Blood Products & Transfusion

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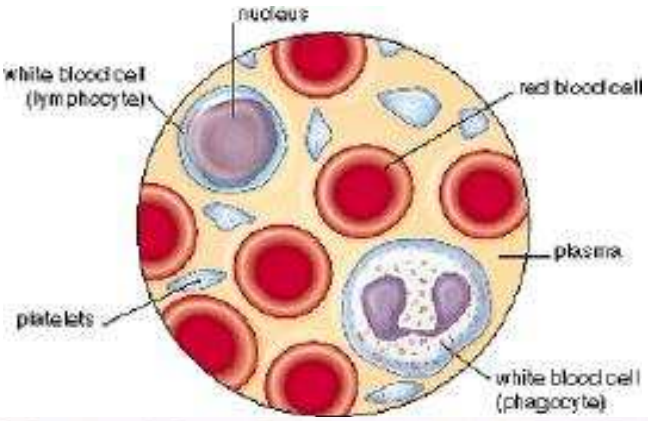
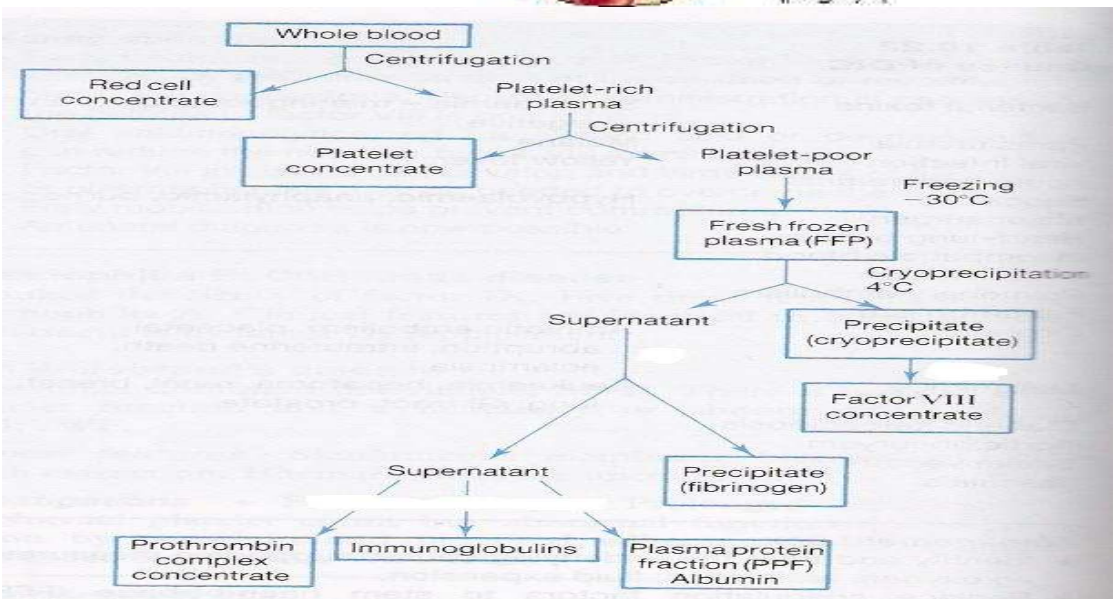
Blood Composition:

- Plasma: 55%
- Formed elements: 45%
  - ✓ RBCs: Life in circulation is 120 days
  - ✓ WBCs
  - ✓ Platelets; Life in circulation is 6-10 days





Blood Products (1):

- Whole Blood
- Packed RBCs
- Platelet Concentrate
- White Cell Concentrate

- Plasma Products

Packed RBCs:

- Indicated in:
  - ✓ Acute blood loss
  - ✓ Chronic anemia
- One unit contains 300 ml
- Out of this 70% are RBC

Platelet Concentrate:

- Indicated in:
  - ✓ Bleeding due to platelet deficiency
  - ✓ Bleeding due to platelet dysfunction
- One unit contains 50 x 10^9 platelets
- Usually 5 to 6 units are given as one pool

WBC Concentrate:

- Rarely indicated
- Difficult to get sufficient quantities
- Half life is only 8 hours
- Non-hemolytic transfusion reactions are common
- Most patients respond to antibiotics and do not need white cells

Plasma Products:

- Fresh Frozen Plasma
- Cryoprecipitate
- Factor VIII Concentrate
- Prothrombin Complex Concentrate
- Human Immunoglobin
- Albumin Containing Solution

Fresh Frozen Plasma:

- Stored at -30C
- Shelf–life 3 to 6 months
- Rich in all components of plasma
- Indicated in:
  - ✓ DIC
  - ✓ Liver Failure
  - ✓ Warfarin over dosage
  - ✓ Massive RBC transfusions.

- Cryoprecipitate:
  - Prepared from FFP after thawing it to 4C
  - When re-frozen shelf-life is 3 to 6 months
  - Rich in factor VIII, VWF, XII, XIII

- Factor VIII concentrate:
  - Prepared by fractionation of cryoprecipitate.
  - Large no. of cryoprecipitates are required
  - Indicated in Haemophilia

- Prothrombin Complex Concentrate:
  - Contains factors II, VII, IX, X
  - Indicated in Haemophilia B

- Human Immunoglobin:
  - Non-specific immunoglobins are used in:
    - ✓ Congenital immunodeficiencies
    - ✓ Acquired immunodeficiencies
    - ✓ Idiopathic thrombocytopenic purpura
  - Specific immunoglobins are used in:
    - ✓ Hepatitis B
    - ✓ Herpes zoster
    - ✓ Rubella
    - ✓ Rabies
    - ✓ Tetrnus
    - ✓ Measles

- Albumin containing solutions:
  - Used as plasma expander in:
    - ✓ Severe hemorrhage while waiting for blood
  - To maintain plasma albumin levels in:
    - ✓ Liver failure
    - ✓ Malnutrition
    - ✓ Protein losing states

Blood Types:

- O Rh-positive 38%
- O Rh-negative 7% Universal Donor
- A Rh-positive 34%
- A Rh-negative 6%
- B Rh-positive 9%
- B Rh-negative 2%
- AB Rh-positive 3% Universal Recipient
- AB Rh-negative 1%

Indications for Transfusion:

- Acute blood loss.
- Chronic anemia.
- Chronic deficiencies of any blood components.

Types of Blood Transfusion:

- Autologous:
  - ✓ Those transfusions in which the blood donor and transfusion recipient are the same.
- Allogenic:
  - ✓ Blood transfused to someone other than the donor.

Autologous Transfusion:

- Preoperative donations:
- Per-operative Haemo-dilution:
- Peri-operative Collection
- Post-operative Collection

Screening Tests on Donors blood:

- Hepatitis B surface antigen (HBsAg)
- Hepatitis B core antibody (anti-HBc)
- Hepatitis C virus antibody (anti-HCV)
- HIV-1 and HIV-2 antibody (anti-HIV-1 and anti-HIV-2)
- HTLV-I and HTLV-II antibody (anti-HTLV-I and anti-HTLV-II)
- Serologic test for syphilis

Transfusion:

Pre-requisites

- Take samples for FBC, serum iron or ferritin B and folate levels
- Cross-match
- Chose appropriate blood group in emergency
- Appropriate I/V access

Practical tips

- Give one unit over 4-hours
- Use blood warmer if patient is hypothermic
- Give 40 mg I/V frusemide in between each unit
- If possible give transfusions early in day
- Check hemoglobin 24-48 hours after transfusion

Complications:

- Transfusion Reaction.
- Transmission of Infections.
- Hyperkalemia.
- Hypocalcemia
- Thrombocytopenia.
- Depletion of Clotting Factors.

Transfusion Reaction :

☒ Clinical Features

- Fever
- Urticarial Rash
- Agitation
- Chest or Abdominal Pain
- Hypotension
- Wheeze
- Severe Back Pain

☒ Management

- Stop Transfusion
- Return the remaining blood to lab
- Give 100 mg of Hydrocortisone & 10 mg Chlorpheniramine I/V
- Re-check the cross match
- Monitor vital signs
- Monitor urine out-put
- Inform your senior colleague

History:

- 1628 William Harvey discovers circulation of blood.
- 1665 The 1st successful animal blood transfusion occurs in England: Physician Richard Lower.
- 1667 Jean-Baptiste Denis in France and Richard Lower in England separately report successful transfusions from lambs to humans.
- 1818 James Blundell, a British obstetrician, performs the first successful transfusion in human.
- 1900 Karl Landsteiner, an Austrian physician, discovers the first three human blood groups.
- 1914 Long-term anticoagulants, among them sodium citrate, are developed, allowing longer preservation of blood.
- 1916 Francis Rous and J.R.Turner introduce a citrate-glucose solution that permits storage of blood for several days after collection.
- 1939/40 The Rh blood group system is discovered by Karl Landsteiner, Alex Wiener, Philip Levine, and R.E. Stetson.

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