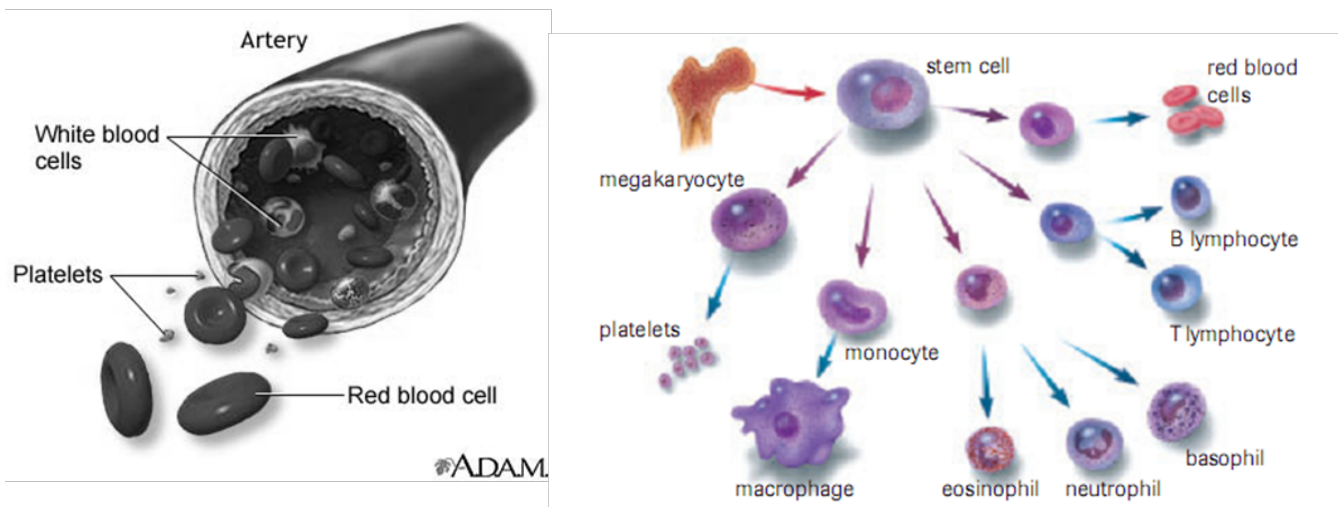


Human Systems - Blood and Immunity: Chapter 11 - Lesson 1: Blood

- Our body depends on oxygen and nutrients being brought to cells and wastes being taken away from cells
- Nutrients are absorbed from our digestive system into our blood
- Oxygen enters and carbon dioxide leaves our blood in our lungs
- Wastes are removed from our blood in our kidneys and liver
- Blood is made up of plasma, red blood cells, white blood cells and platelets
- Blood cells are produced in bone marrow, especially bone marrow from our vertebrae (spine), ribs, hips, skull, and sternum (breastbone)

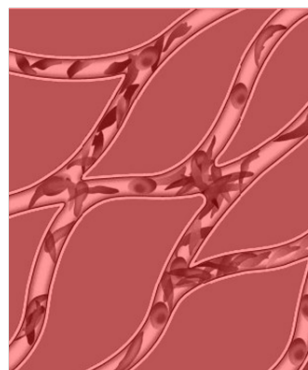
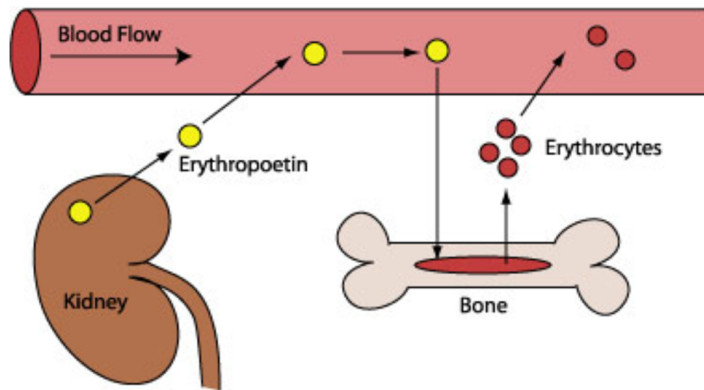
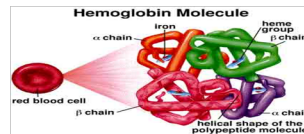


Plasma:

- Plasma makes up 55% of blood
- 90% of plasma is water
- The other 10% of plasma is made up of glucose, proteins, vitamins/minerals, wastes, gases

Red Blood Cells:

- Are called erythrocytes, have a life of 4 months (120 days)
- 5 - 6 million in one drop of blood
- Lack nuclei (enucleated) and mitochondria (WHY??)
 - Produce ATP by anaerobic metabolism
- Small size allows for a lot more surface area
- biconcave shape giving additional surface area
- 1 cell has 280 million molecules of hemoglobin
- hemoglobin is a oxygen carrying protein containing iron
 - heme - iron containing pigment
 - globin - protein structure
- specialized white blood cells in the liver and spleen filter blood for any damaged red blood cells
- Red blood cell production is controlled by the amount of oxygen reaching body tissues
 - If the O₂ level decreases the **kidneys** release a hormone called **erythropoietin**
 - That hormone stimulates red blood cell production in bone marrow
 - If blood is carrying too much O₂, the hormone level decreases, along with red blood cell production



White Blood Cells:

- Called leukocytes.
- Function is to fight infections
- White blood cell engulfs an invader and releases digestive enzymes - creates pus
- 5000 - 10,000 in one drop of healthy blood
- a life of 7-14 days
- ratio of red to white blood cells is 700:1 in a healthy person
- when we have an infection (bacterial, virus) our white blood cell count increases
- have a nucleus
- 5 major types of blood cells
 - neutrophils (40 - 75 %) - phagocytic; defend against bacteria and fungi, form pus
 - eosinophils (5 %) - defend against parasites. active in allergic reactions
 - basophils (0.5 %) - release histamine to help immune response
 - lymphocytes (20 - 50 %) -
 - two types T and B lymphocytes
 - monocytes (1 - 5 %) - phagocytic; leave blood and become macrophages

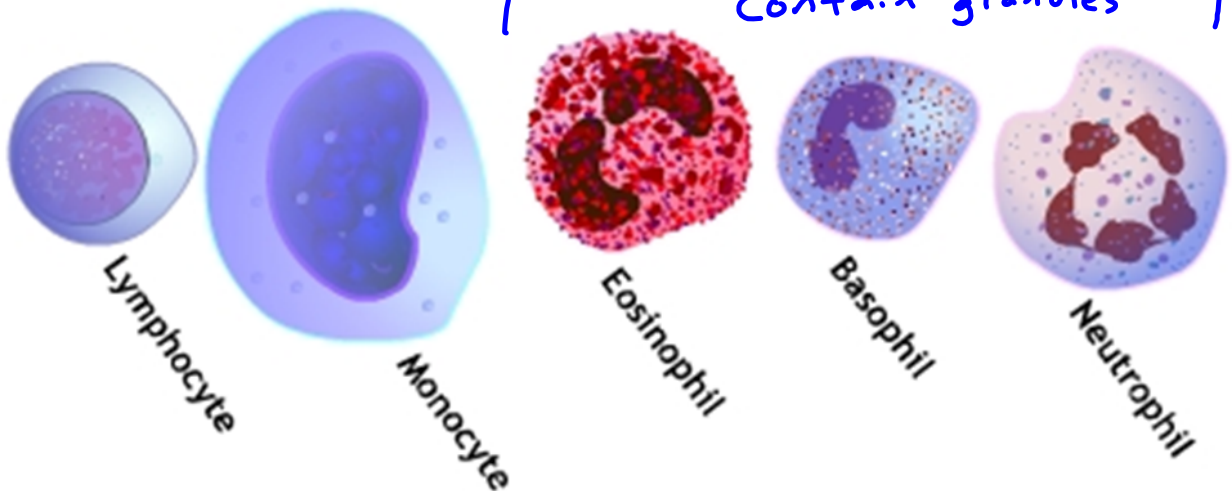
phagocytosis



agranulocytes

granulocytes

contain granules



Platelets:

- no nuclei
- 250,000 - 400,000 in one drop of blood
- life of 8-10 days
- originate as small fragments of cytoplasm that break off from large cells
- function in blood clotting

Blood Clotting:

1. Platelets break when they hit the rough edge of a wound
2. Release a chemical called **thromboplastin**.
3. Thromboplastin changes **prothrombin into thrombin**.
4. Thrombin will react with other chemicals and change **fibrinogen (inactive) into fibrin (active)**
5. Fibrin weaves into a patch which plugs the wound (**clot**)

