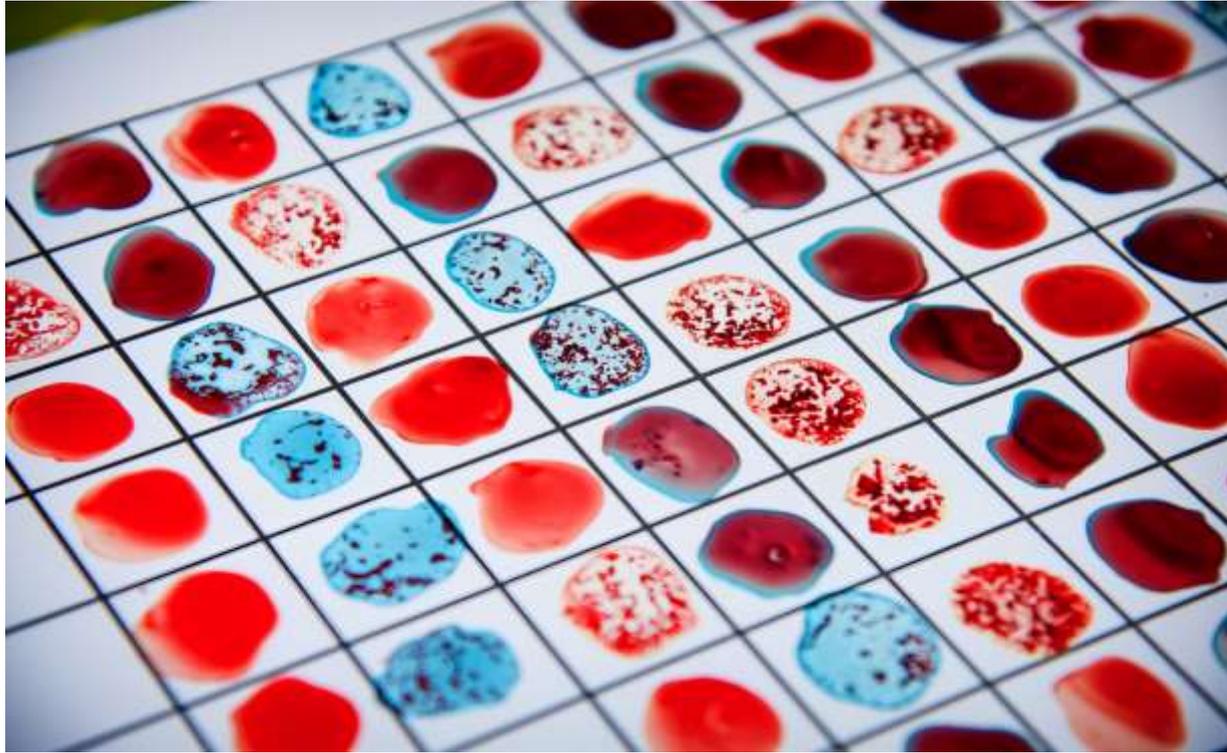


# Blood Groups

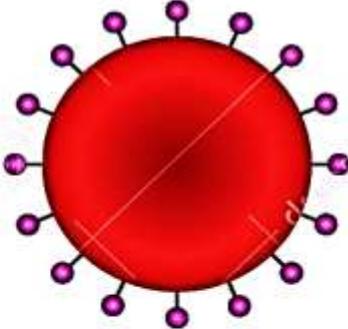
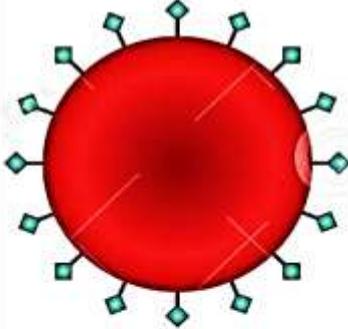
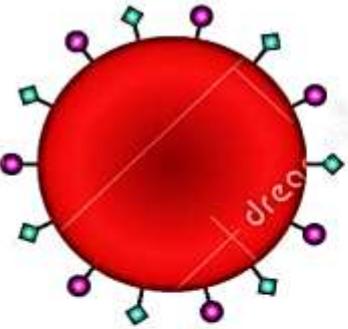
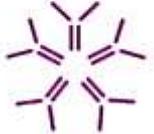
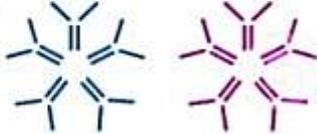


**KHALED ABDEL-SATER, MD**

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# ABO Blood Group System

Group	A	B	AB	O
Red Blood Cell Type				
Antigens Present	 Antigen A	 Antigen B	 Antigen A & B	None
Antibodies Present	 Anti-B	 Anti-A	None	 Anti-A & Anti-B

	<b>A</b>	<b>B</b>	<b>AB</b>	<b>O</b>
<b>Antigen</b>	A	B	A & B	--
<b>Agglutinin</b>	<b>Anti-B</b>	<b>Anti-A</b>	--	<b>Anti-A &amp; Anti-B</b>
<b>Incidence</b>	<b>40%</b>	<b>10%</b>	<b>5%</b>	<b>45%</b>
<b>Can give blood to</b>	<b>A &amp; AB</b>	<b>B &amp; AB</b>	<b>AB</b>	<b>All groups Universal donor</b>
<b>Can receive blood from</b>	<b>A &amp; O</b>	<b>B &amp; O</b>	<b>All groups Universal recipient</b>	<b>O</b>

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

# ABO BLOOD GROUP SYSTEM

-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.

# ● Rhesus Factor (Rh-Factor)

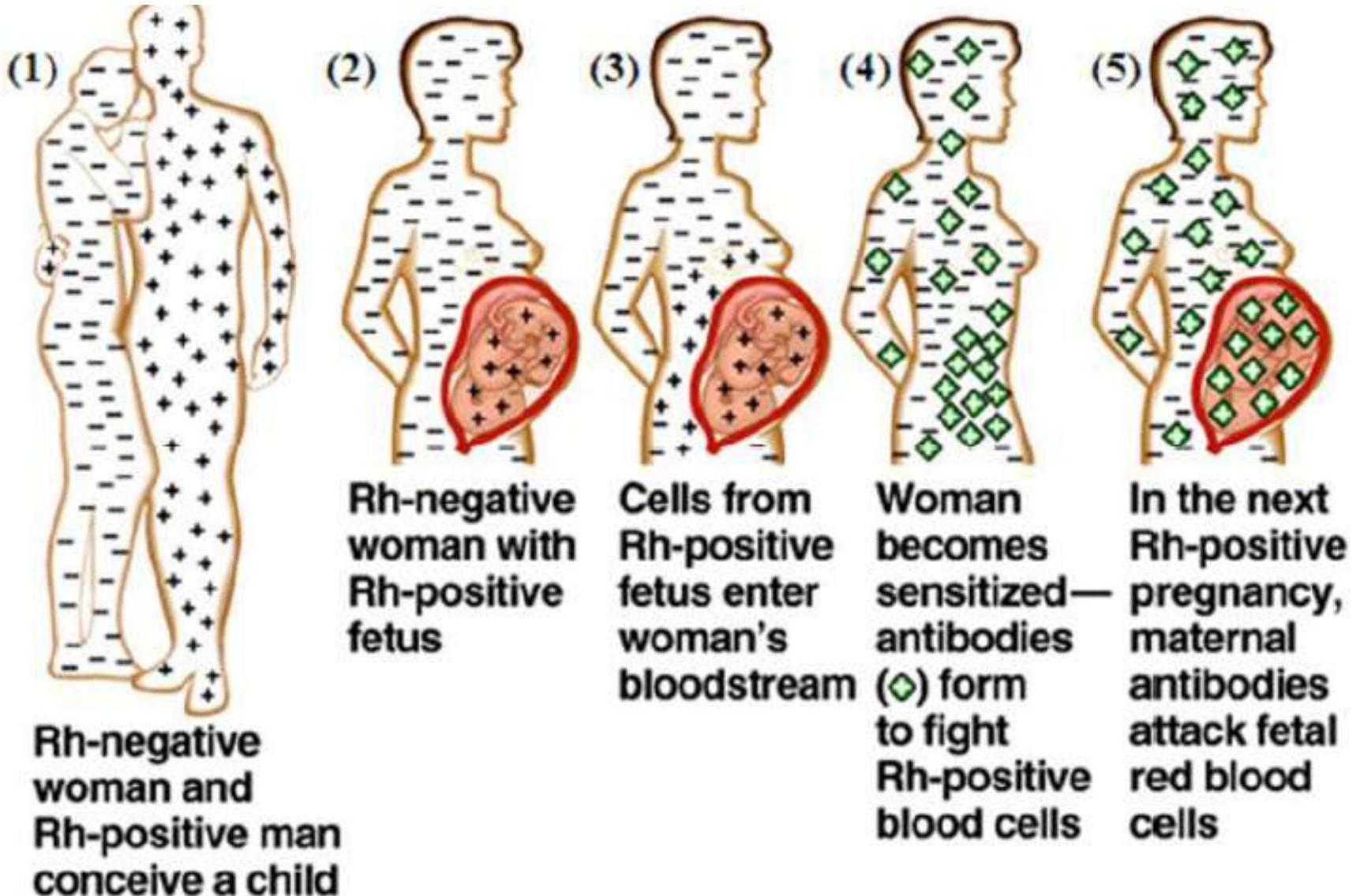


- **-Def.,** It is the agglutinogen which was discovered in the RBCs of “Rhesus monkeys” (hence the name). It is present in 85% of people (and called Rh positive “Rh +ve”) and is absent in 15 % of people. Normally there is no anti –Rh antibodies in the blood in both anti-Rh +Ve and Rh –ve and it is formed only by 2 methods:
- 1-Blood transfusion from person Rh +ve to person Rh-ve.
- 2-Pregnancy of Rh –ve by baby Rh +ve.

## **-Importance of Rh Factor:**

- 1. 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.

## 2. In Marriage:



= Erythroblastosis Foetalis

# Rh Incompatibility in Pregnancy

## 1st pregnancy

Father (RhD+)

Mother (RhD-)

Fetus (RhD+)



Fetal-maternal  
blood transfer  
during labor.

First Newborn (RhD+) Safe

But Mother (RhD-) is now  
**sensitized** to RhD antigen.

## Next pregnancy

Father (RhD+)

Mother (RhD-)

Fetus (RhD+)



Repeat encounter with  
fetal RhD antigen.

**Rapid production of  
IgG anti-D by mother.**



Maternal IgG anti-D  
**crosses placenta.**



IgG anti-D **attaches** to fetal BBCs  
& marks them for **destruction**.



**Severe**  
Increased bilirubin,  
CNS damage (Kernicterus),  
death.

**Mild case**  
Mild anemia,  
jaundice.

Fetal or Newborn Hemolytic Anemia.

### **Note:**

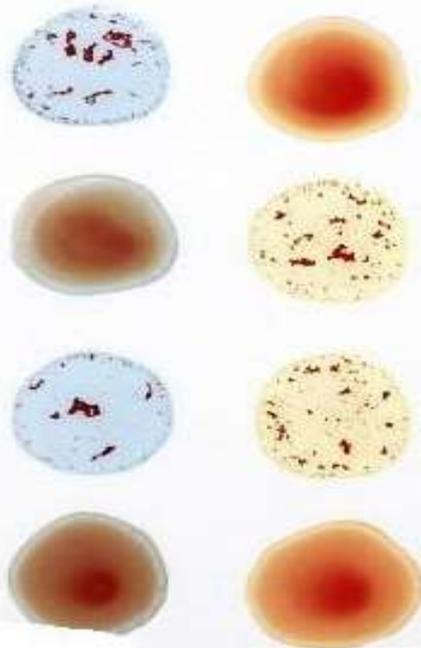
If mother is sensitized to RhD antigen prior to first pregnancy, then first fetal'll be affected.

# Materials:

## What do you need?

- Anti A serum. (blue color)
- Anti B serum. (yellow color)
- Anti D serum. (white color)
- Sterile pin or lancet.
- Glass slide, white background (e.g., paper) and mixing sticks (e.g. toothpicks).
- Alcohol and sterile cotton/gauze swabs.
- Microscope.





**A**

**B**

**AB**

**O**

# Results:

- If agglutination occur with A agglutinin serum i.e. group “A”.
- If agglutination occurs with B agglutinin serum i.e. group “B”.
- If agglutination occur with A and B agglutinin serum i.e. group “AB”.
- If no agglutination occur with A and B agglutinin serums i.e. group “O”.
- If agglutination occurs, the RBCs pose the Rh antigen and the blood is said to be Rh-positive (Rh<sup>+</sup>). If no agglutination occurs, the blood is said to be Rh-negative (Rh<sup>-</sup>).

## Clinical significance:

It is important to know blood group in the following conditions:

1-Before blood transfusion to avoid ***incompatible blood transfusion*** & its complications

2-Before marriage & during pregnancy to avoid ***erythroblastosis fetalis***

3-In ***disputed paternity*** for medicolegal importance

# Cross Matching Test

It is performed prior to a blood transfusion, to determine if the donor's blood is compatible with the blood of an

intended recipient or not even if they have the same blood group and

the same Rh factor to avoid:

- ∅ Subgroup incompatibility.

- ∅ High concentration of antibodies in the donor's blood. (As in case of giving group O blood to a group A recipient).

# ● Blood Transfusion:

## -Indications:

- 1- ↓↓ Of blood volume (> 20 % is lost as in hemorrhage).
- 2- ↓↓ Of RBCs (as in sever anemia).
- 3- ↓↓ WBCs (as in leucopenia).
- 4- ↓↓ Platelet (as in thrombocytopenic purpura).
- 5- ↓↓ Coagulation factors (as in hemophilia).
- 6- ↓↓ Of plasma protein (as in hypoproteinemia).

# Dangers:

## I-Danger of incompatibility:

### 1- Agglutination →

**A**-Blocks of capillaries → sever pain.

**B**-Blocks of blood vessels of brain (→ paralysis) or heart (→ ischemia).

- 2- Hemolysis** of RBCs → **A**-Jaundice due to excess formation of bilirubin. **B**-Cardiac arrhythmia by ↑ the extra cellular  $K^+$  level →.
- C**-Hb. is free in plasma: i-Loss in urine. ii-Precipitated → renal failure. iii-↓ oxygen capacity → ↓↓ oxygen supply to tissues.
- iv-Destroyed by the reticuloendothelial system → jaundice.
- v-Increase the re-absorption forces → no tissue fluid formation.
- D**-↑ histamine → vasodilatation and allergy.
- E**- Toxic substances → Renal a. VC

# Dangers:

**II-Transmission of diseases** e.g. AIDS, hepatitis, syphilis & malaria.

**III-Tetany** due to ↓↓ the level of  $\text{Ca}^{++}$ .

**IV-Transfusion of excess amount** → heart failure.

**V-Allergy** (fever, shivering . etc).

VI- Death due to renal failure due to:

i-Precipitation of Hb. and blocking of renal tubules.

–Renal a. VC due to toxic substances

ii-Hypotension due to liberation of histamine → vasodilatation.

Thank  
You

