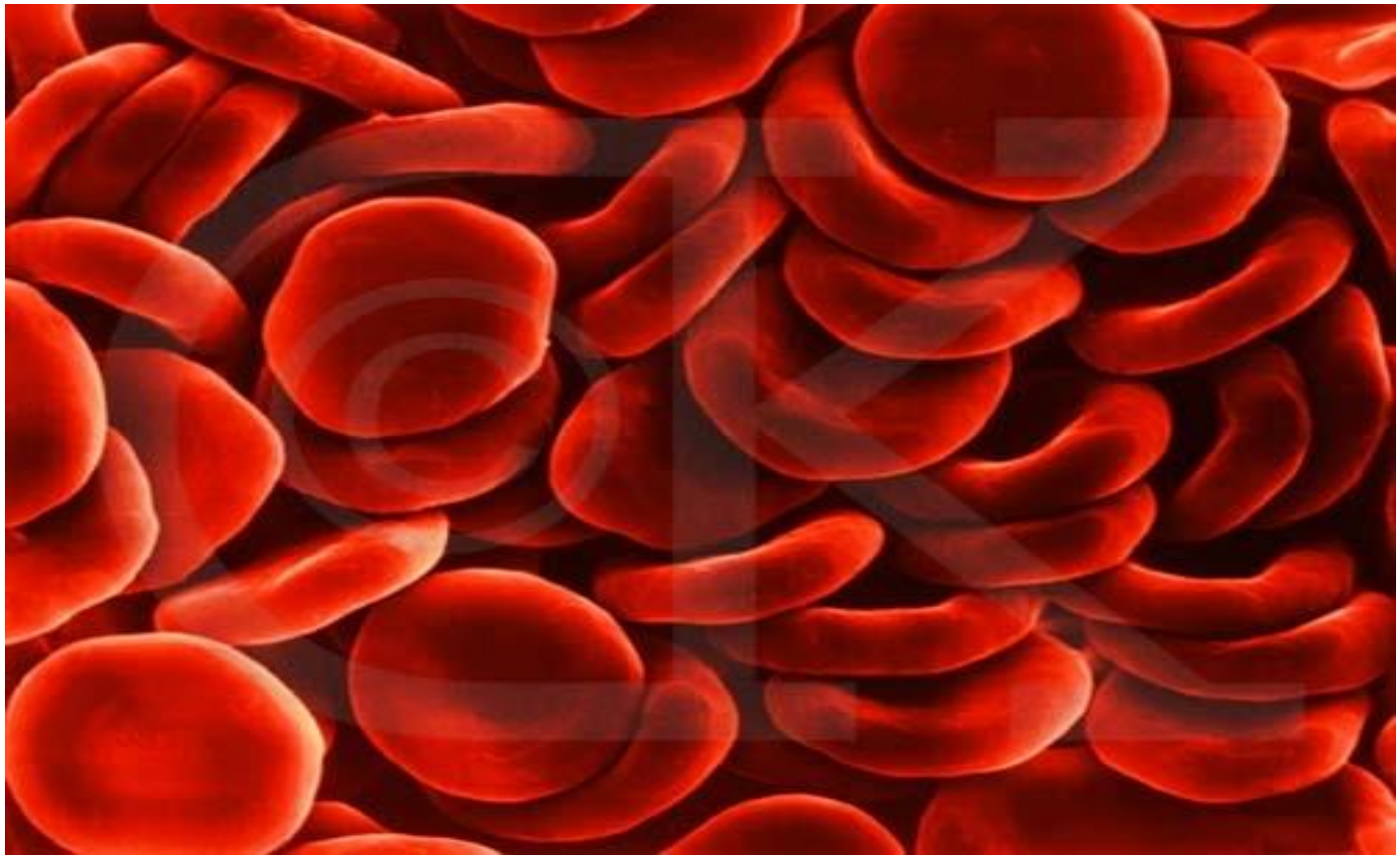
Blood Groups



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STUDY OBJECTIVES

By the end of the lecture the student will able to:

1-Understand different blood group.

2-Understand Rh factor and its role in blood typing.

ABO BLOOD GROUP SYSTEM

Group	A	B	AB	O
Antigen on RBCs	A	B	A & B	-----
Antibody in plasma	Anti-B	Anti-A	-----	Anti-A & Anti-B
% Population	41	9	3	47

-The site of danger in blood transfusion is the agglutinogen of donor (with agglutinin of the recipient) this is because The agglutinin of the donor (with very few amounts =250 ml) in plasma:

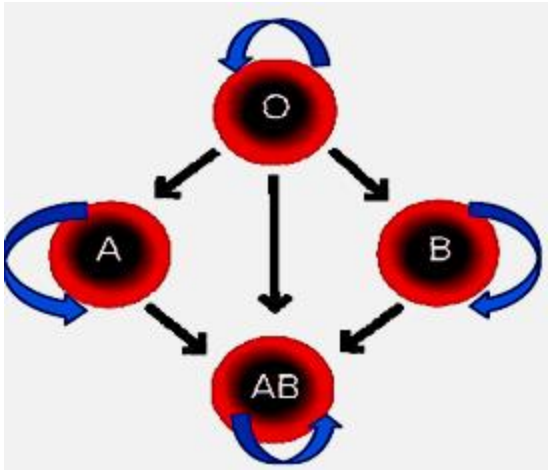
A- is diluted by the recipient plasma because its very large amount (5 L) and so no agglutination occur.

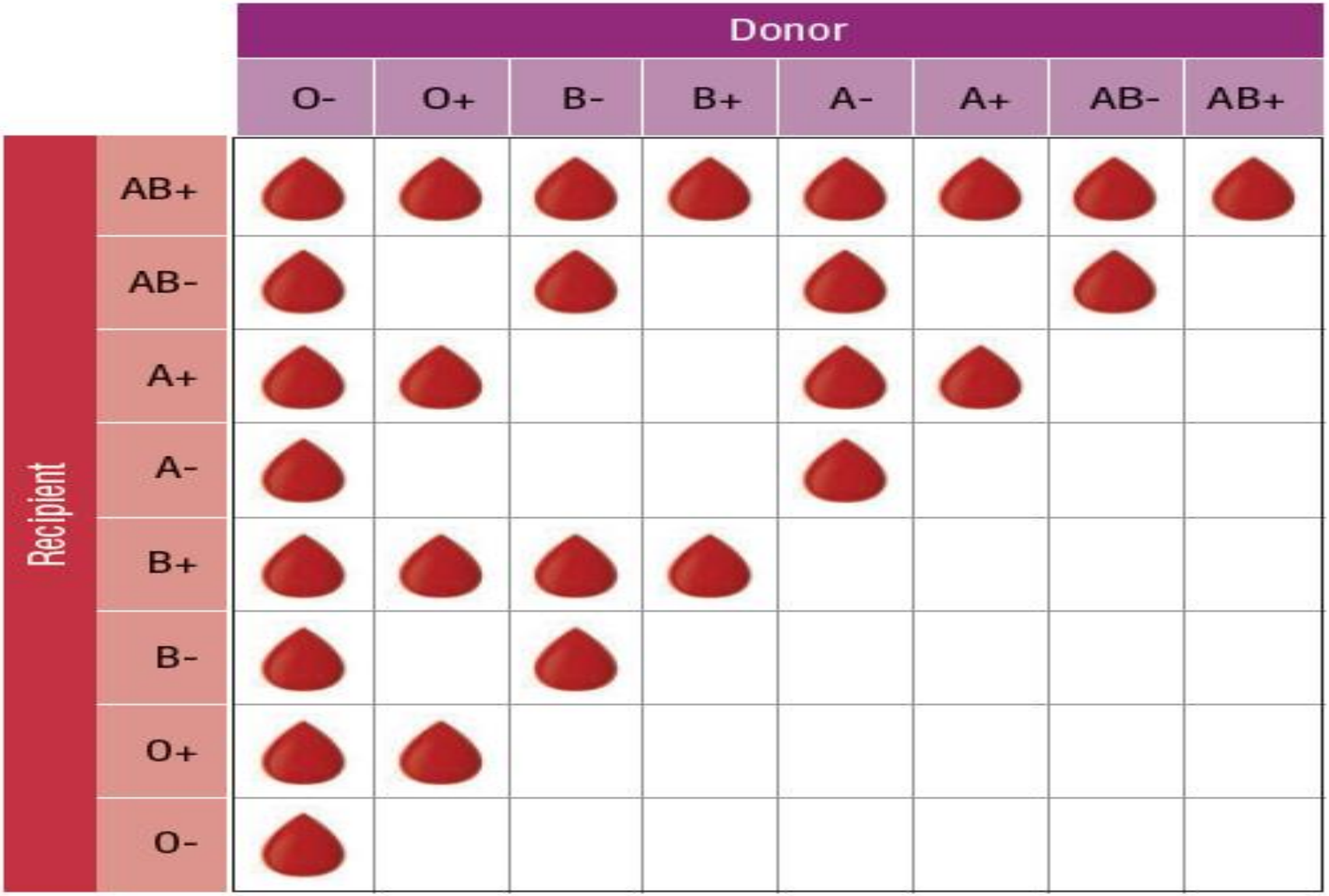
B- is neutrilized by recipient's aggluitonogen.

Universal Donor and Universal Recipient

- The group "O" is called universal donors (this because RBCs of group O contains no agglutinogen and so no agglutination occurs) and the group "AB" also is called universal recipient (no agglutinin in its plasma and so

	A	B	AB	O
Can give blood to	A & AB	B & AB	AB	All groups Universal donor
Can receive blood from	A & O	B & O	All groups Universal recipient	O




Donor
O-
O+
B-
B+
A-
A+
AB-
AB+
Recipient
AB+
AB-
A+
A-
B+
B-
O+
O-

Rh. Factor

-Def., It is the agglutinogen which was discovered in RBCs of "Rhesus monkeys" (hence the name).

-According to presence of Rh-agglutinogen on RBCs membrane:

1) Rh +ve	85% of people.	Has D-antigen (genotype may be DD or Dd).
2) Rh –ve	15% of people.	No D-antigen (genotype is dd).

-Normally there is no anti –Rh antibodies and it is formed only by 2 methods:

- 1-Blood transfusion from person Rh +ve to person Rh-ve.
- 2-Pregnancy of Rh –ve by baby Rh +ve.

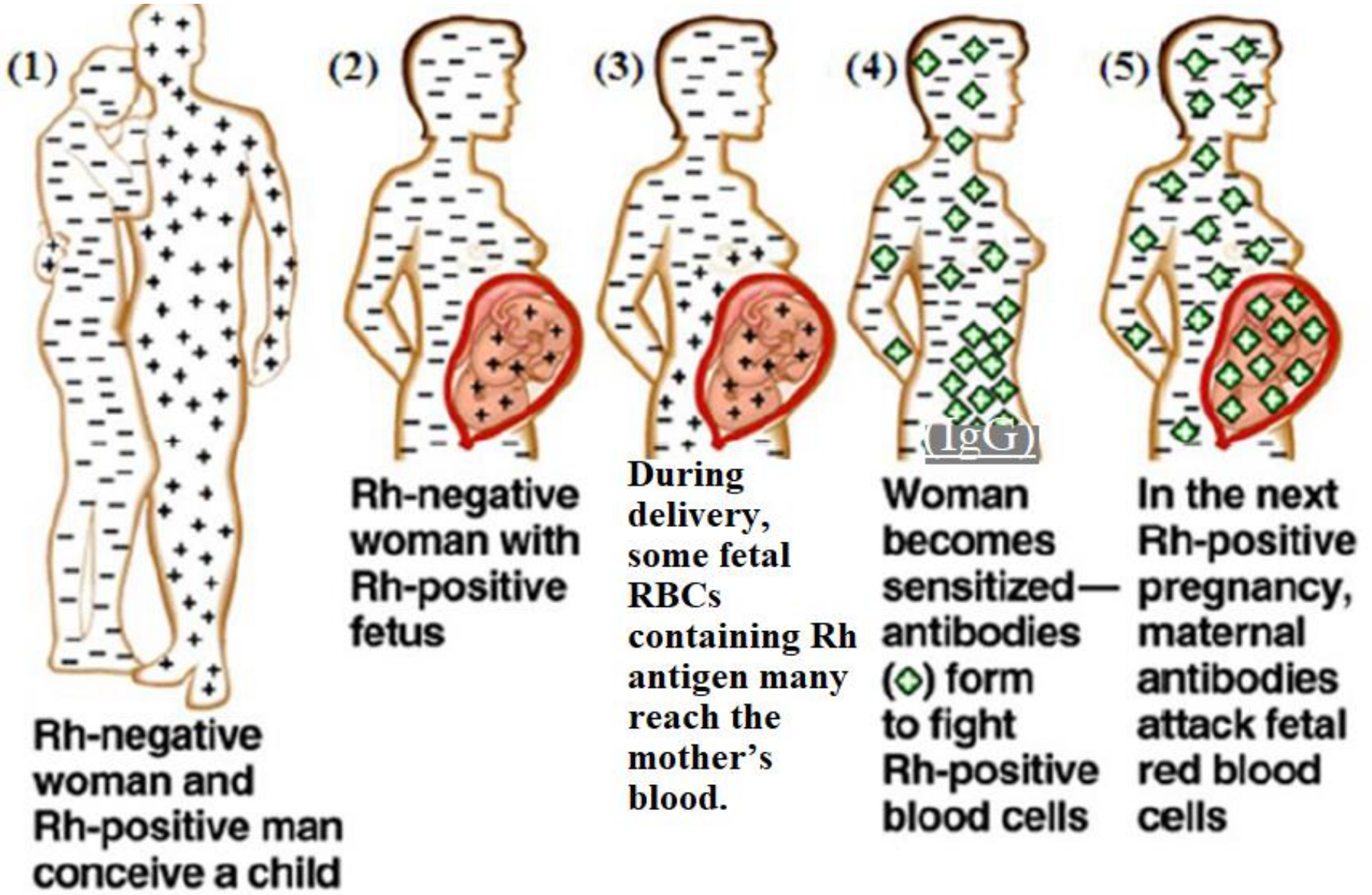
Rh. Factor

-Importance:

In Blood Transfusion: If Rh -ve person is transfused with Rh +Ve blood, anti-Rh antibodies will develop in the plasma. Later on, if he needs a second blood transfusion and is given Rh +Ve blood the agglutination of this blood will occur.

In Marriage: If Rh -ve female married Rh +ve male, the fetus will be Rh +ve in most cases. 1st baby should not be affected while from the 2nd will be die by "Erythroblastosis fetalis" or hemolytic diseases of the newly born (= severe anaemia and jundice)

Erythroblastosis Foetalis



Erythroblastosis Foetalis

1st pregnancy:

Mother Rh-ve + 1st Baby Rh+ve

A Delivery

Leaking of fetal blood into maternal circulation

Sensitization of mother "form of anti-D"

2nd pregnancy:

Mother Rh-ve with anti-D + 2nd baby Rh+ve

Anti-D
Cross placenta

agglutination & hemolysis

1. If severe hemolysis: intrauterine death.
2. If mild or moderate hemolysis.
   - Anemia
   - Severe jaundice
   - Edema (hydrops fetalis)
3. Kernicterus: "Neurological deficit"

Erythroblastosis Foetalis

-Treatment: -Preventing Rh -ve females from receiving (or marring) Rh +ve. But if this occurs:

1- MOTHER must be given a single dose of (Rh immune globulin = anti D) within 48 hours (which neutralize the antigens and inhibits the formation of anti Rh antibodies).

2- BABY can be treated by repeated exchange blood transfusion with Rh-ve group O blood during the first few weeks of life. (determination of neonatal blood group is difficult. He has no agglutinin).

Erythroblastosis Foetalis

N.B:

The first baby usually born normal but may be affected (if the mother was previously sensitized by Rh (+ve) blood transfusion).

Rh antibodies (IgG) can cross the placenta

ABO antibodies (IgM) can't cross the placenta, so no fetal complication.

TEST YOUR SELF

GIVE REASONS:

-The site of danger in blood transfusion is the agglutinogen of donor with agglutinin of the recipient.

Because the agglutinin of the donor (with very few amounts) in plasma is diluted by the recipient plasma because it's very large amount and so no agglutination occur.

-The group "O" is called universal donors while group "AB" is called universal recipient.

The group "O" is called universal donors (this because RBCs of group O contains no agglutinogen and so no agglutination occurs) and the group "AB" also is called universal recipient (no agglutinin in its plasma and so no agglutination occur).

-Hemolytic diseases of the newly born due to Rh incompitability is called erythroblastosis fetalis?

Because the maternal antibodies destroy many fetal erythrocytes, the fetal bone marrow releases immature precursors of erythrocytes, such as reticulocytes and erythroblasts

MCQs

1- The group which has no agglutinogen is:

a) A group.

b) B group.

c) O group.

d) AB group.

MCQs

2-It is said to be agglutinated when the:

A. RBCs are separated
B. RBCs are clumped together
C. WBCs are clumped together
D. Platelets are clumped together

MCQs

3-Blood type O persons are considered universal donors because:

A. Type O blood has the commonest distribution.

B. Their R.B.C's contain neither A nor B agglutinogens.

C. Their R.B.C's may contain the Rh factor.

D. Their plasma contain both α & β aggulitinins.

MCQs

4-A lady presented with shock due to post partum hemorrhage, her blood group was unknown but became coagulated when mixed with serum containing anti-A antibodies and similarly her serum coagulated with blood group B. The most suitable blood group to be transfused in this case is:

A. O negative.

B. O positive.

C. A positive.

D. AB positive.

MCQs

5-Mr. Karim's blood was determined to be AB positive. What does this mean?

a)Antibodies to A and B are present in plasma

b) He has antigen A and B but not antigen D on his RBC's

c) There are no antigen A, B or D

d) There are no antibodies to A, B or D

MCQs

6- The blood group known as the ABO system is based on the presence of what proteins on blood cells?

A. Antibodies

B. Antigens

C. Agglutinins

D. Immunoglobulins

MCQs

7- What type of blood may a patient with blood type "B+" be infused with? Any blood that is

A. Positive for rhesus antigen D

B. Negative for rhesus antigen D

C. Negative for antigen B

D. Negative for antigen A

MCQs

8-What can be said about a person who has the "A" antigen on their red blood cells?

A. Their blood contains anti-B agglutinins.

B. Their blood contains anti-A agglutinins.

C. Their blood contains anti-A and anti-B agglutinins.

D. Their blood contains neither anti-A nor anti-B agglutinins.

MCQs

9- Which is the most rare blood group

a. A Rh+	b. AB Rh+
c. AB Rh-	d. B Rh-

MCQs

10- A person whose blood group is "B positive" has which of the following?

A. The rhesus D antigen and the B antigen on their RBC and the anti-A agglutinin

B. The rhesus D antigen and the B antigen on their RBC and the anti-B agglutinin

C. The rhesus D antigen and the A antigen on their RBC and the anti-B agglutinin

D. No rhesus D antigen and the B antigen on their RBC and the anti-A agglutinin

MCQs

11- With which blood types can a person with blood type B be safely transfused?

A. A or AB

B. B or O

C. A or O

D. B or AB

MCQs

12- A mother with blood type O negative has a 2-year-old child of blood type A positive and is pregnant with a second child who is B positive. What should have been done to ensure the health of the people involved?

A. The mother was administered anti-A antibodies after delivery of the first child.

B. The second child should be administered anti-D antibodies while in utero.

C. The mother was administered anti-D antibodies after delivery of the first child.

D. The first child was administered anti-D antibodies after the birth.

MCQs

13- Which of the following transfusions will result in an immediate transfusion reaction?

A) O Rh-negative whole blood to an O Rh-positive patient

B) A Rh-negative whole blood to a B Rh-negative patient

C) AB Rh-negative whole blood to an AB Rh-positive patient

D) B Rh-negative whole blood to a B Rh-negative patient

MCQs

14- Which blood unit carries the least risks for inducing an immediate transfusion reaction into a B-positive recipient?

A) Whole blood A positive

B) Whole blood AB positive

C) Packed red blood cells O positive

D) Packed red blood cells AB negative

MCQs

15- Which transfusion will result in a transfusion reaction? Assume that the patient has never had a transfusion.

A) Type O Rh-negative packed cells to an AB Rh-positive patient

B) Type A Rh-positive packed cells to an A Rh-negative patient

C) Type AB Rh-positive packed cells to an AB Rh-positive patient

D) Type A Rh-positive packed cells to an O Rh-positive patient

Donor	Donor Antigen	Recipient	Recipient Antibody	Reaction
O-negative	None	AB-positive	None	None
A-positive	A, Rh	A-negative	B	None
AB-positive	A, B, Rh	AB-positive	None	None
A-positive	A, Rh	O-positive	A, B	A (antigen) and A (antibody)

MCQs

16- A woman whose blood type is A positive and who has always been healthy just delivered her second child. The father's blood type is O negative. Because the child's blood type is O negative, what would you expect to find in this child?

A) Erythroblastosis fetalis due to rhesus incompatibility

B) Erythroblastosis fetalis due to ABO blood group incompatibility

C) The child would not be expected to have erythroblastosis fetalis

D) Both A and B

MCQs

17-Rhesus incompatibility of the new born occurs only if:

a) The mother is Rh-, father is Rh+, and the baby is Rh-

b)The father is Rh+, mother is Rh+ and the baby is Rh-

c) The mother is Rh-, father is Rh+ and the baby is Rh+

d) The baby is Rh+, mother is Rh- and the father is Rh-

e) The mother and fetus are ABO incompatible

MCQs

18-Which of the following transfusions will result in an immediate transfusion reaction?

A. O-negative whole blood to an O-positive patient
B. A-negative whole blood to a B-negative patient
C. AB-negative whole blood to an AB-positive patient
D. B-negative whole blood to a B-negative patient

MCQs

19-A woman whose blood type is A positive and who has always been healthy just delivered her second child. The father's blood type is O negative. Because the child's blood type is O negative (O, Rh negative), what would you expect to find in this child?

A. Erythroblastosis fetalis due to rhesus incompatibility
B. Erythroblastosis fetalis due to ABO blood group incompatibility
C. Both A and B
D. The child would not be expected to have erythroblastosis fetalis

Answers

MCQs

1-C	2-C	3-B	4-C	5-D
6-B	7-D	8-A	9-C	10-A
11-B	12-C	13-B	14-C	15-D
16-C	17-C	18- B	19-D	