

DSE A2:
HAEMATOLOGY
SEMESTER 5

SLIDE 1


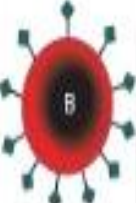








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Types of ABO Blood Group

Group A has 2 subgroups -A1 and A2.

Group AB -A1B and A2B.

Alpha -agglutinins- alpha-1 and alpha -proper.

	20%	40%	8%	32%
	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies present	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens present	 A antigen	 B antigen	 A and B antigens	None

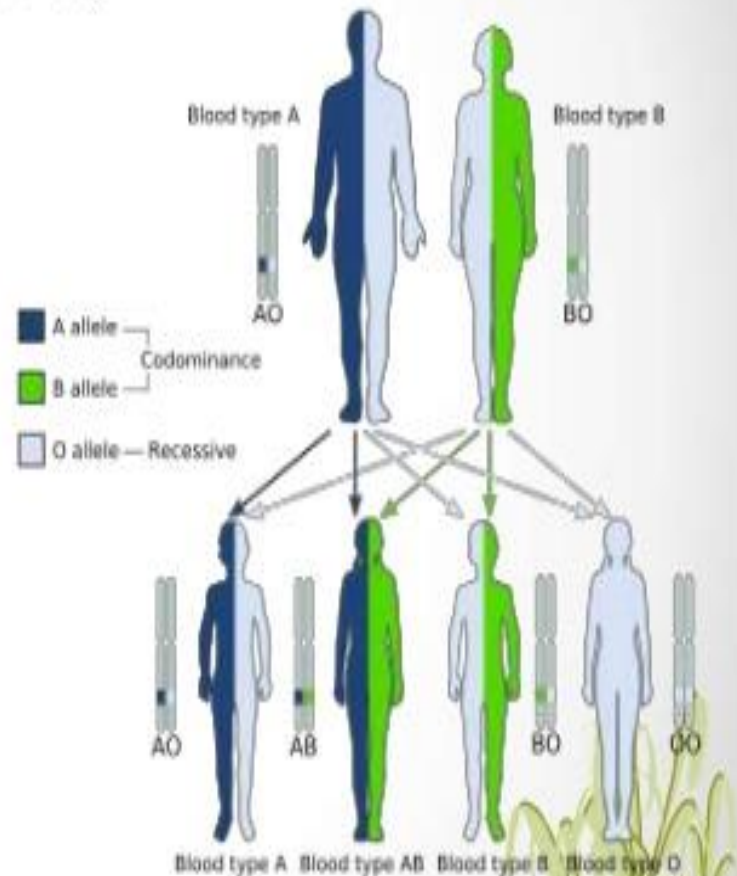
ABO BLOOD TYPE

- Karl Landsteiner and his 5 colleagues in 1900 first discovered the A,B, and O antigens in human blood which marked the foundation of ABO system of human blood typing and earned Landsteiner his Nobel Prize.
- Landsteiner also discovered the RH factor in 1910.
- 30 other human blood types are also found.
- Based on these three antigens 4 major blood phenotypes/groups are found- A, B, AB and O.
- A,B,O antigens are expressed on Erythrocyte(RBC) membrane and also found in other secretions like saliva.

Inheritance of ABO blood group

Follows Mendelian Law.
In 1924, Felix Bernstein proposed presently accepted theory.

Heterozygous: AO or BO
Homozygous: AA or BB



Examples-

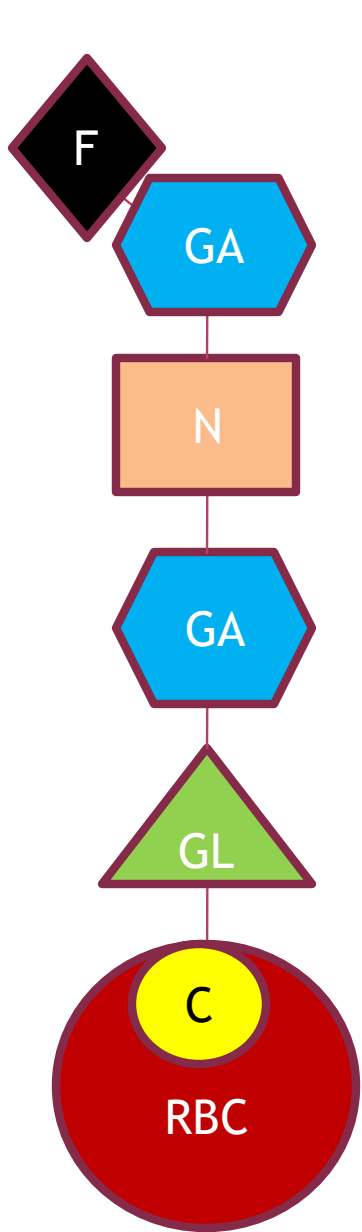
Mom	Dad	Offspring Blood Group
AA	BB	100% AB
BO	OO	50% each of B or O
OO	OO	100% O
OO	AO	50% each of A or O

THE GENETICS....

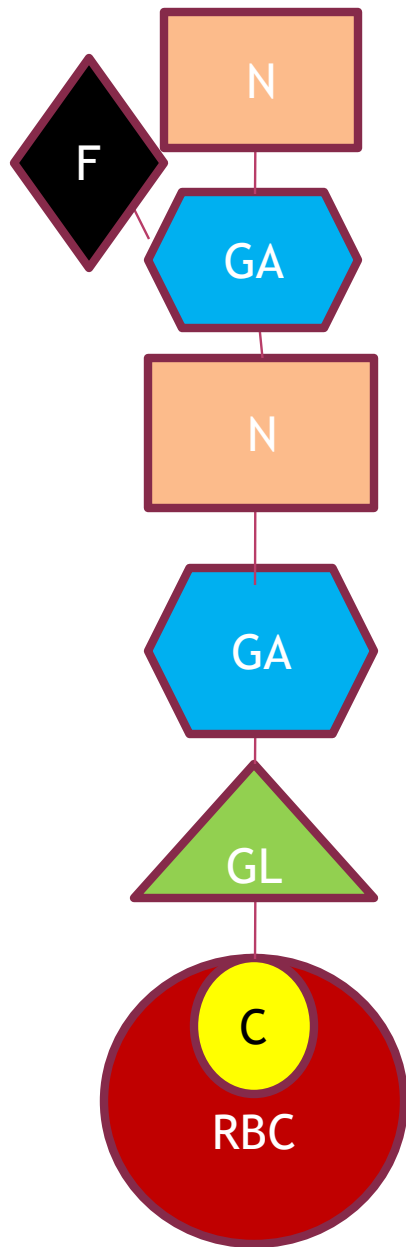
- ⊙ The ABO blood group antigens are encoded by one genetic locus (the ABO locus) on Chromosome 9, which has three different alleles.
- ⊙ The H allele is located on Chr. 19 and encodes for **Fucosyl transferase** which forms the H antigen on RBCs.
- ⊙ A child receives one allele from each parent which gives rise to 6 different genotypes and 4 different phenotypes.
- ⊙ Both A and B allele are co-dominant.
- ⊙ Both A and B allele expresses 2 different **Glycosyl transferases**.
- ⊙ A single base deletion makes the O allele an open reading frame and the consecutive protein has no glycosyl transferase activity.

BIOCHEMISTRY.....

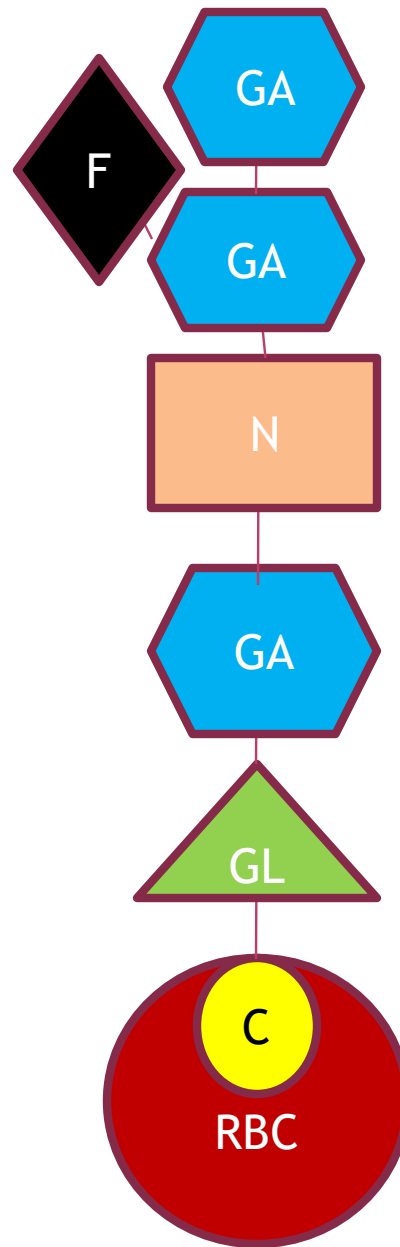
- ⦿ The A and B antigens are complex oligosaccharides, on RBC they are expressed as **Glycosphingolipids**, and in tissue fluids as Glycoproteins.
- ⦿ The A and B antigen have a common oligosaccharide foundation called the **H antigen** but differ at their terminal monosaccharide.
- ⦿ Specific glycosyl transferases add extra monosaccharide to the H antigen.
- ⦿ In **A** type the terminal sugar is N-acetyl galactosamine, in **B** type the terminal sugar is Galactose. (α 1,3 glycosidic bond)
- ⦿ In case of **O**, as the glycosyl transferase is inactive, no monosaccharide is added.



H Antigen



A Antigen



B Antigen

Blood group A : on RBC membrane only A antigens are expressed.

Blood group B : on RBC membrane only B antigens are expressed

Blood group O : on RBC membrane only H antigens are expressed

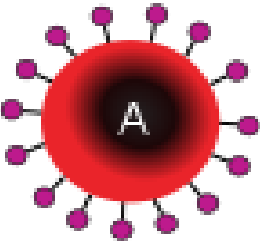
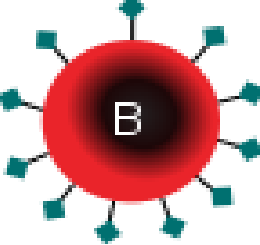
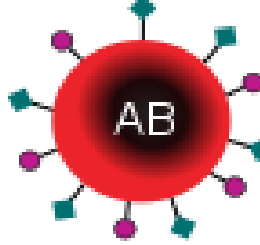
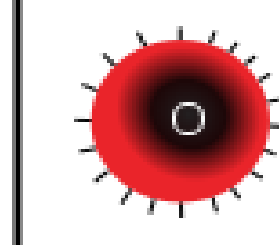






The Letter 'O' indicates the German word "Ohne" = without.

Blood group AB : on RBC membrane both A and B antigens are expressed equally.

Two sub types of A group are found A1 and A2, but the difference is quantitative not qualitative.

Bombay O group: Two recessive homozygous alleles(h/h), cannot produce the fucosyl transferase, H antigen is not formed.

ANTIBODY.....

	Group A	Group B	Group AB	Group O
Red blood cell type	 <p>A</p>	 <p>B</p>	 <p>AB</p>	 <p>O</p>
Antibodies in plasma	 <p>Anti-B</p>	 <p>Anti-A</p>	None	 <p>Anti-A and Anti-B</p>
Antigens in red blood cell	 <p>A antigen</p>	 <p>B antigen</p>	 <p>A and B antigens</p>	None

Blood Transfusion

- I. Indications
- II. Donor and Recepteints
- III. Precautions
- IV. Hazards



Donor And Receptient

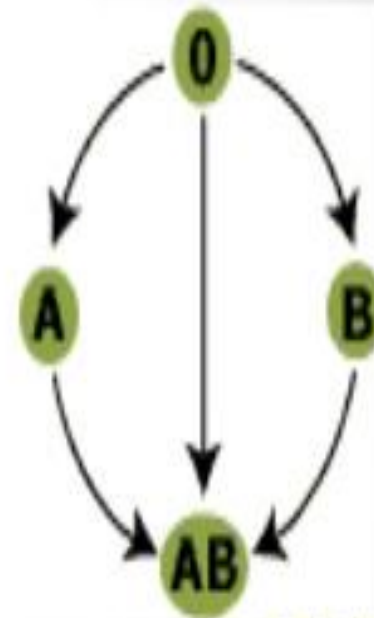
• Donor selection-

- I. Healthy and age between 18 to 60 years.
- II. Haemoglobin > 12 gm%
- III. Weight more than 45 kg.
- IV. Females should not be Pregnant, lactating and menstruating.
- V. No diseases like AIDS, Viral Hepatitis ,Malaria, Syphilis.
- VI. No past H/O jaundice , HTN,TB, and cardiac diseases.



Blood transfusion-who can receive blood from whom?

Blood Group	Antigens	Antibodies	Can give blood to	Can receive blood from
AB	A and B	None	AB	AB, A, B, O
A	A	B	A and AB	A and O
B	B	A	B and AB	B and O
O	None	A and B	AB, A, B, O	O



Investigations

- **For safe and compatible blood transfusion-**
 - ABO and Rh typing
 - Cross matching
 - Antibody screening



Transfusion reactions

(HAZARDS OF MISMATCH BLOOD TRANSFUSION)

Non- Haemolytic

- Cardiorespiratory symptoms
- Acute left ventricular failure
- Immunological reaction
- Pulmonary edema
- Allergic reactions.
- Transmission of diseases.
- Thrombophlebitis,air embolism.

Haemolytic

- Hemoglobinemia
- Haemoglobinuria
- Chestpain and chills
- Fever
- Shock
- Renal failure
- Death



A word cloud centered around the theme of blood banking. The most prominent words are "Blood Bank", "refrigeration", "storage", "transfusion", "platelets", "time", "blood", "important", "efficacy", "7 days", and "blood components". Other significant terms include "transfusions", "inventory", "management", "challenges", "issues", "contamination", "product", "transfusion", "blood", "components", "time", "platelets", "42 days", "6 weeks", "refrigeration", "storage", "transfusions", "involves", "remains", "quality", "commonly", "stored", "hospital", "turn", "stRBC", "cache", "limited", "result", "collection", "increasing", "freezing", "reduce", "preserved", "indirectly", "factor", "blood", "inventory", "performed", "management", "effective", "clinicians", "temperature", "blood", "components", "7 days", "unit's", "performed", "management", "effective", "clinicians", "temperature", "blood", "components", "7 days", "unit's", "performed", "management", "effective", "clinicians", "temperature".



Medical Definition of Blood bank

Medical Author: [William C. Shiel Jr., MD, FACP, FACR](#)

Blood bank: : A place where blood is collected from donors, typed, separated into components, stored, and prepared for transfusion to recipients. A blood bank may be a separate free-standing facility or part of a larger laboratory in a hospital.

Separation of blood: Typically, each donated unit of blood (whole blood) is separated into multiple components, such as red blood cells, plasma and platelets. Each component is generally transfused to a different individual, each with different needs.

An increasingly common blood bank procedure is **apheresis**, or the process of removing a specific component of the blood, such as platelets, and returning the remaining components, such as red blood cells and plasma, to the donor. This process allows more of one particular part of the blood to be collected than could be separated from a unit of whole blood. Apheresis is also performed to collect plasma (the liquid part of the blood) and granulocytes (white blood cells).