High Level Overview of Blood Bank

Process starts with a quality specimen. This is how we know that the right sample was drawn on the right patient for the right testing.

- Specimen requirements
  - Patient name
  - MRN
  - Date and time of collection on the tube
  - Phlebotomist and verifier's signature
  - Indelible ink

Basic ABO/Rh

- Antigens are expressed on the red cells and platelets
- Antibodies are in circulation in plasma
- You should not have antibodies to the antigens that you express
  - It is called an autoantibody (antibody to self) when you do; this is not the normal state.
- There are four Blood groups (A,B, O, and AB)

Blood group	Antigens expressed	Antibodies present
O	None	Anti-A1 Anti-B
A	A antigen	Anti-B
B	B antigen	Anti-A1
AB	A antigen B antigen	None

- There are two Rh types (positive and negative)
  - Rh Positive express D antigen
  - Rh Negative lack D antigen
    - Rh negative individuals do not have antibodies to D antigen unless they have been exposed to Rh positive blood
      - This can occur through transfusion or pregnancy
      - Rh does not matter with plasma and cryo because of this

    NOTE: There is also weak D but that is more complicated. Their Rh will be listed in the computer as Positive or Negative.

    NOTE: D antigen is not expressed on platelets. HOWEVER, it is expressed on the RBCs contaminating the platelet so Rh should still be honored.
- ONeg is the universal RBC donor because the red cells do not express any ABO or D antigens
- AB is the universal Plasma donor because the plasma lacks antibodies to all of the ABO and D antigens

How Whole Blood Donation works:

- 500mL of whole blood is collected from donor; it takes about an hour. The whole blood is separated into Red Blood Cells (RBC) and Platelet rich plasma. The Platelet rich plasma is centrifuged and plasma is removed leaving the platelets in a little bit of plasma (about 55mL).

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The plasma can then be frozen or it can be further processed to concentrate the clotting factors and the resulting product is called Cryoprecipitate (cryo). See flow chart.

- The possible products resulting from a whole blood donation:

Option 1	Option 2
RBC	RBC
Plasma	Cryoprecipitate
	Cryo Poor Plasma (we don't use this product)

How Apheresis Blood Donation works:

- Patient is hooked up to a collection device that draws a small volume of blood, filters out the selected product (Red cells, platelets, plasma, or granulocyte), returns the remaining blood to the patient and repeats that cycle until the desired volume is reached. This takes two to three hours.

Overview of Products:

- Red Blood Cells (RBC):
  - Collected by whole blood donation or apheresis
  - Stored at 1°-6°C
  - Good for 42 days
  - Transfused to increase oxygen delivery to tissues. Thresholds for transfusion vary by patient population and disease state.
- Plasma:
  - Collected by whole blood donation or apheresis and frozen
  - Stored at:
    - Frozen: ≤-18°C
    - Thawed: 1°-6°C
  - Good for:
    - Frozen: 1 year
    - Thawed: 5 days
  - Transfused to improve coagulation (clot formation to stop bleeding) and blood volume
- Platelets:
  - Collected by apheresis
  - Stored at 20° to 24°C with gentle agitation
  - Good for 5 days or 7 days depending on bacterial contamination mitigation method:
    - Large Volume Delayed Sample 48hr culture – 7 days
    - Large Volume Delayed Sample 36hr culture – 5 days
    - Pathogen Reduction Technology – 5 days
  - Transfused to prevent hemorrhage (platelets are the foundation for clot formation). Thresholds for transfusion vary by condition.

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- Cryoprecipitate (Cryo)
    - Collected by pooling the Cryoprecipitate from 5 whole blood donations **-or-** used singly (we only use singles for babies)
    - Stored at:
        - Frozen: ≤-18°C
        - Thawed: 20°-24°C no agitiation
    - Good for:
        - Frozen: 1 year
        - Thawed: 6 hours
    - This contains a concentration of clotting factors in a very low volume, usually around 120mL. Transfused in massive hemorrhage or control bleeding in surgery.
- Granulocyte (Gran)
    - Collected by apheresis
    - Stored at 20°-24°C no agitation
    - Good for 24 hours
    - Transfused very infrequently to treat patient with a bacterial or fungal infection that is not responding to treatment and the patient has severe neutrophenia.
        - Standard protocol is to give one gran a day for four to six days

Emergency Pack:

- ONEG
    - Who gets it:
        - Women and Universal <50 years old (childbearing potential)
            - WHY: Antibodies to D can cause Hemolytic Disease of the Fetus and Newborn (HDFN) which is dangerous to future pregnancies
        - Patients (male and female) <15 years old
            - WHY: If you get transfused as a child you are more likely to be transfused later in life
- OPos
    - Why would we give OPos if ONeg is the universal donor?
        - We need to save our ONeg inventory for people that need it so low risk patients are given OPos
    - Who gets it:
        - Women and universal >50 years old
            - WHY: unlikely to have babies at this point, don't care if they form antibodies to D
        - Male >15 years old
            - Not having babies so we don't care if they form antibodies to D