Lecture 16 **Blood transfusion**

❖ **PLATELET CONCENTRATE: (Random Donor Platelets)**

Platelet concentrate should be prepared by centrifugation of a single unit of whole blood collected with a smooth vein puncture and a continuous flow of blood.

- Platelet concentrate should be separated from whole blood within 8 hours of collection by centrifugation at 22°C + 2°C using either platelet rich plasma (PRP) or buffy coat (BC) method.
- Platelet concentrate prepared from whole blood (450 ml) should contain a minimum 4.5x1010 platelets and from 350 ml whole blood minimum of 3.5x1010 platelets . It is **recommended** that **only** 450 ml bags are used for platelet separation. Platelets should be **suspended** in approximately 50 ml of plasma and stored at 22^0C + 2^0C . The **pH at storage temperature** should not be lower than 6.0 .
- There should be **no grossly visible platelet aggregates** during the storage.
- The concentrate prepared should not be contaminated with red cells.
- 1% of all platelet concentrates prepared should undergo tests for bacterial detection.

❖ **Leucocytes reduced platelets**

Platelets prepared by **buffy coat** method should contain 5 x 10^8 leucocytes. To achieve a level of 5 x 10^6 leucocytes, platelets should be filtered using **leucocyte filters.**

❖ **GRANULOCYTE CONCENTRATE**

- Prepared by use of cell separator should have 1x10^{10} leucocytes and should be kept at 22^0C+ 2^0C for a maximum period of 24 hours.

❖ **PLASMA**

- **Single donor plasma**

Plasma should be separated from whole blood at any time up to 5 days after the expiry of the whole blood. The plasma separated after 5 days of expiry date will be used only for fractionation.

❖ **Fresh Frozen Plasma**

Fresh plasma should be separated from the whole blood not later than 6 - 8 hours of collection and frozen solid at –30°C or lower as early as possible. Prior to infusion the frozen plasma should be thawed rapidly at 30-37°C in a water bath with shaker. Once thawed it should be used within 6 hours.

❖ **Cryo poor plasma or Factor VIII Deficient Plasma**

This is plasma from which cryoprecipitate has been removed. It should be stored at -30°C and once thawed should be used within 6 hours.

❖ **SINGLE DONOR CRYOPRECIPITATE (Cryoprecipitated Anti-hemophilic factor)**

- For preparation of cryoprecipitate the fresh frozen plasma should be frozen within 6 hours of collection at –80°C or lower and thawed at4°C circulating water bath or in 4°C cold room/Blood Bank Refrigerator.
- Thawed plasma should be immediately centrifuged and separated from the cold insoluble material under sterile conditions.
- The cryoprecipitate - cold insoluble material - should be frozen within 1 hour and should be kept at -30°C or lower up to 1 year. Once thawed, it should be used within 6 hours.

Apheresis

❖ **INTRODUCTION**

❖ Apheresis is a procedure carried out to harvest a particular component and returning the rest of the blood to the donor, by an automated machine.

❖ Apheresis only for healthy voluntary donors and not to any therapeutic procedure

❖ There should be provision for emergency medical care .

❖ **PLASMAPHERESIS**

It is a procedure to harvest plasma from the whole blood and returning the cellular components to the donor by automated machine.

❖ **Selection of donors**

- In an **occasional plasmapheresis** in which donors undergo **the process once** every 12 weeks, the standards for whole blood donation.
- In a **'serial' plasmapheresis** in which plasma is donated **more frequently** than **once** every 12 weeks**, the donor** should **be tested** for Haemoglobin should be > 12 g/dl.
- In **serial plasmapheresis** programme with return of the cellular components a minimum interval should be of 48 hours between two procedures in a week.

❖ **Volume of plasma**

Volume of plasma obtained excluding **anticoagulants** from **a donor weighing** at least 55 kg. should **not exceed 500** ml with **serum protein within normal** limit during one procedure.

CYTAPHERESIS

The procedure for **separation of individual cellular component of blood**. by the cell separator machine.

- **Platelet pheresi**s is the harvesting of **platelets** from whole blood using continuous or flow cell separator.
- **Leukapheresis** is the harvesting of **granulocytes** from whole blood using continuous or intermittent cell separator.
- Donors who undergo **serial cytapheresis**, more than **once** every 12 weeks,should be tested**:**

1) Haemoglobin should be > 12 g/dl.
2) Total serum protein should not be below 6.0 gm/dl.
3) Platelet count should be determined before plateletpheresis and should not be below 150,000 cells / ul.
4) Total and differential white cell count should be normal.
5) **Persons** who have ingested **aspirin** or similar **anti-platelet drugs** in the **last** 72 hours should **not be suitable** for plateletpheresis.
6) Donors with personal and **family history** of **bleeding** tendency should **not be** suitable for plateletpheresis.
7) Before leukapheresis total white blood cells counts should be 4000cell /ul with normal differential count.
8) In serial pheresis a minimum interval should be of 48 hours and not more than two procedures in a week.