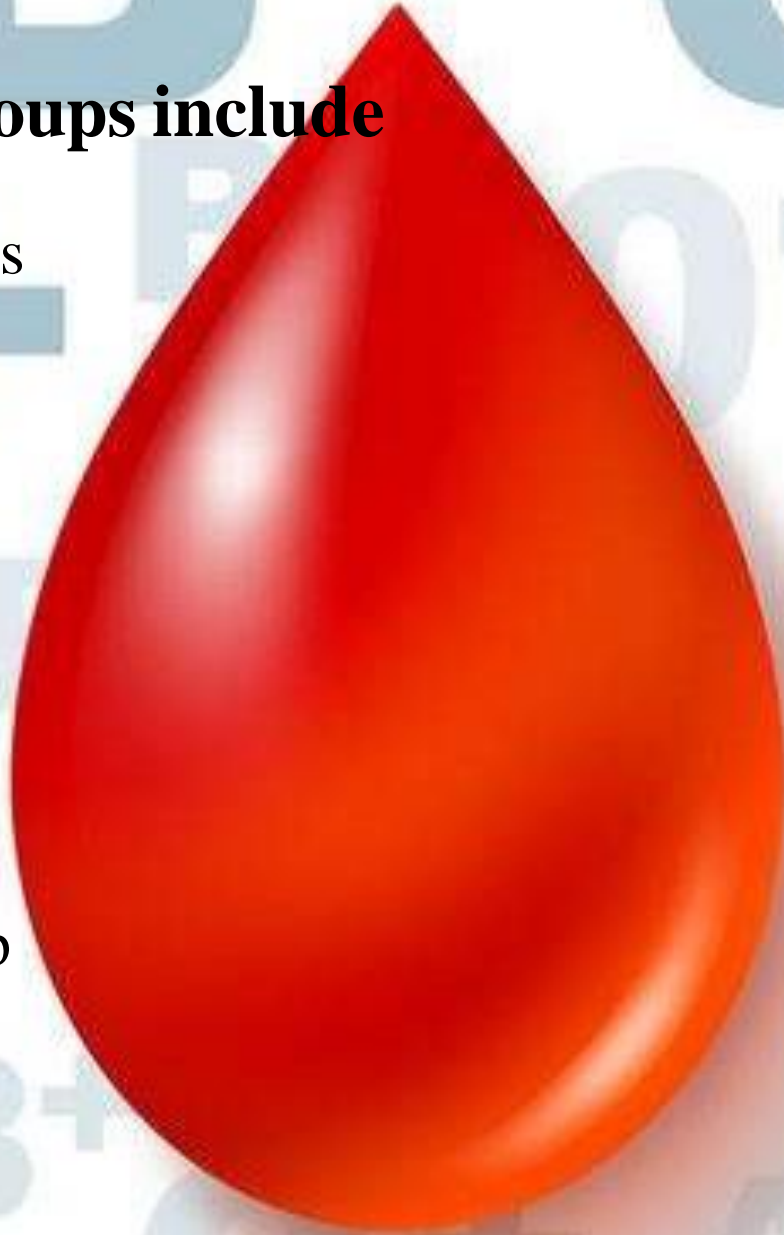


- Thirty-five major blood group systems were recognized by the *International Society of Blood Transfusion* (ISBT) in October 2012.
 - In addition to the ABO antigens and Rhesus antigens, many other antigens are expressed on the red blood cell surface membrane.
- 

➤ An individual can be AB Rh D positive, and at the same time M and N positive (MNS system), K positive (Kell system), and Le^a or Le^b positive (Lewis system). Many of the blood group systems were named after the patients in whom the corresponding antibodies were initially encountered.

Other blood groups include

- Auberger groups
- Diego group
- Bombay group
- Duffy group
- Lutheran group
- P group
- Kell group
- I group
- Kidd group
- Sulter Xg group
- Kidd group
- Duffy group





Thanking
you