



Blood Group Systems

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Blood Type (Group) Definition:

International Society of Blood Transfusion (ISBT) has recently recognized 33 blood group systems. Apart from ABO and Rhesus system, many other types of antigens have been noticed on the red cell membranes. Blood grouping and cross-matching is one of the few important tests that the anesthesiologist orders during perioperative period. A blood type (also called a blood group) is defined as the classification of blood based on the presence or absence of inherited antigenic substances on the surface of red blood cells (RBCs). A series of related blood types constitutes a blood group system, such as the Rh or ABO system. The frequencies of the ABO and Rh blood types vary from population to population. The ABO blood group system is the most important blood type system (or blood group system) in human blood transfusion. The associated anti-A antibodies and anti-B antibodies are usually IgM antibodies, which are usually produced in the first years of life by sensitization to environmental substances such as food, bacteria and viruses. ABO blood types are also present in some animals, for example cows and sheep, and apes such as chimpanzees, bonobos, and gorillas.

Table 1

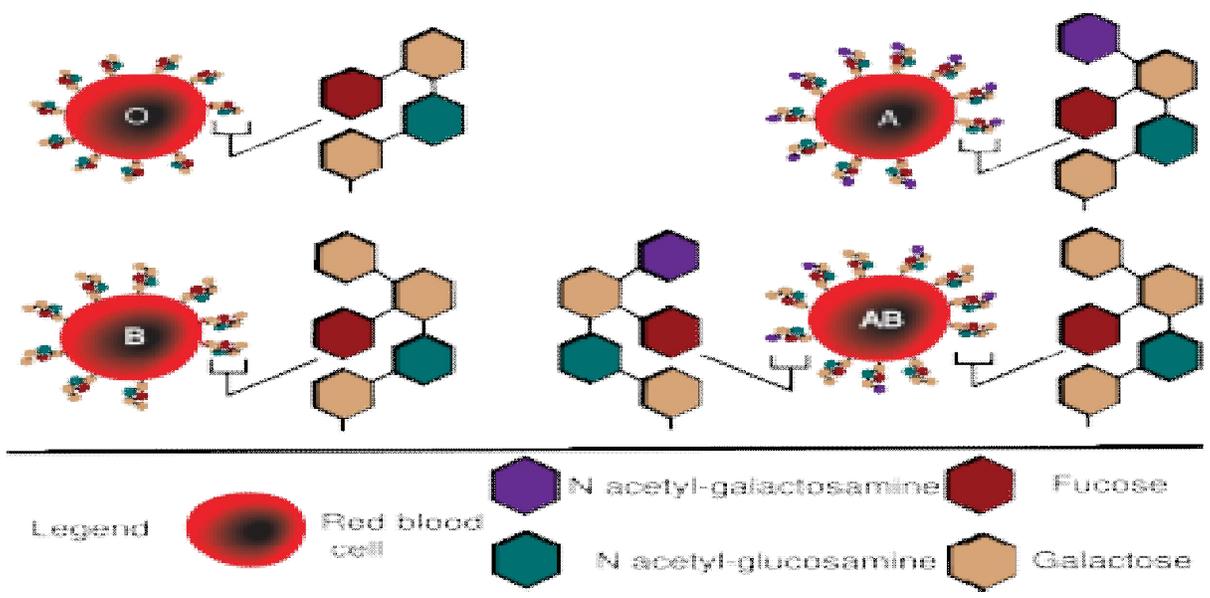
Blood group systems

Name	Symbol	Number of antigens	Gene name	Chromosome
ABO	ABO	4	ABO	9
MNS	MNS	43	GYP A, GYP B, GYP E	4
P	P1	1	P1	22
Rhesus	Rh	49	RhD, RhCE	1
Lutheran	LU	20	LU	19
Kell	KEL	25	KEL	7
Lewis	LE	6	FUT3	19
Duffy	FY	6	FY	1
Kidd	JK	3	SLC14A1	18

Serology



Anti-A and anti-B antibodies, which are not present in the newborn, appear in the first years of life. It is possible that food and environmental antigens (bacterial, viral or plant antigens), similar enough to A and B glycoprotein antigens that antibodies created against the environmental antigens in the first years of life can cross react with ABO-incompatible red blood cells. Anti-A and anti-B antibodies are usually IgM, which are not able to pass through the placenta to the fetal blood circulation. O-type individuals can produce IgG-type ABO antibodies.



	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies present	Anti-B	Anti-A	None	Anti-A and Anti-B
Antigens present	A antigen	B antigen	A and B antigens	None

Role of ABO antigens in transfusion medicine

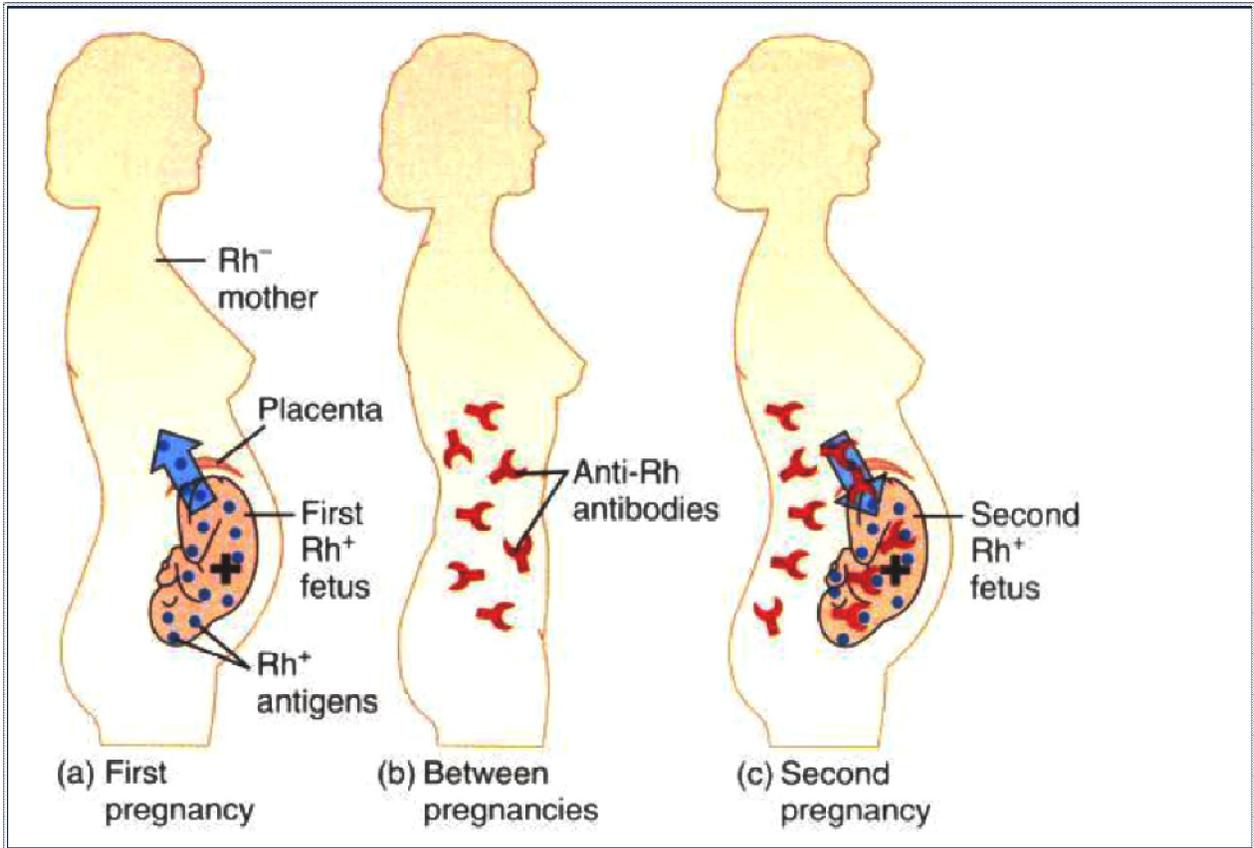


For blood donor and recipient to be ABO-compatible for a transfusion, the recipient must not have Anti-A or Anti-B antibodies that correspond to the A or B antigens on the surface of donor's red blood cells (since the red blood cells are isolated from whole blood before transfusion, it is unimportant whether the donor blood has antibodies in its plasma). If the antibodies of the recipient's blood and the antigens on the donor's red blood cells do correspond, the donor blood is rejected. On rejection, the recipient may experience Acute hemolytic transfusion reaction (AHTR). (Transfusion Reactions resulting from mismatched blood types= • Agglutination and delayed hemolysis of donor's RBC (or immediate intravascular hemolysis) → Jaundice, • Renal failure: Renal tubular blockage by hemoglobin). In addition to the ABO system, the Rh blood group system can affect transfusion compatibility.

An individual is either positive or negative for the Rh factor; this is denoted by a '+' or '-' after their ABO type. Those with Rh-positive blood can safely receive both Rh-positive and Rh-negative blood, but those with Rh-negative blood should only receive Rh-negative blood. Rh-negative blood is used in emergencies when there is no time to test a person's Rh type. Because of this, the AB+ blood type is referred to as the "universal recipient", as there are neither Anti-B or Anti-A antibodies in its plasma, and can receive both Rh-positive and Rh-negative blood. Similarly, the O- blood type is called the "universal donor"; since its red blood cells have no A or B antigens and are Rh-negative, no other blood type will reject it.

ABO hemolytic disease of the newborn

ABO blood group incompatibilities between the mother and child does not usually cause hemolytic disease of the newborn (HDN) = Erythroblastosis Fetalis, because antibodies to the ABO blood groups are usually of the IgM type, which do not cross the placenta; however, in an O-type mother, IgG ABO antibodies are produced and the baby can develop ABO hemolytic disease of the newborn. (• Rh -ve lady marrying Rh+ve man. • If baby is Rh+ve, fetal RBC leaks to maternal circulation during placental separation (delivery or abortion). • Mother starts to make antiRhAb. • Next pregnancy with Rh+ve baby @ antiRhAb pass to baby and cause agglutination and hemolysis of his RBC.)



Among Japanese : many believe that it determines personality, character and affinity

General blood type personality chart in Japan

Type O: self-confident, strong-willed, intuitive, ambitious, realistic, creative, curious, easy-going, workaholic, stubborn, self-centered, unpredictable, cold

Type A: careful, serious, kind, patient, introvert, creative, romantic, sensitive, stubborn, good team players, responsible, hard workers, fastidious

Type B: optimistic, cheerful, eccentric, individualistic, selfish, creative, active, passionate, irresponsible, playful, elastic, extrovert, self-centered

Type AB: mysterious, unpredictable, logical, cool, rational, irresponsible, arty enjoy having time alone, forgetful, critical, have strong spirituality