

Blood

1. Components

1. formed elements ~45%
 1. erythrocytes (RBC's) ~45% = hematocrit (note: slight gender differences)
 2. buffy coat ~1%
 1. leukocytes (immunity)
 2. platelets (clotting)
2. plasma ~55%
 1. water (~90%)
 2. proteins
 1. albumin- osmotic pressure
 2. fibrinogen- clotting
 3. globulins- immunity
 3. salts
 1. Na
 2. K
 3. Ca
 4. Mg
 5. Cl
 6. bicarbonate
 4. substances
 1. nutrients
 2. waste products
 3. respiratory gases
 4. hormones

2. Functions

1. transport
 1. gas
 2. nutrients
 3. immunity
 4. heat
 5. force
 6. self-sealing
2. buffering
 1. pH
 2. thermal

3. Hemostasis

1. intact endothelium repels platelets
2. if endothelium damaged, collagen fibers cause platelets to become sticky
 1. mechanical positive feedback
 2. chemical release
3. once anchored, platelets release serotonin, causing vascular spasms
4. thromboplastin released by injured tissues
5. PF3 phospholipid on platelet surface + thromboplastin helps to trigger clotting cascade
6. prothrombin to thrombin (enzyme)
7. thrombin joins soluble fibrinogen into insoluble fibrin
 1. traps RBC's and forms clots

4. Clinical

1. undesirable clotting
 1. thrombus to embolus
 1. injury
 2. inactivity
 3. atherosclerosis
 2. fight with anticoagulants
2. undesirable bleeding
 1. thrombocytopenia
 1. vitamin K deficiency prevents clotting factor production by liver
 2. hemophilia
 1. hereditary lack of clotting factors
3. blood groups & transfusions
 1. RBC plasma membranes bear antigens
 2. antibody response causes agglutination
 1. reduced transport
 2. biggest risk: blocked kidney tubules
 3. over 30 antigens: ABO and Rh most important
 1. antibodies formed against non-self during life
 2. antibodies against self are destroyed during infancy
4. Types
 1. ABO
 1. AB no plasma antibodies; universal recipient
 2. A antibodies; accept A or O
 3. B plasma anti-A antibodies; accept B or O
 4. O plasma anti-A & B antibodies; accept O; universal donor
 2. Rh
 1. most Rh positive
 2. if Rh negative, then can become sensitized
 1. transfusion
 2. pregnancy
 1. treat with RhoGAM immune serum (anti- Rh agglutinins)
 2. otherwise mother's antibodies attack fetal RBC's