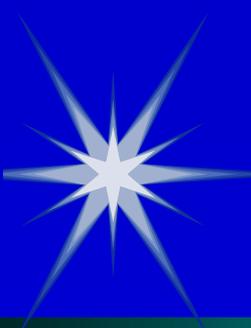


Blood, Lymph and Immune Systems



- Hematology
- Immunology
- Blood disorder, Blood diseases
- Blood dyscrasia (pathologic condition in which any of the constituents of the blood are abnormal in structure, function, or quality, as in leukemia or hemophilia.)



Blood

→ **hem/o** and **hemat/o**

→ plasma - 55%

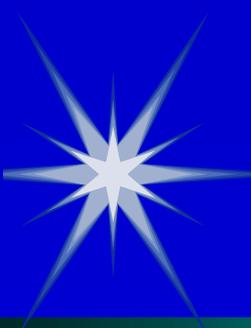
→ formed elements - 45%

→ serum - plasma without clotting proteins



Blood Cells

- RBC (Red blood cell) - erythrocytes – erythropoiesis (process of erythrocyte production.)
- WBC (White blood cell) - leukocytes – leukopoiesis (process of leukocyte production)
- Platelets - thrombocytes – thrombopoiesis (process of thrombocyte production)



Erythrocytes

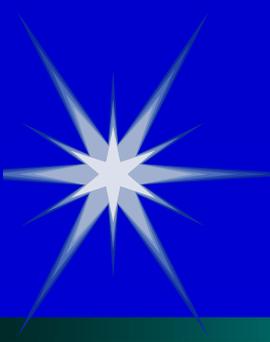
→ erythr/o - red

→ cyte – cell

→ erythrocyte

→ Hemoglobin - blood protein
transports oxygen

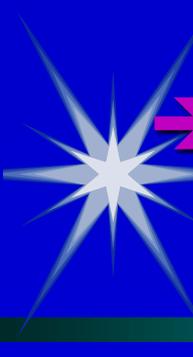
→ Reticulocyte - immature erythrocyte



Leukocytes

→ leuk/o – white (leukocyte)

→ Protect the body against invasion



→ Granulocytes

☎ neutrophils (phagocytosis)

☎ eosinophils (allergies)

☎ basophils (promote inflammation)

→ Agranulocytes

☎ lymphocytes (production of circulating antibodies)

☎ monocytes (macrophages)

→ Collection of dead and living bacteria and leukocytes called pus, abscess.



Thrombocytes

- Also called platelet
- essential to blood clotting
- Thrombocytopenia (decrease platelet)
- Thrombocytosis (increase platelet)



Plasma- blood without RBC

→ plasma

☎ 92% water

☎ 8% plasma proteins

👍 albumin

👍 globulin

👍 fibrinogen

→ serum - plasma without clotting proteins or fibrinogen

Lymphatic System

→ Major structures

☎ lymph vessels

☎ lymph nodes

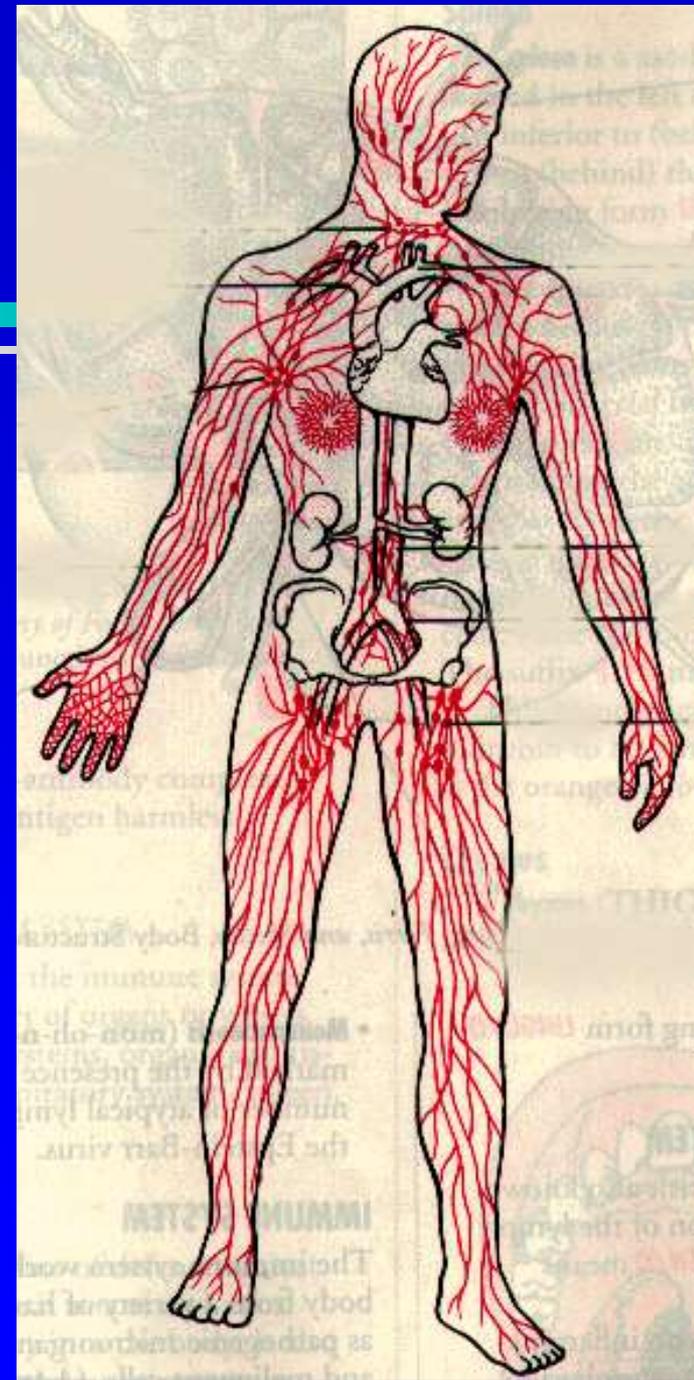
☎ lymph fluid

☎ tonsils

→ Also

☎ spleen

☎ thymus





Antigen-Antibody Reactions

- **Antigen** - any substance that the body can regards as foreign (virus, bacterium, toxin)
- **Antibody** - a disease fighting protein developed by the body in response to the presence of an antigen
- **Antigen-antibody reaction** or immune reaction



WBCs for Immune Reactions

→ monocytes - type of WBC

☎ formed in bone marrow/transported where needed by body

☎ become **macrophages**

→ macrophage - phagocytic cell that protects body by ingesting invading cells

→ lymphocytes - major class of WBCs

☎ formed in lymphatic tissue

Lymphocytes

→ T cells or T Lymphocytes

☎ mature in thymus gland

☎ Cell mediated immunity

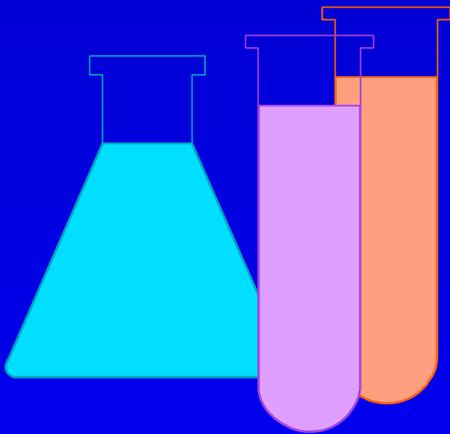
→ B cells or B Lymphocytes

☎ mature in bone marrow

☎ antibody-mediated
immunity



Blood Groups



- Four blood groups based on presence or absence of blood antigens (agglutinogens) on surface of RBCs
- A - A antigen
- B - B antigen
- AB - both AB antigens
- O - no AB antigens



Rh Factor

- Rh factor is antigen present on RBC of 85% of population.
- Rh positive and Rh negative
- Rh negative pregnant woman may develop antibodies to the Rh protein of her Rh-positive fetus.



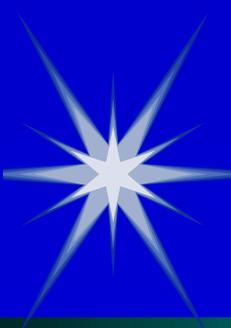
Immunity

- **Immunity**-state of being resistant or not susceptible to a specific disease
- **Acquired immunity**-any form of immunity NOT present at birth and obtained during life



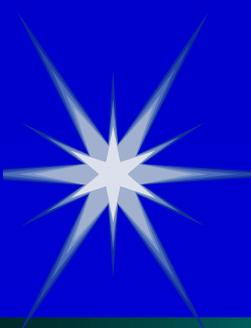
Anemias

- Oxygen-carrying capacity of blood is reduced
- reduced hemoglobin
- erythropenia
- hematocrit



Anemia

- Iron deficiency anemia
- Hemolytic anemia
- Favism
- Macrocytic anemia
- Hypochromic microcytic anemia
- Reticulocytosis



Anemia

Hereditary anemia

→Thalassemia

→Sickle cell anemia



Acquired Immune Deficiency Syndrome (AIDS)

- Caused by HIV (Human Immunodeficiency Virus)
- HIV infects T-helper cells with often a long incubation of up to 10 years
- AIDS name applied during advanced stages of disease
- After immune system destroyed, opportunistic infections occur.



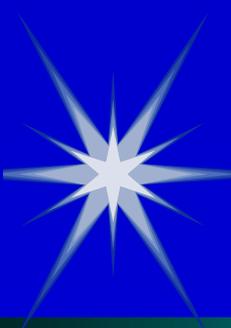
Edema (Oedema)

Pitting edema

Non-pitting edema

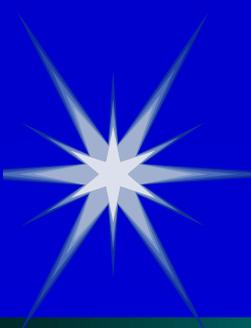
Dependent edema

Brain edema



Hemophilia

- Hereditary blood clotting disorder
- sex-linked, usually in men



Oncology, the study of tumors

→ Metastasis, Metastasize

→ Carcinoma

☎ Malignant Melanoma

☎ Adenocarcinoma

→ Sarcoma (arises from bone, fat, muscle, etc.)

☎ Osteosarcoma

☎ Myosarcoma

☎ Myeloma



Leukemia

- Major oncological disorder of blood-forming organs
- acute myelogenous leukemia (AML)
- Chronic myelogenous leukemia (CML)
- acute lymphocytic leukemia (ALL)
- Chronic lymphocytic leukemia (CLL)



Lymphoma

- Malignant disorder of lymphatic cells
- Hodgkin lymphoma
- Non- hodgkin lymphoma



Kaposi's Sarcoma

→ Malignancy associated with AIDS