

INHERITANCE PATTERN OF ABO BLOOD GROUPING AND ITS MEDICAL IMPORTANCE

SEMINAR PRESENTATION

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SUMMARY

ABO blood group is a classification of blood based on the presence and absence of antibodies and inherited antigenic substance on the surface of red blood cell. It is widely credited to have been discovered by the austrian scientist Karl Landsteiner in 1900.

SUMMARY CONT'D

ABO blood group are inherited from biological parents in the same way as other genetic traits(e.g eye color). Everyone inherits two alleles of gene one from each parents. The combination of the two alleles determines the blood group. the medical importance help to solve some of the future genetics problems such the Hemolytic disease of new born in (pregnancy), blood transfusion reaction, paternity and maternity cases and medico legal cases.

ABO BLOOD GROUP

ABO blood group (also called blood type) is a classification of blood based on the presence and absence of antibodies and inherited antigenic substance on the surface of red blood cells (RBC). It is credited to have been discovered by the Austrian scientist karl Landsteiner in 1900. These antigens may be proteins, carbohydrates, glycoprotein's or glycolipids, depending on the blood group system.

ABO BLOOD GROUP CONT'D

ABO blood group are inherited and represent contributions from both parents. The two genes (one from each parent) which control the ABO group can be the same or different. If the two genes are the same the person is known as homozygous for the character and if different heterozygous.

TYPE OF ANTIGENS AND ANTIBODIES.

In ABO blood group, there are two antigens and antibodies. The two antigens are antigen A and antigen B. the two antibodies are Anti A and Anti B. The antigens are present in the red blood cells and the antibodies in the serum/plasma. Regarding the antigens property of the blood all humans being can be classified into four groups

TYPE OF ANTIGENS AND ANTIBODIES CON'T

Those with antigen A (group A) those with antigen B (group B) those with both antigen A and B (group AB) those with neither antigen (group O) the antibodies present together with the antigens are found as follows

group	The red blood cells	serum/plasma	Genotype
A	A antigen	Anti-B	A/A OR A/O
B	B antigen	Anti-A	B/B OR B/O
AB	A antigen and antigen B	None	A/B
O	None	Anti A and anti B	O/O

Table, 1. Antibodies present together with the Antigens

ABO INHERITANCE

The inheritance of the ABO blood groups is governed by three genes A, B, O. The A and B genes are dominant while the O gene is recessive. The O gene is called an amorph because it has no protein product i.e. it produces no observable change in genotype even when present in this homozygous form, each individual inherits single ABO gene from each,

ABO INHERITANCE CONT'D

parent which means that there are six possible ABO genotype namely AA, AB, BB, AO, BO and OO the genotype translate into four possible phenotype namely A, B, AB and O because the O gene is recessive AO and BO genotype are expressed as group A and B respectively and are indistinguishable from AA and BB genotype. Every individual has two chromosomes each carrying A, B, or O, one chromosome from each parent, the inheritance of the A, B, and O genes determine the presence and absence of the ABO antigens on the red cells.

ABO INHERITANCE PATTERNS

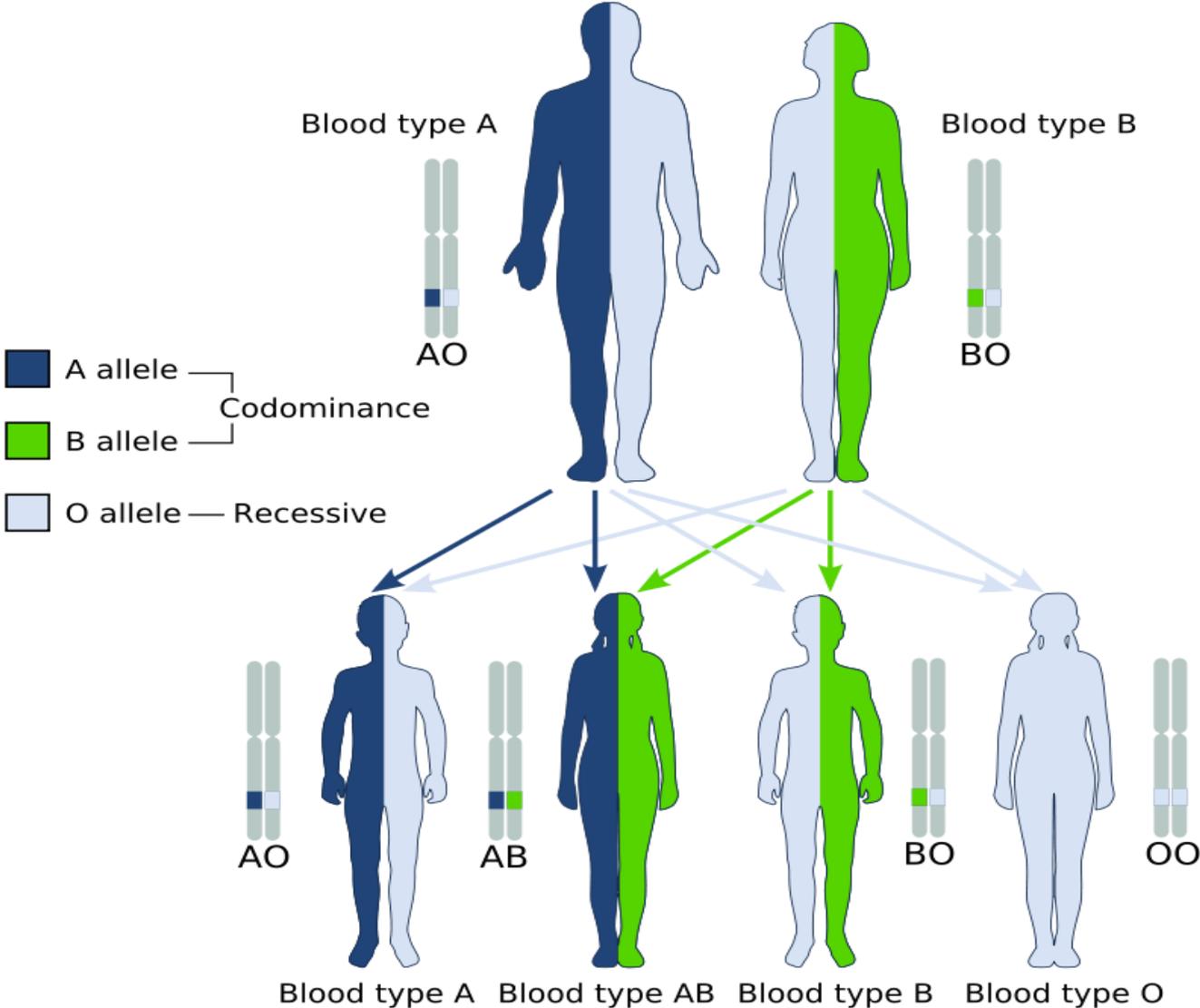


Fig. 1. ABO Inheritance Patterns

MEDICAL IMPORTANCE COMPATIBILITY AND INCOMPATIBILITY OF ABO ANTIGEN

ABO incompatibility: is a condition in which the antigens of a mother and her fetus are different enough to cause an immune reaction, occur in a small number of pregnancies. Rarely ABO incompatibility may give rise to erythroblastosis fetalis (hemolytic disease of the new born), a type of anemia in which the red blood cells of the fetus are destroyed by the maternal immune system.

COMPATIBILITY AND INCOMPATIBILITY OF ABO ANTIGEN CONT'D

This situation occurs most often when a mother is type O, and her fetus is either type (A, B or AB). Anti-A and anti-B antibodies are naturally occurring antibodies which tend to belong to IgM class and do not pass through the placenta, but some mothers naturally have IgG anti-A and anti-B antibodies which can pass through the placenta and hemolyse fetal red blood cells.

TRANSFUSION REACTIONS

The routine practice of blood typing and cross matching blood products should prevent adverse transfusion reactions caused by ABO antibodies. However, clerical error can result in "the wrong blood" being transfused into a patient, an error which can result in the death of the patient. If a recipient who has blood group O is transfused with non-group O RBCs,

TRANSFUSION REACTIONS CONT'D

The naturally occurring anti-A and anti-B in the recipient's serum binds to their corresponding antigens on the transfused RBCs. These antibodies fix complement and cause rapid intravascular hemolysis, triggering an acute hemolytic transfusion reaction that can cause disseminated intravascular coagulation, shock, acute renal failure, and death.

REFERENCE

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