Introduction to Transfusion Medicine
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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

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

What do we do?
• Blood Bank
• Stem Cell/Cellular Therapy
• Therapeutic Apheresis
• Stem Cell Collection
• Blood Collection
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 \(\rightarrow\) Fridge
• Platelet rich plasma hard spin
• Express off plasma \(\rightarrow\) freeze as FFP
• Platelet concentrate \(\rightarrow\) RT
• Freeze FFP, thaw at 4\(^{\circ}\)C, express off supernatant
  \(\rightarrow\) 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
- Leukoreduced

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

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