

Topic: HUMAN PHYSIOLOGY

BA PART I, 1ST PAPER, By: Dr. AMARJEET KUMAR, Home Science Department, Rohtas Mahila College, Sasaram. E-mail ID: amarjeetkumar011@gmail.com.

Blood Transfusion

When more than 40 percent of the blood is lost from the body over a short period of time, the body is unable to repair the loss unaided. Some artificial means of replacing the lost fluid must be resorted to. The intravenous injection of blood is called blood transfusion.

Methods of blood Transfusion

1. Direct method i.e. direct from donor's vein to that of recipient. It is however, not undertaken in practice.
2. Indirect method: In this method the blood is collected, tested and stored. For transfusion purpose, blood banks are established. The blood is used as and when needed.
3. Plasma Transfusion is given in cases of burns etc. Body conditions which need blood transfusion are
 - (1) major operations
 - (2) Accidents involving blood loss
 - (3) Various blood diseases i.e. leukaemia, severe anaemia and agranulocytosis.
 - (4) In case of haemophilia with severe bleeding and
 - (5) In carbon - monoxide poisoning cases.

Blood groups

For a long-time physician have been waiting to give blood transfusion in order to save patients in cases of haemorrhage. Somehow or other, this was not possible

as transfusion invariably tended to produce severe reactions. Blood grouping and tests of in-compatibility are carried out in order to ensure a high degree of safety before a blood transfusion is given. Karl Landsteiner introduced the ABO blood grouping system. According to him, the transfusion reactions are mostly due to the presence of powerful agglutinogens A and B and corresponding agglutinin called alpha (α) and beta (β) present in the R.B.C, and the blood plasma respectively. In the ABO blood grouping system blood groups are classified according to the presence or absence of agglutinin on cells. This can be made clear by the following self-explanatory table 1.

Table 1.

ABO group	Agglutinogens	Agglutinins
O	Nil	α and β
A	A	β
B	B	α
AB	AB	Nil

All human beings can be divided into four groups namely A, B, AB and O. In considering donors of blood groups AB may give blood to AB, A to A and AB, B to B and AB. O is the universal donor for all groups. Group AB is a universal recipient. A may receive blood from A and O, B may receive blood from group B and O and O can receive blood from O only.

Rh factor

The Rh system is so named because it was first worked out in the blood of the Rhesus monkey. Like the ABO grouping the Rh system is based on the agglutinogens that lie on the surface of the red cells. Individuals whose red cells have Rh agglutinogens are designated as Rh+(positive). Those who lack Rh agglutinogens are designated as Rh- (negative). Under normal circumstances

human plasma does not contain anti Rh antibodies. If a Rh- person receives Rh+ blood, the body starts to make anti Rh antibodies that will remain in the blood. If a second transfusion of Rh+ blood is given later, the previously formed anti Rh antibodies will react against the donated blood and severe reaction may occur. One of the most common problems with Rh incompatibility arises from pregnancy. During delivery some of the foetal blood may leak from the placenta into the mother's blood stream. If the foetus is Rh+ and mother is Rh-, the anti Rh antibodies will be produced in the mother's blood. If the mother gets pregnant again, her anti Rh antibodies will cross through the placenta into the blood stream of the body. If the foetus is Rh- no problem will occur since Rh- blood does not have Rh antigen. If the foetus is Rh+ an antigen-antibody response called haemolysis may occur in the foetal blood. Haemolysis means a breakage of erythrocytes resulting in the liberation of haemoglobin. The haemolysis brought on by foetal - maternal incompatibility is called **erythroblastosis foetalis**. Several other groups like M, N and P are known. These groups have no clinical importance. But they are sometimes used as medicolegal evidence in disputed paternity.

Blood Bank

Recent advances in Medicine and safety of surgical procedures like open heart surgery, transplant of kidney and heart are made possible because of improved techniques of blood grouping and safety in transfusion. Moreover, the world is moving at a very fast pace and there are so many automobile accidents occurring, making it necessary for a separate department of Traumatology, where effective treatment can be done only because of the availability of blood transfusion. The place where blood is stored is called a Blood Bank and the doctor in-charge is called the blood bank medical officer. Donors can be voluntary or paid donors and they should donate blood at an interval not less than three months. The donors should be within 18 to 50 years, healthy and screened for infectious and sexually

transmitted diseases. Donors should have 80 percent haemoglobin and blood is drawn aseptically into a sterile bottle containing 3% sodium citrate. Then it is stored at four degree Centigrade. Before bottling the donor's blood, it is tested for the blood group, so that it will be easy for them to label it before storing.

Determination of blood group

Blood of the donor and the recipient must first be tested against A and B serum. Usually 'O' group serum is used as a control, as it contains both agglutinins a and b. A drop of A serum and a drop of B serum are placed separately on a slide. To each of these sera, a drop of blood diluted in 10 percent sodium citrate in normal saline is added. If clumping of corpuscles occurs in all the sera, then the group is AB or universal recipient. If there is no agglutination in all, then the group is 'O' or universal donor. If serum A agglutinates the corpuscles, then the donor's blood is B group. If serum B agglutinates then the donor's blood belongs to 'A' group. Similarly, with Rh antigen, if the blood agglutinates then the donor is Rh positive. According to these findings the bottle filled with blood is labelled and stored.