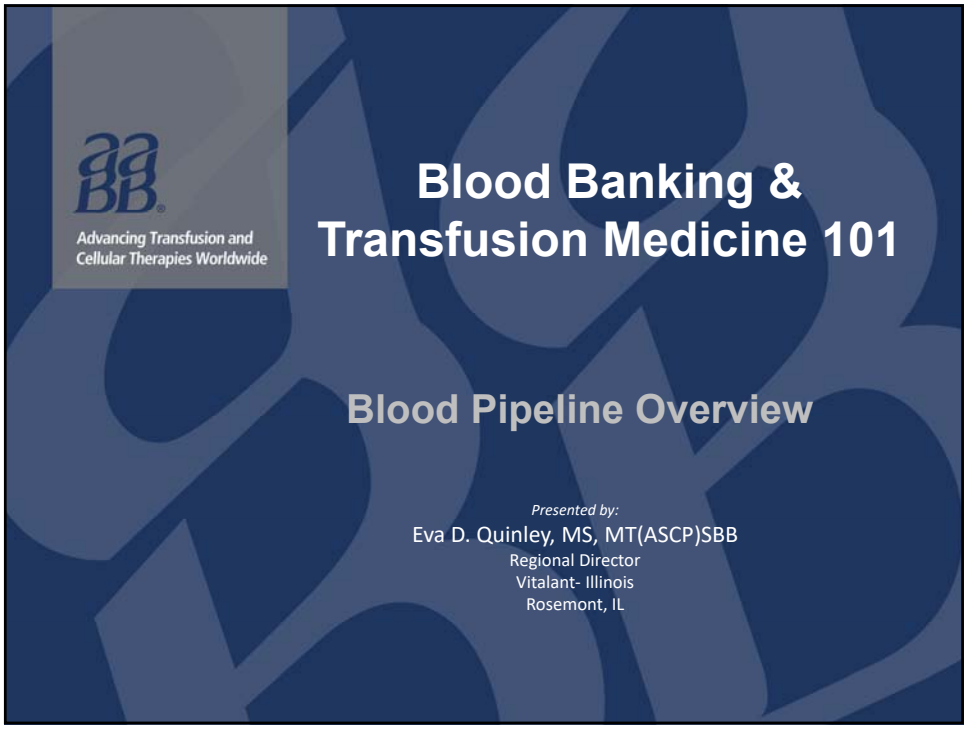

1

Learning Objectives

After participating in this program you should be able to….

- Compare and contrast the eligibility requirements for allogeneic and autologous blood donations.
- Describe in basic terms blood component preparation, storage, and processing.
- Distinguish transfusion transmitted infections including HIV, hepatitis, HTLV, bacteria, CJD, syphilis, malaria, babesia, and Chagas disease.

2

Autologous Blood vs Allogenic Blood

- Definitions
  - **Autologous** - In blood transfusion and transplantation, a situation in which the donor and recipient are the same person.
  - **Allogeneic** – denoting, relating to, or involving tissues or cells that are genetically dissimilar although from individuals of the same species.

3

Types of Autologous Donations

- Pre-operative
- Hemodilution
- Intra and post operative (not a traditional donation)

4

Autologous Blood Donation

- Require a doctor's prescription
- Donor must be in reasonably good health
  - No active infection
  - No severe heart disease
- No age limitation
- Donations every 4 to 7 days and up to 3 business days before surgery as long as donation guidelines are met
- Cannot donate within 72 hours of your surgery

5

Autologous Blood Donation

- Acetaminophen (Tylenol), aspirin and alcohol should be avoided for 48 hours before donation.
- Hemoglobin/hematocrit must be at a satisfactory level before donating. A physician may prescribe iron supplements to prevent deferral at the donation site.
- If blood loss during surgery is less than anticipated, transfusing the autologous blood may not be medically necessary.
- If the donated blood is not used during surgery, it may be discarded if the donation does not meet allogeneic requirements.

6

Comparing Autologous and Allogeneic Requirements

- Allogeneic
  - Relatively good health
  - Must have hemoglobin of at least 12.5
  - Can donate whole blood every 56 days (double red cells every 112 days)
  - Must weigh at least 110 pounds
  - Cannot donate if pregnant or pregnant in past 6 weeks
  - Must be at least 16 (requires parental permission)
- Autologous
  - May donate with some health conditions with physician permission
  - May donate with a hemoglobin of 11
  - May donate more frequently than every 56 days
  - No lower weight limit
  - Pregnancy is not cause for definitive deferral
  - May be less than 16 years of age

7

Comparing Autologous and Allogeneic Requirements

- Allogeneic
  - Deferred for certain infectious diseases such as hepatitis or HIV
- Autologous
  - May donate even with infectious disease, including hepatitis and HIV

Note: The autologous donor must not have a bacterial infection at the time of donation.

8

Advantages of Autologous Donations

- Avoid complications that may be seen with receipt of allogeneic donations
  - Hemolytic transfusion reactions
  - Allergic reactions
  - Transfusion transmitted diseases
- Avoid immunosuppressive effects of receipt of allogeneic blood
- May be necessary for rare blood types
- Allows transfusion of fresh whole blood
- Augments the allogeneic supply

9

Basics of Component Preparation

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Blood Components

- Red Cells
- White Cells
- Platelets
- Plasma
- Cryoprecipitate

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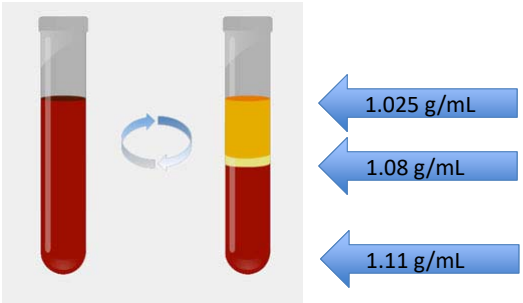
Separation of Blood Components

- Centrifugation based on density



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Separation of Blood Components

- Variable temperature centrifuges are used in the preparation of components.
- Depending upon centrifuge speed, platelets may be suspended in the plasma layer.

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Separation of Blood Components

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Apheresis

- Process of removing whole blood, separating components and returning those not needed to the donor.
- Usually an automated process using apheresis machines.
- Components are separated by differential centrifugation according to each one's specific gravity.

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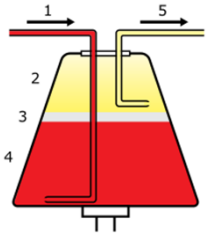
Apheresis Process



Whole blood enters the centrifuge (1) and separates into plasma (2), leukocytes and platelets (3), and erythrocytes (4). Selected components are then drawn off (5).

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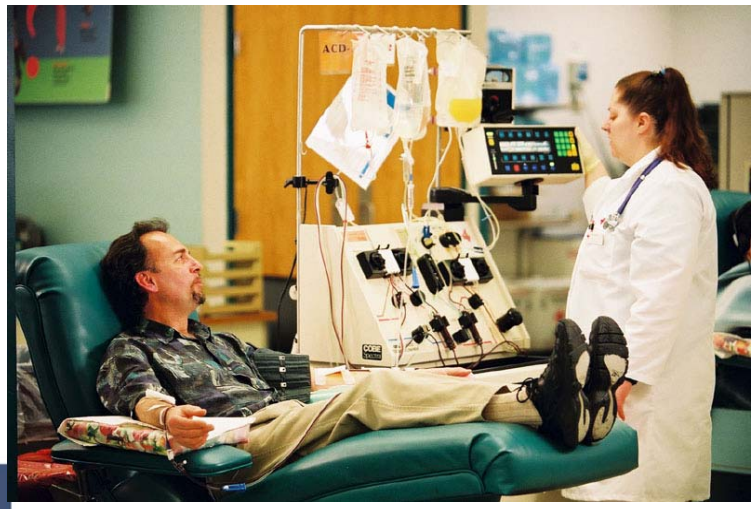
Apheresis



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Apheresis Process Products

- Red cell and plasma
- Jumbo plasma
- Platelet and plasma
- Double red cells
- WBC

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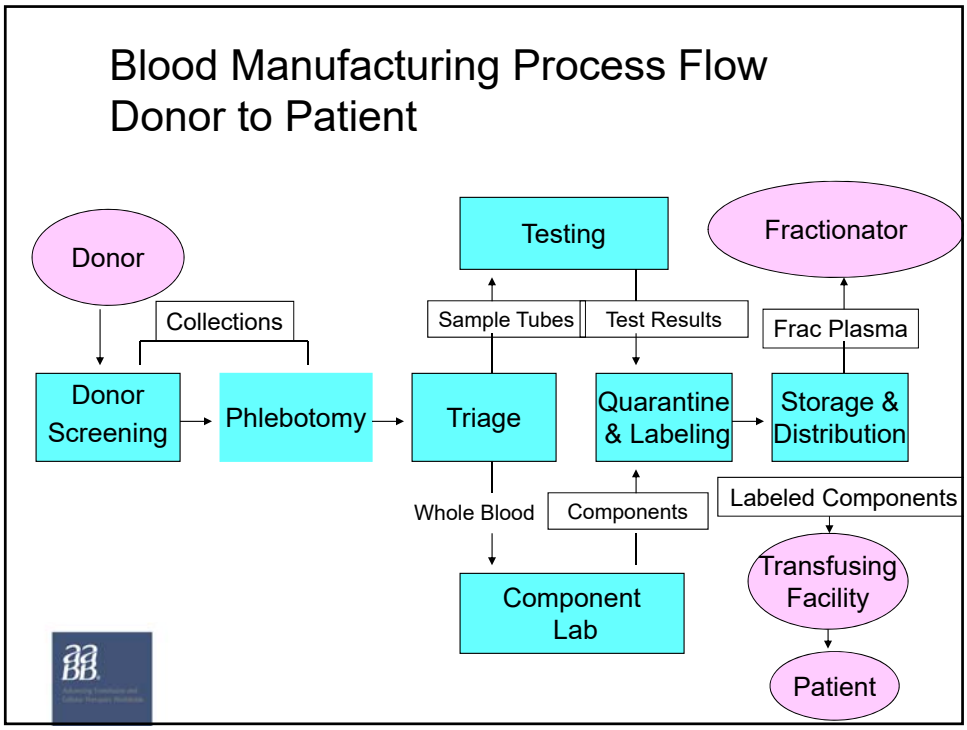

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Centrifugation

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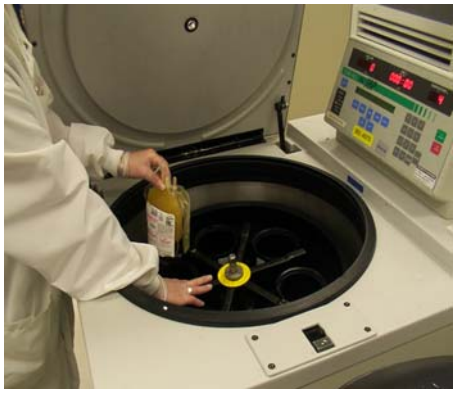
Removing Centrifuged WB Units From the Centrifuge



Plasma is at the top of centrifuged WB units.

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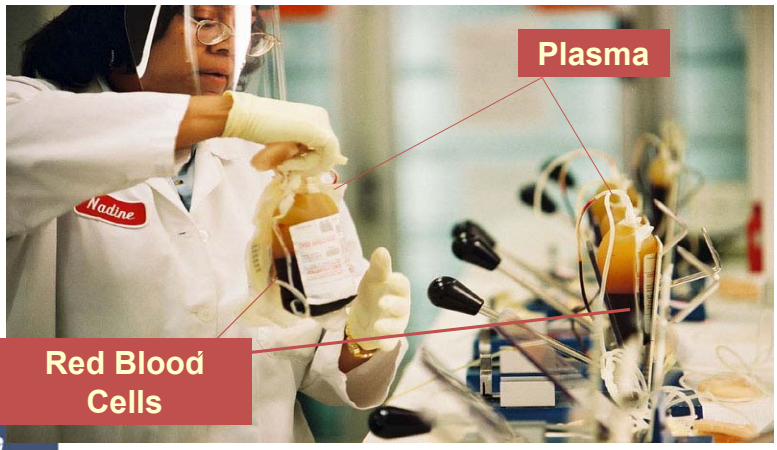
Separated Elements in Centrifuged Whole Blood



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Separating Plasma from RBCs

Closed System Processing

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Expressing Plasma

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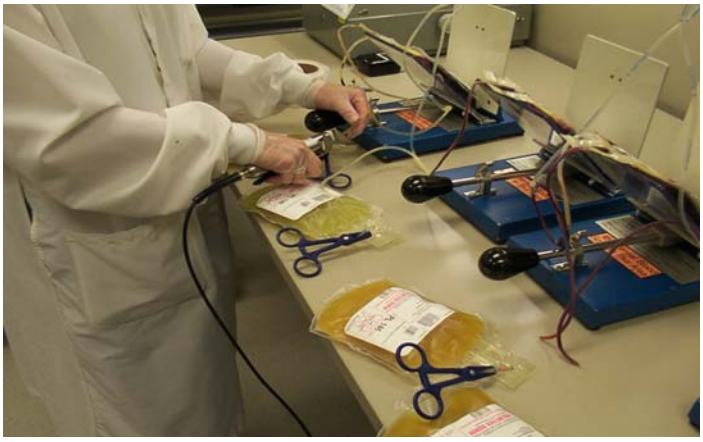
Plasma Unit Is Separated From Red Blood Cells



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Plasma

- Plasma products
  - FFP
  - FP 24
  - RTFP 24
  - Liquid plasma
  - Cryo reduced
  - Platelet rich plasma

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Platelet Production

- Single donor platelets
- Random platelets
  - Whole blood is soft spun to separate red cells from platelet rich plasma
  - Platelet rich plasma is centrifuged - hard spin
  - Platelets settle to the bottom.
  - The top portion, plasma, is expressed off into satellite bag
  - A small amount of plasma is left on the platelets.

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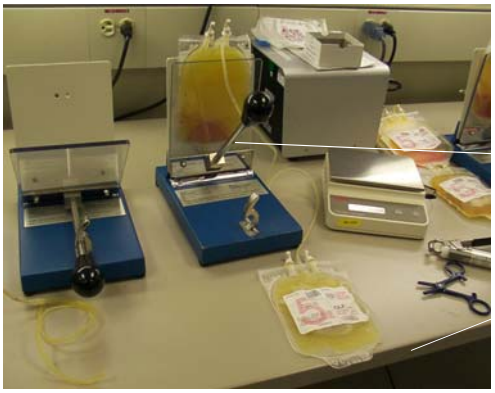
Platelet Production



Platelets

Plasma

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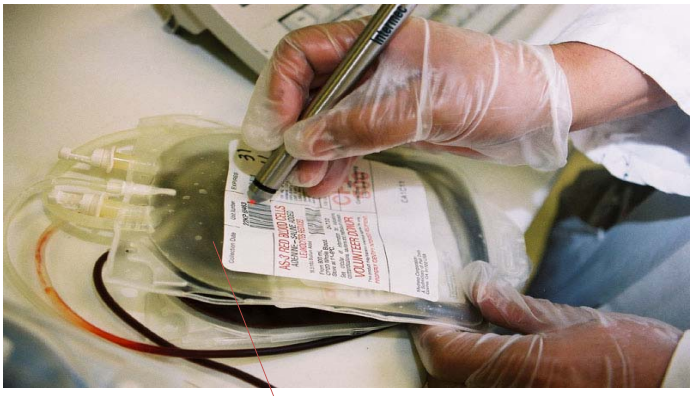
Manufacture Of Each Component Is Documented



Wanding the barcode

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Leukoreduction

- Most allogeneic RBCs and some platelets are leukoreduced
- White cells removed, usually by filtration
- Benefit
  - reduce recipient adverse reactions
  - some studies indicate improved patient response to transfusions

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Leukoreduction

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Irradiation

- **Irradiation inactivates certain white cells (lymphocytes) that can attack the recipient's system**
  - Donations from first degree blood relatives
  - Recipients who are severely immunocompromised
    - neonates
    - transplant patients

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Types of Plasma

- FFP
  - Separated from red cells and frozen within 8 hours of collection
  - All clotting factors full functional
- FP 24
  - Separated from red cells and frozen within 8 -24 hours of collection
  - Some degradation of labile factors
- PF24RT24WB
  - Whole blood is held at room temperature for up to 24 hours prior to separation of plasma from red cells and subsequent freezing
- All 3 are used somewhat interchangeably in clinical practice
- All 3 are maintained in a frozen state at -18 degrees C or colder
  - One year expiration in frozen state
- All must be thawed for use
  - Transfuse within 24 hours but may hold up to 5 days after thawing (5 day cold)
  - Clotting factors are significantly reduced with aging

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Types of Plasma

- Liquid plasma
  - Separated from red cells never frozen
  - Stored at 1-6 degrees C
  - 40 days expiration date
  - Often used in trauma
- 5 day converted – thawed FFP which can be retained for 5 days

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Component Therapy

- **Whole Blood (WB)**
  - used for massive bleeding
  - expiration date = 21 or 35 days, depending upon anticoagulant – may be extended to 42 days with additives.
  - storage = 1 - 6C
- **Red Cells (RBCs)**
  - used to correct anemia **(chemo, surgery, accidents)**
  - expiration date = 42 days **(usually)**
  - storage = 1 - 6C

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Component Therapy

- **Platelets**
  - used to treat low or non-functioning platelets (bleeding, chemo)
  - expiration date = 5 days
  - storage temp = 20-24 degrees C
- **FFP, PF24, PF24RT24WB**
  - used to treat some bleeding problems
  - frozen expiration date = 12 months
  - storage = < -18 degrees C

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Component Therapy

- **Plasma Derivatives**
  (made from "frac plasma")
  - further manufacture of pooled plasma
  - Clotting factors, IVIG, Albumin
- **Cryoprecipitated AHF ("cryo")**
  - used to treat clotting problems
  - storage = < -18 degrees C
  - expiration date = 12 months

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Testing of Donated Blood Products

- **FDA-required tests**
  - ABO, Rh (blood type)
  - Hepatitis
    - Anti-HBc (antibodies to core antigen)
    - Anti-HCV (antibodies to hepatitis C)
  - HIV
    - Antibodies to HIV-1, HIV-2
  - Antibodies to HTLV I and HTLV-II
  - Syphilis
  - Chagas – selective testing

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Testing of Donated Blood Products

- Other FDA-required tests
  - NAT testing for Hep C and HIV-1
  - HBV NAT also performed by most blood centers
  - NAT for West Nile Virus
  - Chagas
  - Babesiosis (region dependent)
  - Zika
- Optional tests
  - CMV (Cytomegalovirus)
  - Sickle cell (Hgb. S)

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Diseases Known To Be Transmitted By Human Blood

- Hepatitis
- HIV 1 and 2
- HTLV I/II
- Bacteria
- CJD
- Syphilis
- Malaria
- Babesia
- Chagas disease
- West Nile Virus
- Zika
- Dengue
- Chikungunya

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Hepatitis

- HAV
- HBV
- HCV

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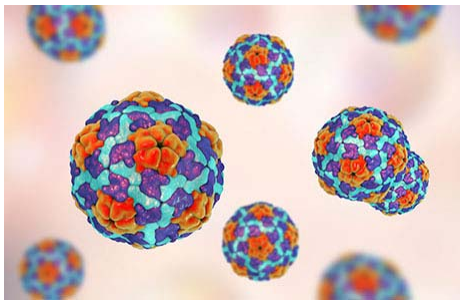
Hepatitis A

- Normally transferred fecal-oral route, rare cases of transfusion transmitted disease
- Self limited disease
- No chronic state



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Hepatitis B

- Transmitted through blood and infected body fluids
- Disease can be severe
- Donor blood is tested for the presence of antibody to HBV and for the presence of viral DNA/RNA
- Having hepatitis B or a positive test for Anti-HBV or for viral DNA/RNA is cause for permanent deferral
- A vaccine is available.
- Preventive measures to keep out of blood supply
  - Questionnaire
  - Testing

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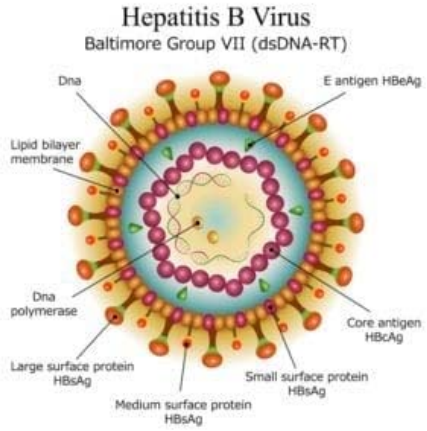
Hepatitis B



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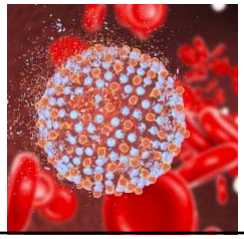
Hepatitis C

- Transmitted by human blood and body fluids
- Can cause severe illness
- Often moves to chronic state
- There is now a cure.
- Permanent deferral for those testing positive for Anti-HCV or HCV viral RNA/DNA
- No vaccine at this time
- Preventive measures to keep out of blood supply
  - Questionnaire
  - Testing



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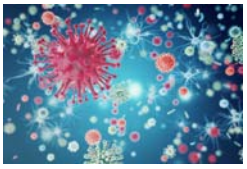
HIV 1 and 2

- Transmitted by human blood and body fluids
- Retrovirus
- Attacks immune system leading to AIDS
- Permanent deferral for exposure to individuals who have HIV
- Permanent deferral for individuals testing positive with confirmation for Anti-HIV 1 or 2 and for positive tests for viral RNA/DNA
- No vaccine available
- Preventive measures to keep out of blood supply
  - Questionnaire
  - Testing



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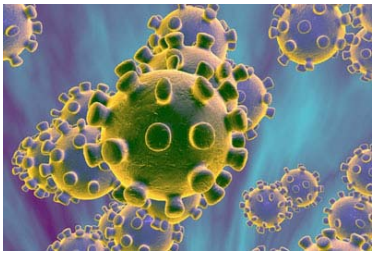
HTLV I/II

- Retrovirus
- Transmitted through human blood and body fluids
- Permanent deferral for those testing positive for Anti-HTLV I or 2
- Preventive measures to keep out of blood supply
  - Questionnaire
  - Testing



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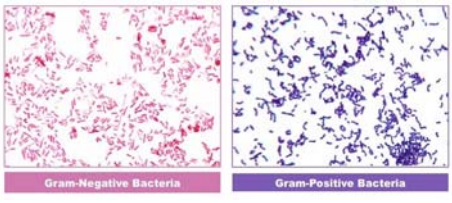
Bacteria

- Rare in red blood cells
- Can occur in platelets due to storage conditions
- Species noted:
  - Gram negative
    Proteus, *Pseudomonas*, *Escherichia*, *Klebsiella*, *Acinetobacter*, and *Serratia*
  - Gram-positive
    Propionibacterium, *Staphylococcus*, *Bacillus,* and *Enterococcus*
- Preventive measures include:
  - 30 second arm scrub
  - Diversion pouch
  - Testing (platelets only)
  - Pathogen Reduction



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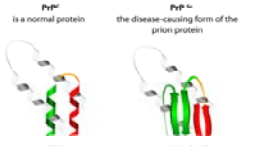
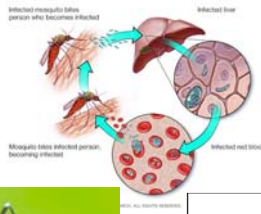
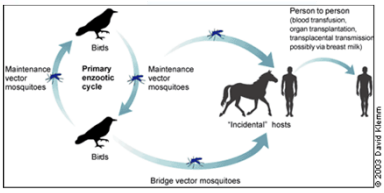
Other Infections Potentially Transmitted By Human Blood Transfusion

- Creutzfeldt-Jakob disease (CJD)
- Chagas
- Zika
- Babesiosis
- Malaria
- West Nile Virus
- Syphilis







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Emerging Infectious Disease Concerns

- Dengue
- Chikungunya
- H1N1

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Thank you!

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Questions?

Contact

AABB eLearning Team

eLearning@aabb.org

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