Introduction to Transfusion Medicine

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History

- 1960-2005
  - Identification of hundred of red cell antigens and molecular typing
  - Fractionation; recombinant factors
  - improved preservation
  - leukocyte and platelet antigens
  - apheresis technology
  - Automation
  - infectious disease screening testing
  - Cellular Therapies

History

- 1492 ?first transfusion to Pope Innocent VIII
- 1616 description of circulation William Harvey
- 1600's Animal to Animal; Animal to Human
- 1818 Human to Human James Blundell
- 1900 Landsteiner ABO groups (ABC); later AB by DeCastello and Sturli

What do we do?

- Blood Bank
- Stem Cell/Cellular Therapy
- Therapeutic Apheresis
- Stem Cell Collection
- Blood Collection

History

- WWI Bottles with Citrate
- 1932 Leningrad First Blood Bank; Cook County Hospital in USA
- 1938 Hemolytic Disease of Newborn Levine and Stetson; Rh Landsteiner and Weiner
- WWII "Plasma for Britain"
- 1950 Plastic Bags Carl/Separation of Components Walter
- 1960's anti-Rh prevents alloimmunization

Donor Evaluation

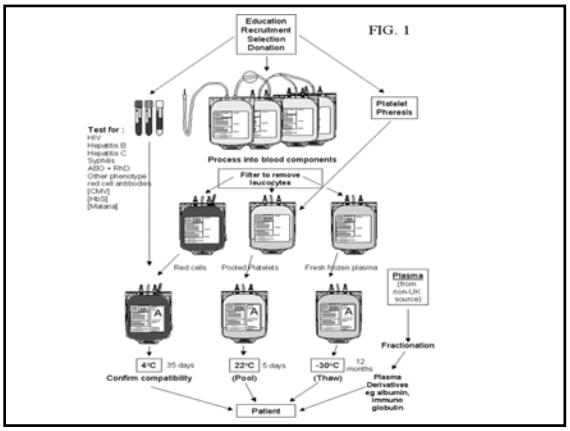
- Protect Donor and Recipient
  - Donor History Questionnaire/Physical Exam
  - Donor Testing (Infectious Disease Markers)
- See handout

Component Production

- Collect in ACD
- Soft Spin and take off platelet rich plasma
- Red cells finished add adsol → Fridge
- Platelet rich plasma hard spin
- Express off plasma → freeze as FFP
- Platelet concentrate → RT
- Freeze FFP, thaw at 4C, express off supernatant → cryopoor plasma, cryoprecipitate

Blood Tests

- ABO/Rh; antibody screen
- Hepatitis B (1 in 63,000)
- Hepatitis C (1 in 1.6 million)
- HIV (1 in 1.9 million)
- HTLV (1 in 641,000)
- WNV
- STS
- CMV



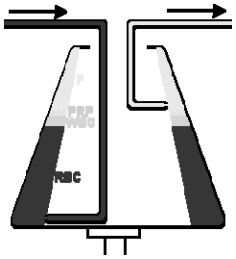
Collection of Blood

- Blood Containers
- Phlebotomy
- Treatment of Adverse Donor Reaction
  - Nausea/Vomiting
  - Syncope
  - Hyperventilation
  - Hematoma
  - More Serious
- Meets FDA regulations
- Manages Inventory and Distribution

Apheresis Technology

- Single Donor Platelets (6-8 U)
- Double Plt
- Double Red
- FFP and Red

But need HES



Red Cells

- Homologous
- Autologous
- Packed Red Cells
- Frozen thawed
- Irradiated
- CMV negative
- Antigen Negative
- Sickle negative
- LeukoreducedPlatelet

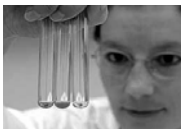
Cryoprecipitate

- Fraction of blood that does not dissolve on thawing at 4 degC
- Rich in fibrinogen, factor VIII, vWF, fibronectin
- 15ml/unit; dose is 10 units; NOT concentrated plasma!;
- Treats low fibrinogen (↑50-100g/dl)
- Can be used to treat uremic thrombocytopathy

Plasma

- Repletion of all known clotting factors
- Short half-life of coagulation factors (some <4 hours)
- Takes 1 hour to thaw
- Good for 24 hours post thaw
- 200-300 ml per unit
- 4-6 units is the appropriate dose (large volume load!)
- Vitamin K!
- TRALI

Blood Bank



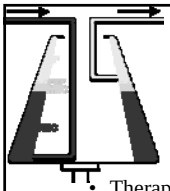
- Pretransfusion Testing:
  - Blood Typing
  - Antibody Screening and Identification
  - Direct Antiglobulin Test
  - Indirect Antiglobulin Test
- Inventory Management PRBC, PLT, FFP, Cryo..etc Autologous Program Directed Blood
  - RhoGAM, Novoseven, Factors
  - Rare Blood

Platelets

- Random vs Apheresis
- kept at room temperature increasing risk of bacterial contamination
- 5 day outdate
- Always in short supply
- Apheresis SDP is 200-400 ml (6-8 units)

Blood Bank

- Transfusion Reaction Evaluation
  - Acute Hemolytic
  - Delayed Hemolytic
  - Allergic/Anaphylactic
  - TRALI
  - Transfusion related volume overload
  - FNHTR
  - Transfusion Transmitted Disease
- Meets regulations (FDA, NYSDOH, AABB, CAP, JCAHO)



Hemotherapy

- Therapeutic
  - TTP
  - AIDP/CIDP
  - Sickle Cell Disease
  - Leukostasis
- Collections
  - Single Donor Platelets; FFP; Red cells
  - Peripheral Blood Stem Cell Collections

Stem Cell Processing and Transplantation

Cord Blood Transplants