

## Blood Groups

The Blood Groups were discovered and explained by German Biochemists: Karl Landsteiner in (1900) & Landsteiner was awarded Noble-prize in (1931) for his work on Blood Groups.

- In case of serious loss of blood, Blood transfusion is the only method to save the life.
- It's transfusion help to remove the threat & restore the normal vital activities of life.
- It's not necessary that the blood of any healthy person would do the work. often in case, where the blood type is not tested, transfusion becomes fatal for the recipient due to clumping of RBCs of donor.
- This is caused by Incompatibility of blood, because man's Polymorphic for Blood Groups. A, B, AB, O.
- Therefore it is essential to match the blood of donor & recipient, known as Compatibility.
- Accordingly, the human blood has been classified in to 500 million blood groups, phenotype, such as ABO, Rh, Mnl, Lewis, Lutheran, Kell, Duffy, Kidd, etc.
- Extensive studies have shown that there are two types of substances in the blood.
  - Antigen or Agglutinogen
  - Antibodies or Agglutinins
  - Antigens are present in the Red blood cells & Antibodies in the plasma
  - The Antigens are the cause of Agglutination & the Antibodies are substances which Agglutinate.
  - In the human blood two types of antigens called A and B in RBC & two types of antibodies called Anti A / (a) & Anti B / (b) are found in plasma.

## Antigen (Agglutinogen) and Antibody (Agglutinin)

- | <u>Antigen</u>  | <u>Antibody</u>   |
|---|---|
| <ul style="list-style-type: none"> <li>- Chemically may be <u>protein</u>, <u>polysaccharides</u>, or <u>nucleic acid</u> in nature.</li> <li>- Any external (foreign) substances entering the body.</li> <li>- Does not occur in natural form in body, except a few.</li> <li>- Stimulates <u>Antibody-formation</u> process called <u>Immune response</u>.</li> </ul> | <ul style="list-style-type: none"> <li>- Chemically <u>protein</u> in nature.</li> <li>- Formed by <u>stimulation</u> of <u>invaded Antigen</u>.</li> <li>- Does not occur in natural form in body, except a few.</li> <li>- Chemically interacts (with) to <u>destroy</u> kill or <u>inactivate</u> the <u>Antigen</u>.</li> </ul> |

### Blood Groups with their Antigens & Antibodies

<u>Blood Group</u>	<u>Antigen</u>	<u>Antibody</u>	<u>% individuals</u>
<u>A</u>	<u>A</u>	<u>Anti-B/b</u>	<u>25</u>
<u>B</u>	<u>B</u>	<u>Anti-A/a</u>	<u>35</u>
<u>AB</u>	<u>AB</u>	<u>None</u>	<u>10</u>
<u>O</u>	<u>None</u>	<u>Anti</u>	<u>30</u>

- Based on the mutual associations of two substances four Blood Groups have been typed in human beings. These are groups: A, B, AB, O.
- The persons with Blood Groups A, have Antigen A & Antibody b. (Anti-B)
- Persons with group B. have Antigen B & Antibody Anti-A/a
- Those with Blood Group AB. have Antigen A & B but no Antibodies.
- While those with Blood Group O have no Antigen but share both Anti-A (a) & Anti-B (b) Antibodies

The Blood Group: AB was discovered by DeCastro & Sturli (1902)

2) Possible Effects of Blood Transfusion:

Donor's Blood Group.	Recipient's Blood Group				Can give Blood to.	Can receive Blood from.
	A	B	AB	O		
<u>A</u>	-	+	-	+	<u>A, AB.</u>	<u>A, O</u>
<u>B</u>	+	-	-	+	<u>B, AB</u>	<u>B, O</u>
<u>AB</u>	+	+	-	+	<u>AB</u>	<u>A, B, AB, O</u>
<u>O</u>	-	-	-	-	<u>A, B, AB, O</u>	<u>O</u>

Note: The Sign '-' indicates no clumping of RBC (Compatibility), while '+' shows clumping. . . . (Incompatibility)

- A person, who donates the blood is called Donor and the other, who receives it, is called Recipient.
- Before, the transfusion, the blood of the Donor & Recipient must be tested.
- Persons with Blood Group O, are termed as "universal Donors", as their blood can be transfused to any individual without any adverse effect.
- Persons with Blood Group AB are termed as "universal Recipients", as they can receive blood of any groups.
- Blood Groups Characteristics are inherited & remain constant throughout life.

Importance of significance

The study of Blood Groups is very important in the following fields.

- (i) Blood Transfusion
- (ii) Haemolytic disease in new borns.
- (iii) determination of paternity test - in Medico-legal cases.
- (iv) Susceptibility to disease, such as Gastric Ulcers.
- (v) Study of Anthropology.