Notes

27

BLOOD COMPONENTS

27.1 INTRODUCTION

In many clinical conditions a patient needs to be transfused blood taken from another person. This is the process of blood transfusion.

OBJECTIVES

After reading this lesson, you will be able to:

- describe blood components
- discuss the production of blood components
- explain the selection of blood components
- describe Hema pheresis

27.2 BLOOD COMPONENTS

Once blood has been taken from the donor it can either be kept as such to be used as whole blood or can be separated into its various components. Separating blood into its components has many advantages like:-

(a) Maximize the yield of products form a single donation.

(b) Ability to use optimal product for specific disease.

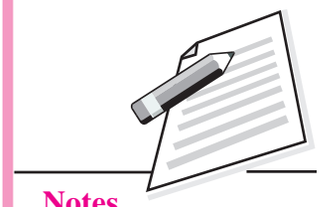
(c) Reducing the exposure of foreign material to the donor to minimum.

The most commonly used blood components are:-

(a) Whole blood.

(b) Packed cells.

(c) Platelet concentrate.



(d) Fresh frozen plasma (FFP)

(e) Cryoprecipitate

Others include:

(a) Leukodepleted packed cells

(b) Platelet rich plasma

(c) Platelet poor plasma

(d) Fresh plasma

27.3 PRODUCTION OF BLOOD COMPONENTS

Blood which is to be used for component production is collected into special collection system in which 2 or 3 smaller satellite bags are attached to the main collection bag.

Blood components are prepared from whole blood in large centrifuges which are refrigerated. The blood can be subjected to a light spin or a heavy spin depending upon components to be produced.

For preparation of platelet concentrate, centrifugation is performed at room temperature (20° C to 24° C); for all other blood components, centrifugation is carried out between 1°C and 6°C.

27.4 SELECTION OF BLOOD COMPONENTS

Whole Blood

Whole blood is the unmodified blood collected from the donor. 450 ml blood is collected from the donor which is added to 63ml of CPD (Citrate phosphate dextrose) or CPDA-1 anticoagulant.

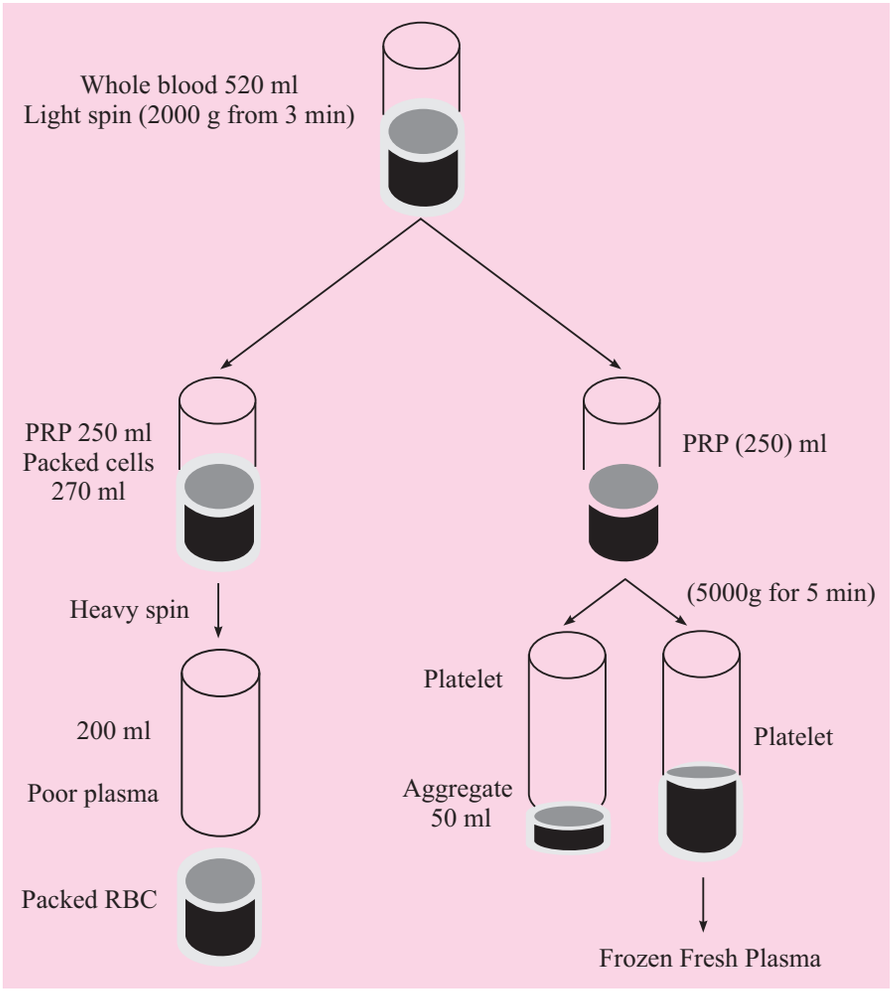
It can be stored at 1°-6°C for 21-35 days.

It is most commonly used in blood loss anemia e.g. Trauma

Packed Red Cells

The separation of RBCs from plasma concentrates the blood, the haematocrit is increased to 70%-80%. After removing plasma 100ml of an additional solution is added for long term storage, most common being CPD. This extends storage time to 42 days.

The major indication for use of packed red cells is chronic anemia when there is no loss of blood volume but of hemoglobin only.



Platelet Concentrates

Platelets are produced from the whole blood within eight hours of collection and are stable at room temperature (20° C-24° C) for up to 5 days. It is important that the pH is maintained at 6 or above for the platelets to remain functional. Each concentrate has a minimum of 5.5×10^{10} platelets.

Platelet concentrates are used to prevent bleeding from thrombocytopenia.

Fresh Frozen Plasma

Fresh frozen plasma is obtained by subjecting whole blood to a light spin and separating 200-260ml of upper part. It is then immediately frozen to -18° C or less within 8 hour of collection.

FFP is a rich source of plasma protein & coagulation factors. It is used in coagulation factor deficiencies & in disseminated intravascular coagulation (DIC).

27.5 HEMA PHERESIS

It is a procedure in which blood is withdrawn from the donor, anti coagulated and the desired component is separated from it. The remaining blood is returned back to the donor. Most commonly platelet aphaeresis is made in which platelets are separated from the donor blood and rest of the blood is transfused back.

INTEXT QUESTIONS 27.1

1. For preparation of platelet concentrate, centrifugation is performed at ..... temperature
2. ..... is used in blood loss caused from trauma
3. Packed red cells are prepared by separating ..... from plasma concentrates
4. Platelets concentrates are prepared from the whole blood within ..... hours of collection
5. Fresh frozen plasma is a rich source of ..... & .....

WHAT HAVE YOU LEARNT

- Blood taken from donor, can either be used as whole blood or can be separated into various components
- Commonly used blood components are whole blood, packed cells, platelet concentrate, fresh frozen plasma and cryoprecipitate
- Preparation of platelet concentrate, centrifugation is performed at room temperature at 20^{o}c to 24^{o}c.
- All other blood components are prepared by centrifugation carried out between 1^{o}c to 2^{o}c
- Whole blood is the unmodified blood collected from donor. 450ml blood is collected from the donor to which 63ml of CPD(Citrate Phosphate Dextrose) or CPDA-1 anticoagulant
- Packed red cells are prepared by separating RBCs from plasma concentration
- Platelets are produced from the whole blood within eight hours of collection

ANSWERS TO INTEXT QUESTIONS

27.1

1. 20°C – 24°C
2. Whole blood
3. RBC's
4. Eight hours
5. Plasma Protein & Coagulation factors