***Lecture 5 Blood transfusion***

***Collection of Blood from Donors:***

Blood should be collected only by a licensed blood bank. Blood should be drawn from the donor by a qualified physician. Blood should be collected by single vein puncture and flow of blood should be continuous. The blood donor area should be clean, congenial, comfortable and conveniently approachable. As the temperatures vary widely in different seasons, it is mandatory to have air-conditioned rooms to make the donor comfortable and to minimize chances of contamination.

* ***Method***

Standardized procedure should be in use to achieve surgical cleanliness for preparing vein puncture site to provide maximum assurance of sterile product.

* ***Equipment***

Theplastic blood bags for collection of blood should be ***sterile, pyrogen free and disposable,*** with a closed system of collection .

Venting of any container should be done under laminar airflow bench and such container should be used within 24 hours**.**

* ***Anticoagulant solutions***

The anticoagulant solution should be sterile and pyrogen free.

One of the following solutions should be used in the indicated volumes.

1. Citrate-Phosphate-Dextrose (CPD) Solution. 14 ml solution is required for 100 ml of blood.
2. Citrate-Phosphate-Dextrose-Adenine (CPDA-1) solution. 14 ml solution s required for 100 ml of blood.
3. 100 ml SAG-M saline adenine and glucose (or with mannitol) is added to packed cells after separation of plasma for storage.
* ***Volume of blood***

Volume of blood collected should be ***proportionate*** to the volume of anti-coagulant, with ±10% variation and should not exceed 10 ml/kg body weight, Limited to a volume of 500 ml. No attempt should be made to collect blood from such donor during the same session.

* ***Samples for laboratory tests***

The blood samples in the plane tubes (clotted and anti coagulated) should be collected at the time of collection of blood by the same person who collects blood. They should be **marked** before collection to be identified with the unit of blood. The integral donor tubing of plastic bag should be filled with anti coagulatedblood and sealed in such a manner that it will be available for subsequent compatibility tests.

* ***Identification***

Each container of blood/blood components /plane tubes should be identified by a ***numeric or alphanumeric*** at the time of collection of blood.

* ***Temperature***

Immediately after collection, the***blood*** should be placed at **(** 4C° to 6C° + 2C°**) *except if*** it is used for***component*** preparation it will be stored at **(**22C° + 2C°**)** until the platelets are separated.

* ***Donor reaction***

Necessary***drugs and equipment***should be available for treatment of donor reaction if any. ***Donor collection staff***should be trained in identification and management of donor reactions.

* ***THERAPEUTIC PHLEBOTOMY***

Therapeutic phlebotomy should be done only on the request of the patient's physician. The blood bank physician must decide whether to accept the responsibility of the patient. The blood collected in such circumstance should not be used for transfusion.

***Blood Groups:***

Blood types are important when it comes to transfusions. If you get a transfusion that does not work with your blood type, your body’s immune system could **fight** the donated blood. This can **cause** a serious or even **life-threatening transfusion reaction.**

Sometimes blood donor called a **universal donor**. (Universal donor blood is only used in extreme emergencies. For example, if a person is **bleeding** severely and nearing death, there may no time for testing. In everyday practice, people in the US are always given the **exact same type of red blood cells** that they have.)

The red blood cell membrane consists of a large number of protein and sugar structures and antigens, which together form the blood groups.

Each individual has his own specific blood group systems of which over 100 are currently known.

Rhesus, Lewis, Kell, Duffy, Kidd, MNSs, P, Lutheran, and Ii system.

 The majority of the blood group systems are cell-bound, therefore, the antigen are not present in plasma or serum. However, the ABO and Lewis system are both cell-bound and soluble, which means that the corresponding antigens can be present in plasma and serum as well as in other body fluids.

***ABO Blood Group System:***

The oldest known blood group system is the ABO or ABH system, which discovered at 1901. It still remains the most important of all blood groups in transfusion practice.

The ABO system consist of the basic antigen H and 2major groups of antigens; these are (A) antigen and (B) antigen. The basic material of these antigens is a glycoprotein or glycolipid backbone to which sugars are attached; the terminal sugars specify the antigen,

Group A= N-acetyl-D- galactoseamine.

Group B = D-galactose.

Within the ABO system, four major blood groups can be recognized, depending on the presence or absence of one or both antigens: blood group A, B, AB, O.

***Formation of ABO blood groups***

The production of A and B antigen is regulated by the H gene, which determining the conversion of (precursor substance-P.S-) into H substance.

In the presence of H substance (A) gene regulates the production of (A) and H antigen , and the (B) gene regulates the production of B and H antigen. In the absence of both the A and B genes, only the H antigen will be responsible for blood group O. In the absence of the H gene, a homozygous hh situation. This means that even in the presence of A and /or B genes, there will be no production of A and/ or B antigen.



 **Blood group B** **Blood group A**

 

**Blood group ABBlood group O**

Substance gene substance gene antigens

 A+H A

 H+BB H H

H ++BAAB

 H O Precursor substance

 hh

 None A,B,AB, O P.S

Such a substance is very rare and is known as type (Oh) or Bombay group.

All the ABH antigens develop as early as 37 days of fetal life, but it is weak in strength in relation to adult antigens.

***Secretor and non secretor***

The presence of A, B, H antigen substance in body fluids (saliva, serum, tears and plasma) is regulated by a dominant gene called Se. The presence of the gene Se determines the so- called (**secretor**) status. (**Non secretor**)are of the genotype **se se**.

About 80% of people are secretors and 20% non- secretor.

**Percentage blood groups**

The frequency of occurrence of the blood groups in the ABH system in Caucasians is:A:42%,

B:8%, AB:3%, O: 47%.