BLOOD COMPONENTS & ITS CLINICAL USES

OBJECTIVES

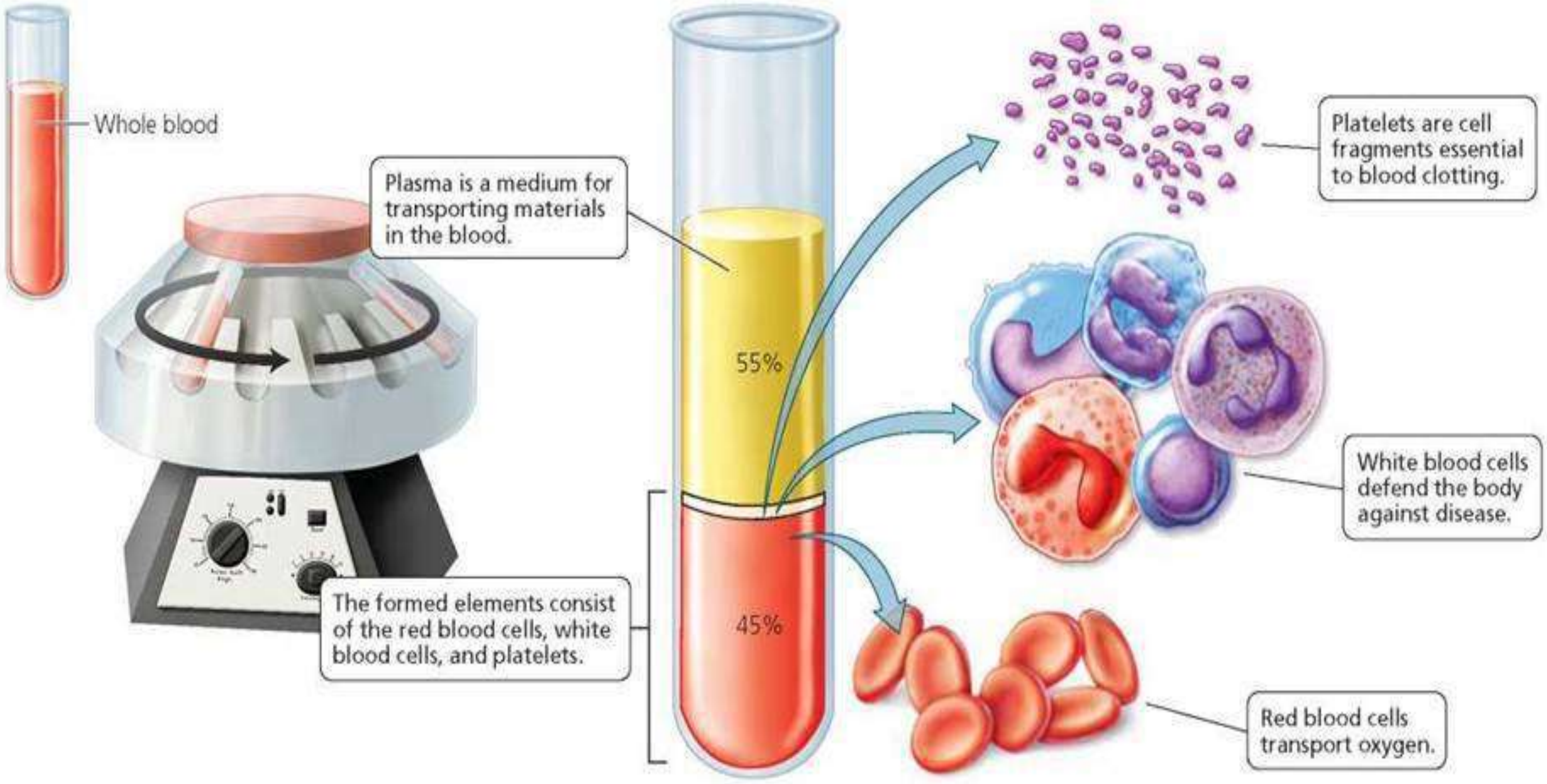
- ✓Introduction
- ✓Blood component preparation & its steps
- ✓Life span
- ✓Storage
- ✓Clinical uses & its contraindications
- ✓Summary

WHY THERE IS NEED FOR COMPONENT SEPARATION

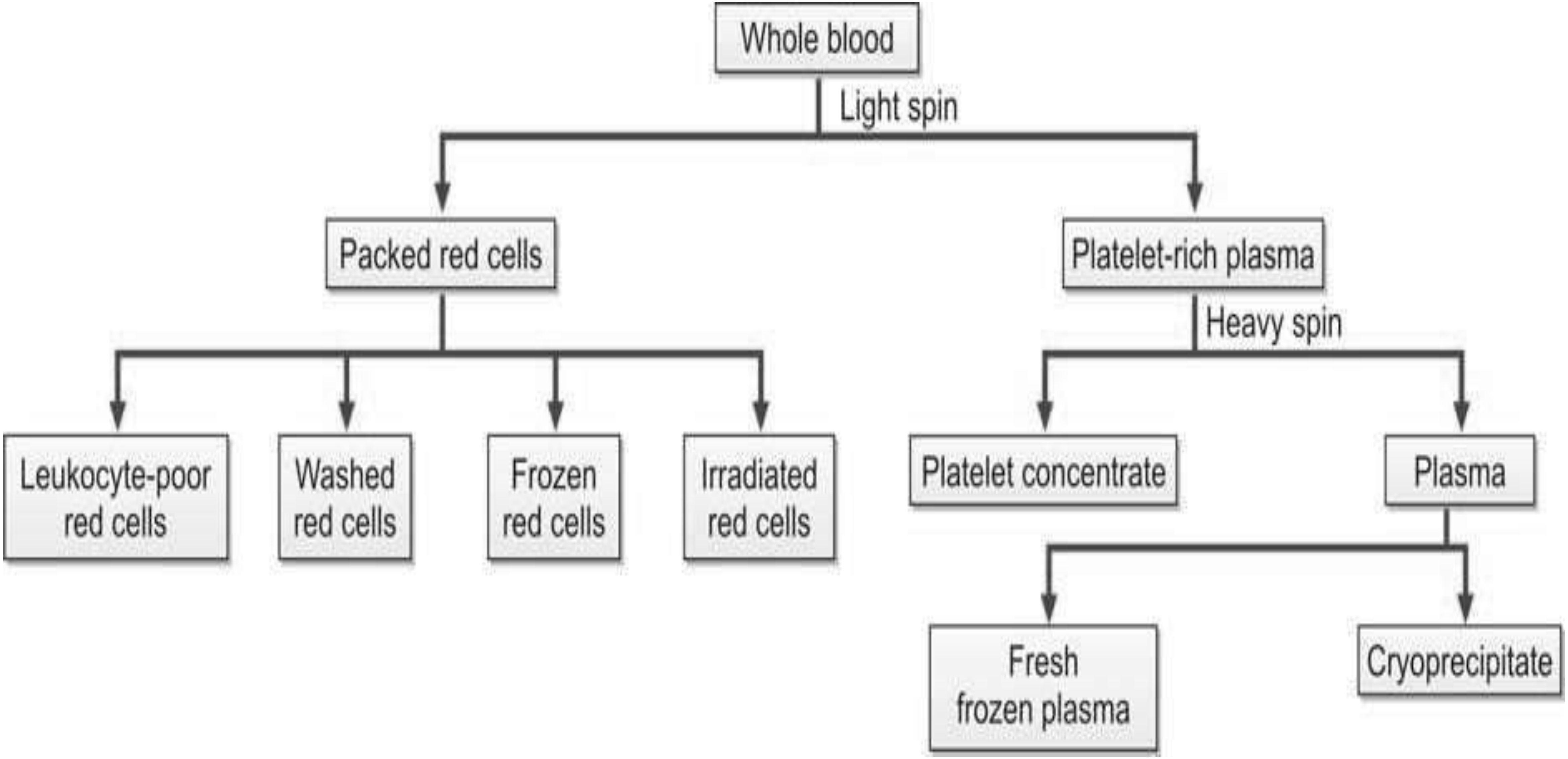
- 1. Separation of blood in to components allows optimal survival of each constituents.
- 2. component preparation allows transfusing only specific blood component that the patient requires.
- 3. Transfusion of only specific constituent of blood needed avoids the use of unnecessary component, which could be contraindicated in a patient

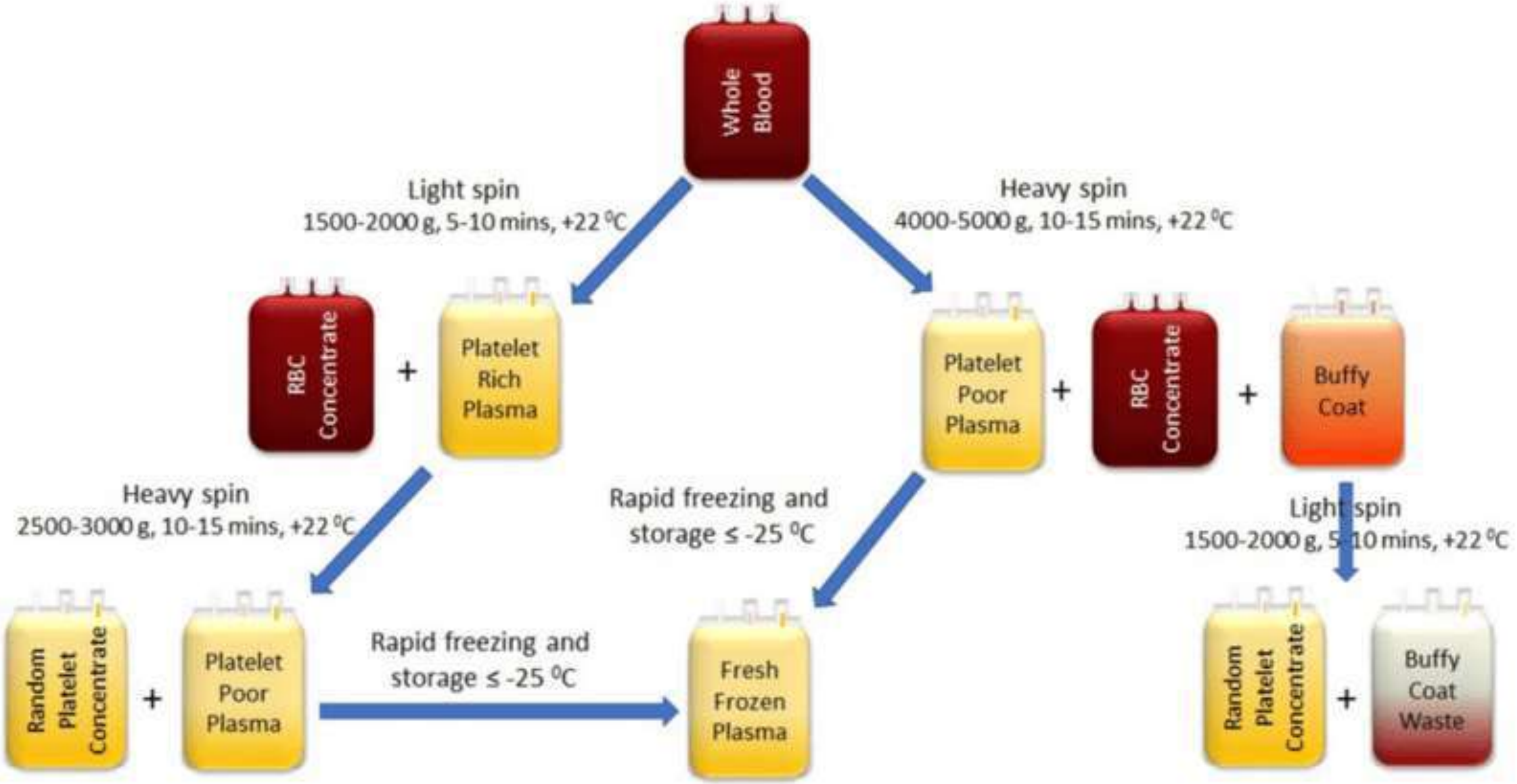
- 4.By using blood components, several patients can be treated with the blood from one donor, giving the optimal use of every unit of donated blood.
- 5. use of blood components, supplements blood supply- adds to the blood inventory

BLOOD COMPONENT PREPARATION



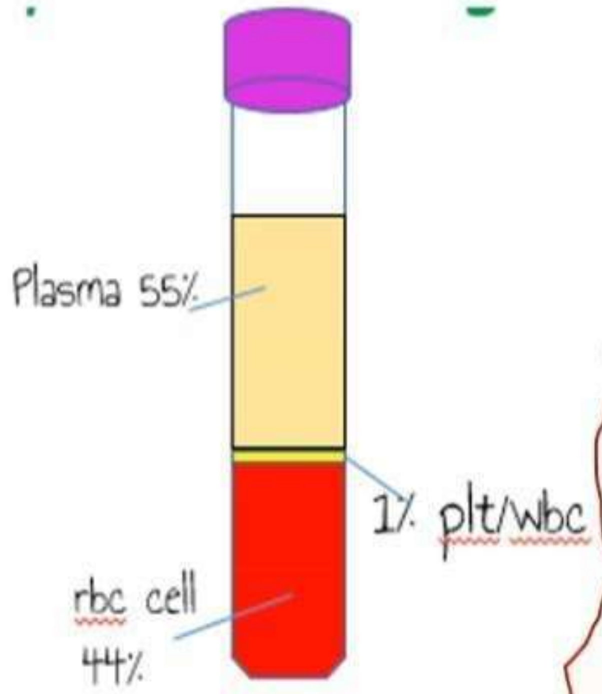
BLOOD COMPONENTS





Algorytm for blood components preparation from whole blood.

Different components of whole Blood prepare for transfusion



❖ Common

- Packed Red blood cell
- Platelet Rich Plasma
- Platelet Concentration
- Fresh Frozen Plasma
- Cryoprecipitate

❑ Specialized

Granulocyte concentration
Leucocyte depleted RBC
Frozen RBC
Albumin

WHOLE BLOOD

- 350-450 ml of blood
- 49-63ml of anticoagulant solution
- Hct- 36-44%
- No components removed
- Stored at 1- 6 degree celsius
- Shelf life :
- Citrate –phosphate –Dextrose(CPD)- 21days
- CPDA (adenine) – 35 days
- AS-1, AS-3, AS-5 – 42 days

WHOLE BLOOD INDICATION & DRAWBACKS

- Acute active blood loss with hypovolemia
- Exchange transfusion Contradictions

  Risk of volume overload
- chronic anemia
- Incipent cardiac failure

- After storage for 24 hours platelets and wbc are non functional
- Factor V and Viii decrease with storage
- Fluid overload

PACKED RED BLOOD CELLS

- Shelf life – 35 days
- Storage temp- 2 – 6 Degree celsius
- QC Requirements: PCV 80% (Range 65-80%)
- Volume- 250- 300 ml

<u>Contents :</u>

- red cells- 65-80%,
- Plasma 20- 35%,
- Some platelets,
- white blood cell and anticoagulant preservative solutions Effect – 1 unit RBC raise Hct by 3% and hb by 1g/dl

PACKED RED BLOOD CELL

Indications

- Patient need urgent operation and has Hb < 10g/dl
- Anticipated surgical blood loss > 1000 ml
- Other acute Loss of blood
- Replacement Fluid blood loss < 20% of blood vol.
- Anemia associated with incipient/established cardiac failure
- Hb value < 6 g/dl
- Patients approaching delivery and has Hb value < 7g/dl
- In hereditary hemolytic anemias and betathalassaemia major.

IRRADIATED RED BLOOD CELLS

- <u>**Gamma radiated to kill the lymphocytes**</u>
- The lack of T cells prevents graft versus host reaction

Indications:

- Severely imunocompromised patients
- Lymphoma patients
- Stem cell/marrow transplants
- Intrauterine transfusion
- Neonates undergoing exchange transfusion
- Hodgkin Disease

LEUCOCYTE REDUCED RED BLOOD CELLS

INDICATIONS

- Multi transfused patients like thalasemia
- Leukemia
- Aplastic anemia
- Immunosupressed
- Immunodeficient
- Prevention of recurrent FNHTRs
- Prevention or delay of primary alloimmunization to HLA antigen
- Prevention of CMV transmission in at risk individual

PLATELET CONCENTRATE

- Shelf life:

  1 day if no storage cabinet

  5 days in platelet incubator and agitator
- Storage temp :20-24 degree celsius
- Q.C Requirements: to be prepared within 6hr of collection and ph should be >6.2
- volume: 30 to 50 ml
- Contents: 5.5×10^{10} unit/bag

PLATELET CONCENTRATE

Indications

- Platelet count is < 5000 / µl regardless of clinical condition
- Effect: increases platelet count by 10000/ µl per unit

Non-immune thrombocytopenia due to bone marrow disease or chemotherapy,

2) Platelet function **defects- acquired and congenital disorder**

3)disseminated intravascular coagulation **(DIC)**

4)**Autoimmune** thrombocytopenia

7) Platelet transfusions in **massive haemorrhage**

9) Platelet transfusion **following thrombolysis for acute stroke**

FRESH FROZEN PLASMA

- FFP is plasma obtained from

a) a single donor either by normal donation or

b) by plasmapheresis

<u>It contains all coagulation factors and</u>

a) plasma proteins Factor viii – 0.6 IU/ml

b) Factor ix – 0.9 IU/ml

c) Fibrinogen- 250-300 mg/bag Proteins – albumin, globulin etc 1 IU/kg of factor viii or factor ix raises factor viii in plasma by 2% and factor ix by 1%

d) Volume: 200 – 250ml

e) Shelf life- 1 year Storage temp(-20 to -70) degree or below

Indications of Fresh Frozen Plasma

- Actively bleeding and multiple coagulation factors deficiencies
- Liver diseases
- Disseminated intravascular coagulation (D1C)
- Coagulopathy in massive transfusion
- TTP

CRYOPRECIPITATE

- Shelf life: frozen – 1 year
- Thawed : 6 hours
- Storage temp : frozen -20 degree or less
- thawed : 37 degree
- Volume- 10 to 20 ml

- **Contents –**

  Factor viii- 80 to 150 units/bag

  Fibrinogen- 150 to 250 mg/ bag

  Factor xiii- 20 to 30 % of whole blood

  Von wilebrand factor- 40 to 70 % of whole blood

- Transfusion criteria :

➢ ABO compatibility not required

➢ Must be infused within 6 hours of thawing

CRYOPRECIPITATE

INDICATIONS

- Quantitative and qualitative fibrinogen deficiency : DIC
- Correction of factor viii deficiency

  Haemophilia A
- Von wilebrand disease
- Factor XIII deficiency
- Uremic coagulopathy

Pooling Cryoprecipitate

- THANK YOU