

BLOOD PHYSIOLOGY

Blood groups & Transfusion

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Lecture Content

- 1. ABO Blood groups: antigen, antibodies and their genetic inheritance.**
- 2. Rhesus Antigens.**
- 3. Blood groups typing.**
- 4. Transfusion reaction.**
- 5. Rhesus immune response.**
- 6. Hazard of blood transfusion.**

BLOOD GROUPS

- **The chief blood groups are:**
 - **A-B-O**
 - **Rh (Rhesus)**
- **Blood groups are antigen (glycoprotein) on the surface of RBC**
- **The ABO system: Depends on whether the RBC contain one, both or neither of the two blood antigens A & B.**
- **Four main ABO groups: A, B, AB, O**

Blood groups

Group	Agglutinogen (Antigen)	Agglutinin (Antibody)	%
A	A	Anti-B	41%
B	B	Anti-A	9%
AB	A & B	No antibodies	3%
O	-	Anti-A & anti-B	47%

Agglutinins A, B antibodies

- **Anti-A & Anti-B are naturally occurring antibodies.**
- **Not present at birth, appear 2-8 weeks after delivery may be due to antigens in food**

Genetic determination of the agglutinogens

- **Two genes are inherited from each parent**
- **Blood group genotype:**
 - **A = AA, AO**
 - **B = BB, BO**
 - **O = OO**
 - **AB = AB**
- **Use of genotype of child in paternal dispute**
- **Frequency of ABO has ethnic variation**

Transfusion reaction

- **If a person with blood group A transfused with blood of group B**
- **The anti-A in plasma of recipient blood group B will agglutinate the transfused cell (A)**
- **The clumped cells plug small blood vessels**
- **Sometimes causes immediate hemolysis**
- **Transfusion reaction**

Blood group typing

- **Before transfusion blood from donor and recipient should be typed to know its group**
- **A drop of blood is mixed with ant-A and ant-B & Rh then inspected for agglutination**
- **Cross matching, donor cells + recipients serum**

RBC	Anti A	Anti-B
O	-	-
A	+	-
B	-	+
AB	+	+

Rh Blood types

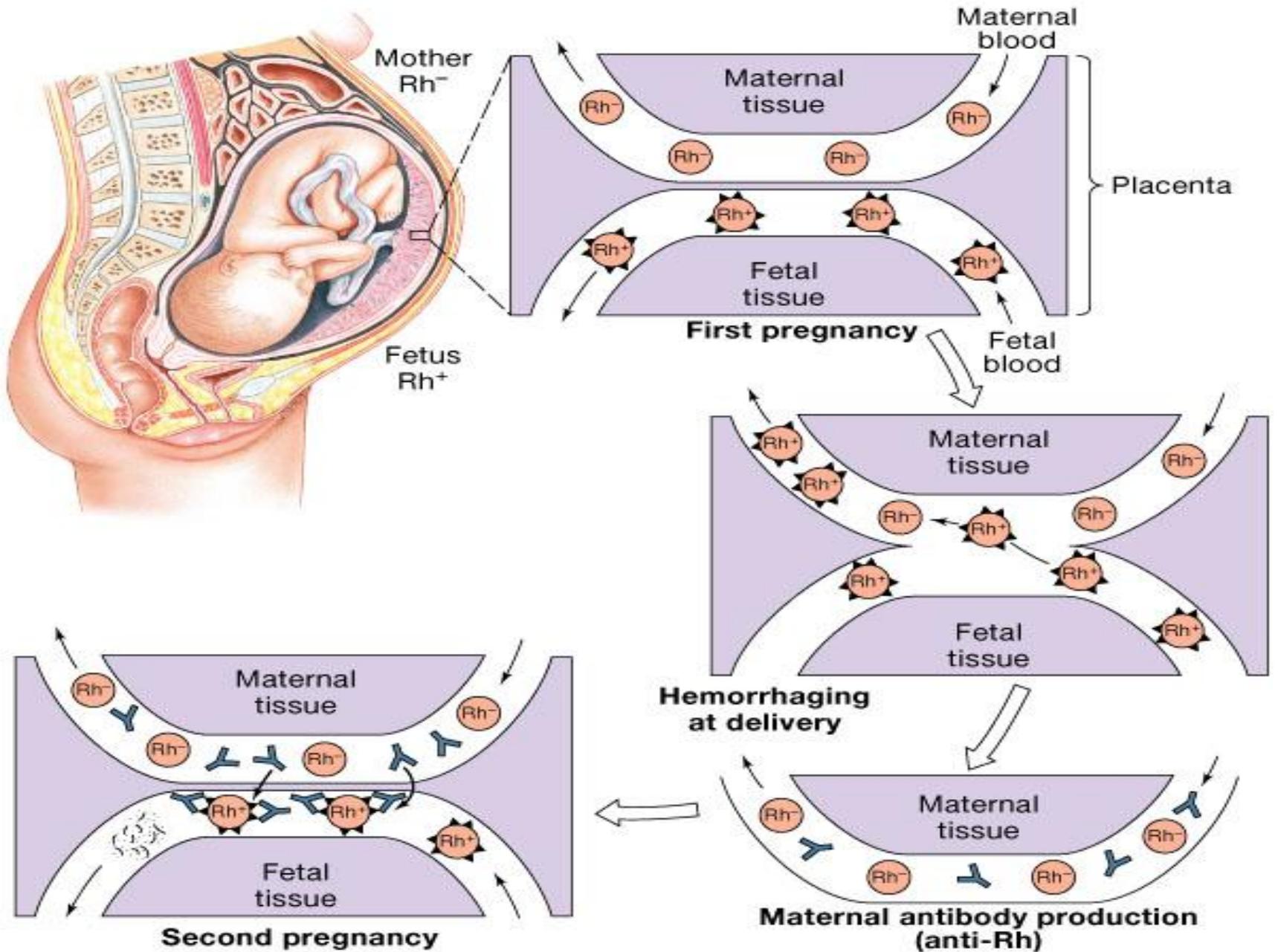
- **Presence of the Rhesus antigen (D) on the surface of RBC.**
- **Rhesus antigens are: C, D, E, c, d, & e
commonest D**
- **Presence of antigen D (Rh+ve); absence of D (Rh-ve)**
- **Rh+ve are 85% in European, 100% in Africa**

Rh Immune response

- **When a Rh-ve person is transfused by Rh+ve blood he will develop Anti-D agglutinin in circulation (not naturally present)**
- **Anti D antibodies can be acquired by:**
 - **Transfusion of Rh-ve individual with Rh+ve blood**
 - **Rh-ve mothers having a Rh+ve baby due to blood mixing at delivery time.**

Hemolytic disease of the newborn (Erythroblastosis Fetalis)

- **Rh-ve mother pregnant with her first Rh+ve baby, the mother will develop Anti-D at the time of delivery (First child escape)**
- **Second Rh+ve child, already formed anti D (IgG) cross the placenta and destroy baby's RBC leading to haemolytic disease of new born (haemolytic anaemia, erythroblastosis foetalis,)**
- **If the mother is transfused with Rh+ve blood before, first child will be affected.**
- **This reaction could be prevented by giving the mother an injection of Anti D at delivery of first baby**
- **Replace baby blood with Rh-ve several times**



Complication of blood transfusion

- 1. Immune reaction: Incompatible blood transfusion leading to immediate or delayed reaction, fever, haemolysis, allergic reaction**
- 2. Transmission of diseases; malaria, syphilis, viral hepatitis & Aids**
- 3. Iron overload due to multi-transfusion in case of sickle cell anemia and thalassemia**

Objectives

At the end of this lecture student should be able to:

- 1. Describe ABO blood groups types**
- 2. Recognize Agglutinin in plasma**
- 3. Describe genetic inheritance of Blood groups.**
- 4. Recognize transfusion reaction**

Objectives

At the end of this lecture student should be able to:

- 5. Describe Rhesus blood groups.**
- 6. Describe causes of hemolytic diseases of newborn.**