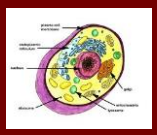
HEMATOLOGY

Study of the formed elements in the blood.

MORPHOLOGY AND FUNCTION OF CELLULAR COMPONENTS

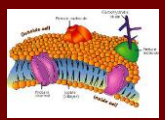
Three Basic Units

- Membrane
- Nucleus
- Cytoplasma and organelles



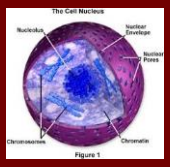
MEMBRANE

- Three Functions
  - Restricts and Facilitates interchange of substances
  - Cell to Cell Recognition
  - Location of Surface Markers



NUCLEUS

Three Components
- Chromatin
- Nuclear Envelope
- Nucleoli

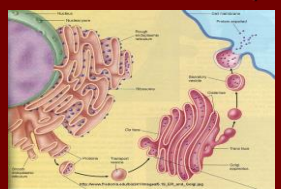


CYTOPLASMA ORGANELLES

- Golgi Body
- Endoplasmic Reticulum
- Ribosomes
- Mitochondria
- Lysosomes
- Microfilaments
- Microtubules
- Centrioles

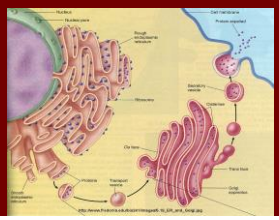
GOLGI

- System of stacked membrane bound flattened sacs
- Packaging and Trafficking
- Synthesis of Ribosomes and Lysosomes



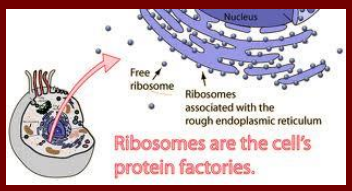
ENDOPLASMIC RETICULUM

- Lacelike network of flattened sheets, sac, and tubules
- Makes and transports lipids and proteins



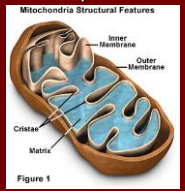
RIBOSOMES

- Made up of protein and ribosomal RNA
- Synthesis of protein



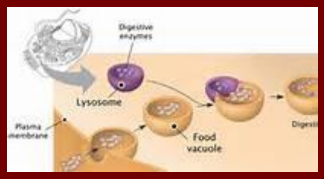
MITOCHONDRIA

- Round or oval structure
- 2 membranes, inner membrane has folds called cristae
- Cell Power house, makes ATP



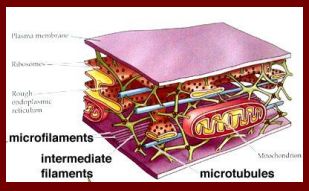
LYSOSOMES

- Membrane bound sacs
- Hydrolytic enzymes for cellular digestion



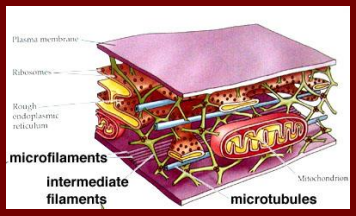
MICROFILIMENTS

- Fine filaments of actin and myosin
- Supports cytoskeleton and motility



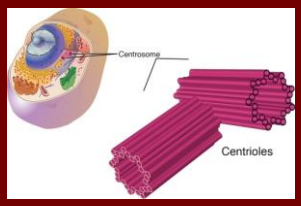
MICROTUBULES

- Maintains cell shape , motility and mitotic process



CENTRIOLE

- Bundles of microtubules and act as insertion points for mitotic spindle fibers



BLOOD

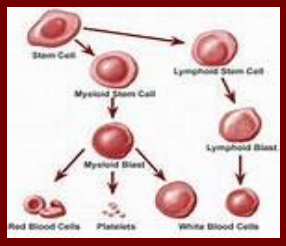
- Plasma
- Cellular
  - Erythrocytes – have hemoglobin carry O_2
  - Leukocytes
    - Neutrophils
    - Eosinophils
    - Basophils
    - Monocytes
    - Lymphocytes
  - Platelets – maintain hemostasis

LABORATORY TESTS

- Complete Blood Count (CBC)
- Differential
- Sedimentation Rate
- Reticulocyte Count
- Coagulation Testing

HEMATOPOIESIS

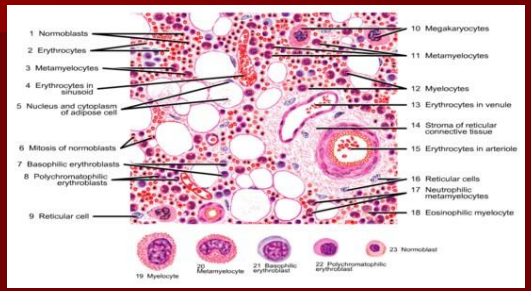
Formation and Development of Blood Cells



FETAL

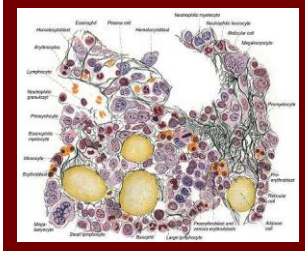
- First Cells
- 2nd Month
- 4th Month
- 5th – 6th Month

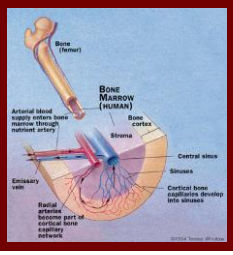
BONE MARROW

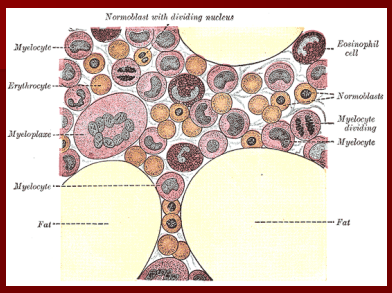


COMPARTMENTS

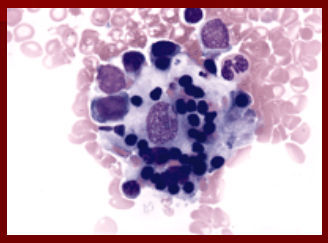
- Hematopoietic
- Vascular



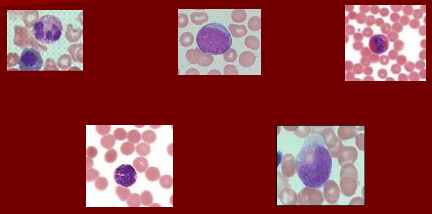




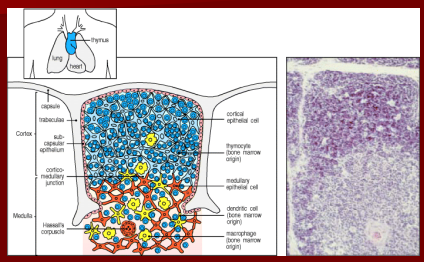
ERYTHROBLASTIC ISLAND



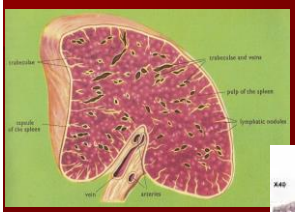
LEUKOCYTE

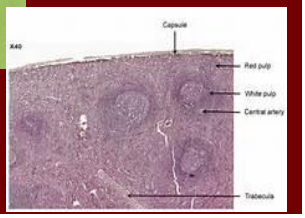


THYMUS

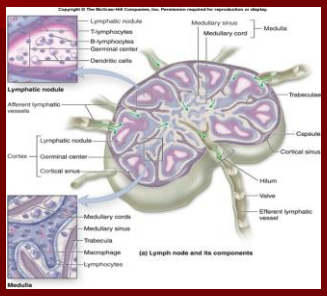


SPLEEN

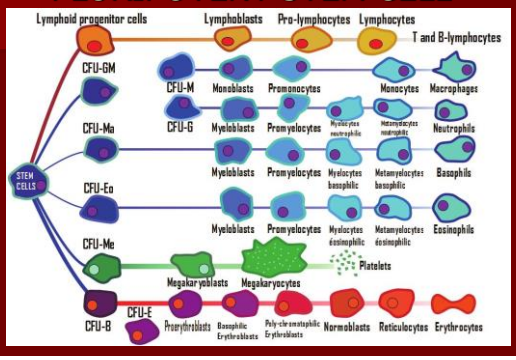




LYMPH NODE



PLURIPOTENT STEM CELL



CYTOKINES

- Glycoproteins that govern differentiation
  - Promote cell survival
  - Proliferation and cell division
  - Control and regulate process of differentiation
  - Produced by monocytes, macrophages, T lymphocytes, fibroblasts, & endotheliel cells

EARLY-ACTING (Multilineage)

- SCF (stem cell factor)- (CFU-GEMM, CFU-GM, CFU MK, BFU-E).
- Flt 3 Ligand – Inhibits apoptosis
- Interleukin 3 – BFU-E
- GM-CSF – Granulocytes and Monocytes
- Interleukin 6 - Megakaryocytes
- Interleukin 11 - Megakaryocytes

Later Acting (Lineage Restrictive)

- Interleukin 5 - Eosinophils
- EPO (Erythropoietin) - Erythrocytes
- G-CSF - Granulocytes
- M-CSF – Monocytes or macrophages
- TPO(mpl-ligand or MGDF) - Megakaryocytes

INDIRECT-ACTING GROWTH FACTORS

- Il-1

NEGATIVE REGULATORS

- Interferons & TGF-β – Suppresses hematopoietic progenitor cells
- TNF – Suppresses colony growth
- PGE – Suppresses granulopoiesis and monopoiesis
- Acidic isoferritins & Lactoferritin – Inhibits hematopoiesis
- Di-OH vitamin D – Inhibits myelopoiesis
- T_s and NK cells – Negative regulator of hematopoiesis
- SCI (MIP-1α)m- Negative regulator of stem cell proliferation

HEMATOPOIETIC MICROENVIRONMENT

- Stomal Cells
- Extracellular Matrix

ONCOGENES AND TUMOR SUPPRESSOR GENES

- Proto-oncogenes
- Antioncogenes