



## **Blood Groups and Blood Types**

### **Physiology Lab Two**

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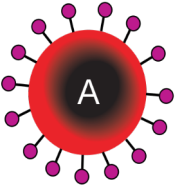
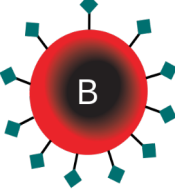
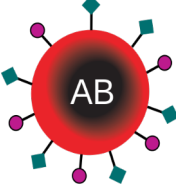
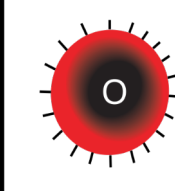


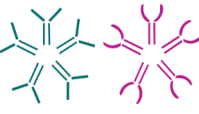



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## Blood groups and blood types

A **blood type** (also called a **blood group**) is a classification of blood based on the presence or absence of inherited antigenic substances on the surface of red blood cells (RBCs).

The **ABO blood group** is characterized by two glycolipid antigens, called A and B – depending on whether the RBCs have none, only one or both antigens, blood groups are distinguished as **type O**, **type A**, **type B**, or **type AB**.

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in Plasma	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens in Red Blood Cell	 A antigen	 B antigen	 A and B antigens	None

### Agglutinins of ABO System

Blood plasma contains **antibodies** or **agglutinins** that react with non-self-antigens.

They are absent in a newborn; the ABO antibodies start appearing in the plasma by the age of 3–4 months due to cross reactivity of ABO antigens present in naturally occurring bacteria, viruses, pollen, etc. present in the environment.

These antigens are absorbed into blood and stimulate the formation of antibodies against **antigens not present in the infants’ red cells**, i.e. those antigens that are recognized as “non-self” by the body’s immune system.

### Purpose of blood typing

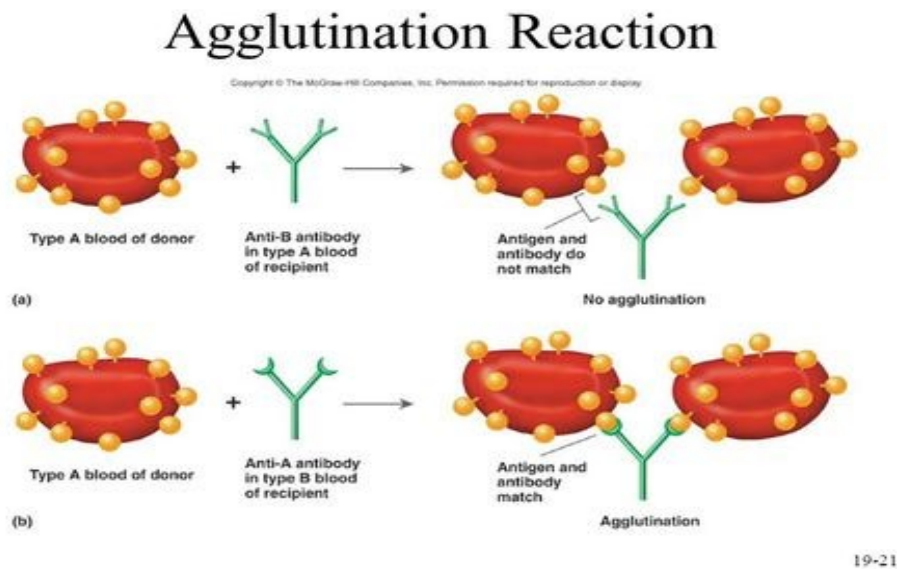
Blood can only be given after blood grouping which is an essential requirement before blood is given to any individual.

## Agglutination

If someone receives blood of the wrong type, the worst problem is the reaction of the recipient's antibodies on the donor's RBCs.

When the body encounters a foreign antigen, **agglutination occurs**.

**Agglutination**: is the clumping of RBCs due to binding of antibodies (part of the immune system) to antigen, and causes blockage of blood vessels and eventually death. In your blood, you have antibodies for the antigens you don't have (see below).



## Blood Groups

Blood Group	Antigens	Antibodies	Can give blood (RBC) to	Can receive blood (RBC) from
<b>AB</b>	<b>A and B</b>	<b>None</b>	<b>AB</b>	<b>AB, A, B, O</b>
<b>A</b>	<b>A</b>	<b>B</b>	<b>A and AB</b>	<b>A and O</b>
<b>B</b>	<b>B</b>	<b>A</b>	<b>B and AB</b>	<b>B and O</b>
<b>O</b>	<b>None</b>	<b>A and B</b>	<b>AB, A, B, O</b>	<b>O</b>

## RH Factor

In addition to antigens of ABO system, the red cells of humans also contain an additional antigen, called Rh antigen (or Rh factor).

There are several varieties of Rh antigen but the D antigen is the most common, and antigenically, the most potent. Therefore, Rh +ve persons are also called D +ve and Rh -ve are called D -ve .

Persons whose red cells contain this additional antigen are called “Rh positive” ( Rh +) while those who lack this antigen are called “Rh negative” (Rh -) .

However, there are no naturally occurring antibodies against Rh (D) antigen .

The Rh (D) antigen is not present in body fluids and tissues, but only on red cells.

### Apparatus and Materials

1. Microscope.
  2. Sterile blood lancet, Sterile cotton/ gauze swabs, alcohol.
  3. Clean, dry microscope slides .
  4. Anti-A serum: [contains monoclonal anti-A antibodies (against human) .
  5. Anti-B serum: [contains monoclonal anti-B antibodies (against human) .
  6. Anti-D (anti-Rh) serum: [Contains monoclonal anti-Rh (D) antibodies (against human).
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- ❖ Clean your finger with alcohol and let dry.
  - ❖ Prick finger with lancet, near the tip but not too close to the nail. You will need three fairly large drops of blood. Prick so that blood flows freely. Try squeezing up from your wrist if blood does not flow after pricking finger.
  - ❖ Use one slide for ABO typing and Rh factor. Place three drops of blood on the slide, add the appropriate typing serum, and determine your blood type. Be sure the serum dropper does not touch the drop of blood. Results should be readable in about a minute.

## Observations and Results

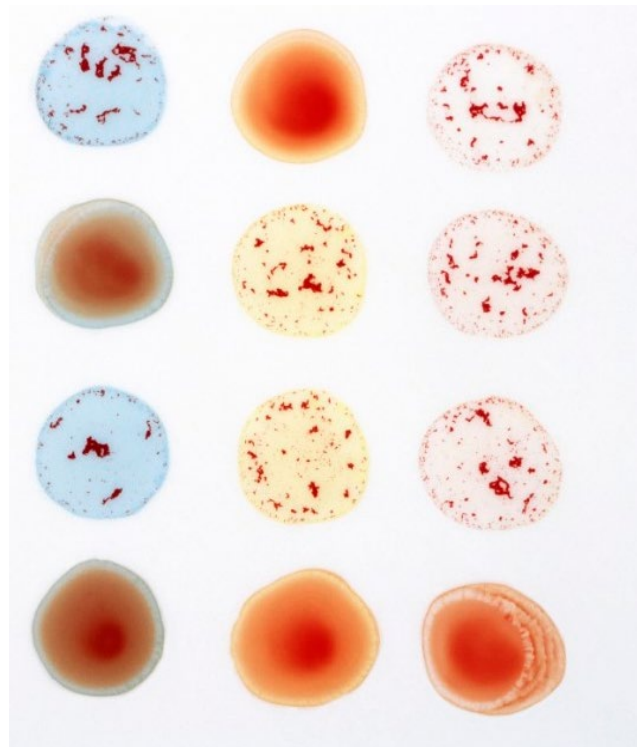
It is essential that you should be able to distinguish between “agglutination” and “no agglutination”. The features of each are:

If agglutination occurs, it is usually visible to the naked eye. The hemolysed red cells appear as isolated (separate), dark-red masses (clumps) of different sizes and shapes. There is brick-red coloring of the serum by the hemoglobin released from ruptured red cells.

### What is cross matching?

In transfusion medicine, refers to the test that is performed prior to a blood transfusion in order to determine if the donor's blood is compatible with the blood of an intended recipient.

Cross-matching is also used to determine compatibility between a donor and recipient, in organ transplantation or blood transfusion.



**Names of the students:**

**Date----- Group-----**

**Name of the experiment:**

**Aim of the experiment:**

**Materials:**

**Procedure:**

- 1- Clean your finger with alcohol and let dry.
- 2- Prick finger with lancet, near the tip but not too close to the nail. You will need three fairly large drops of blood. Prick so that blood flows freely. Try squeezing up from your wrist if blood does not flow after pricking finger.
- 3- Use one slide for ABO typing and Rh factor. Place three drops of blood on the slide, add the appropriate typing serum, and determine your blood type. Be sure the serum dropper does not touch the drop of blood. Results should be readable in about a minute.

**Result: put + or –**

<b>Anti- A</b>	<b>Anti- B</b>	<b>Anti- D</b>

**Blood type:**

**Discussion:**