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HISTOLOGY SHEET

Doctor 2021 -mercy- I medicine I MU

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DOCTOR

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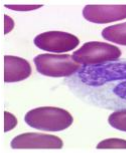
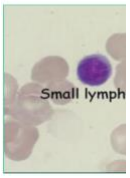
Agranular leukocytes

Monocytes

As we said that when the cell doesn't have a specific granules we called Agranular but, if it has a granules becomes granular , so the granules word related with specific granules.





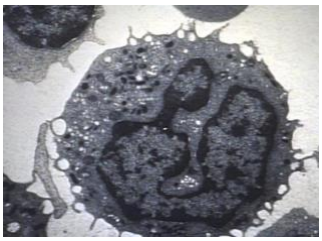
- *Differential count: 3 - 8%*
- *Size : 20 microns*
- *Shape : rounded*

LM:

- *Largest in blood film*
- *Nucleus: Large, eccentric , Kidney- shaped (deep Indented)*
- *Cytoplasm: Abundant, Pale basophilic,*
- *Finely granular= non specific azurophilic granules*

WBCs have amoebic movement : they can leave bloodstream or blood circulation and enter to the tissue in normal condition (not abnormal conditions)

EM:

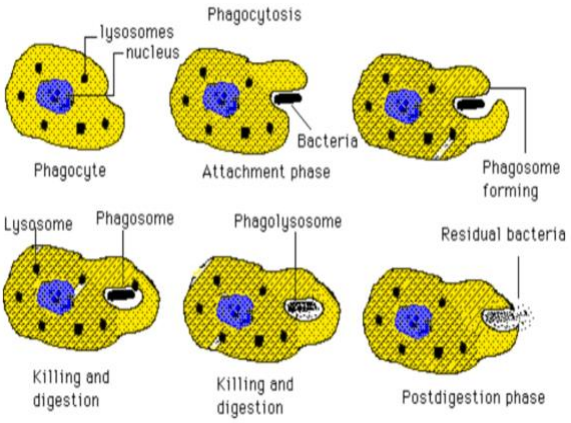


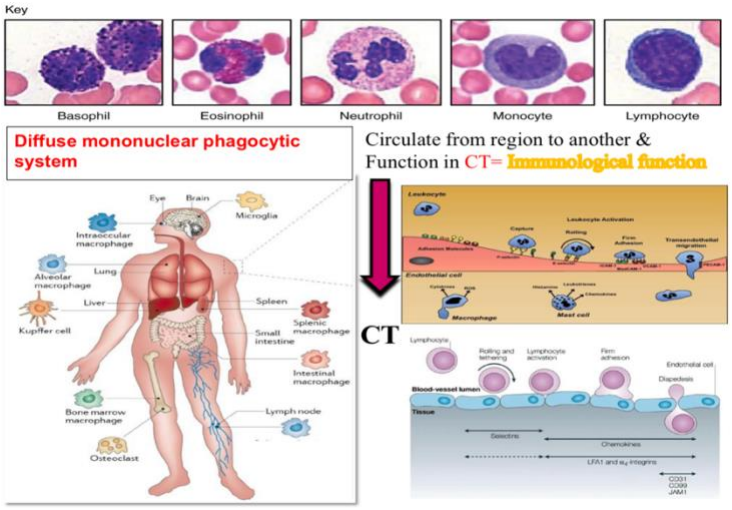
- *Irregular = Pseudopodia*
- *Nucleus: Large, eccentric kidney- shaped (Indented)*
- *The cytoplasm contains a moderate amount of organelles.*
- *Non specific (Azurophilic granules) containing lysosomal h enzymes.*

Life span : *1-2 days circulation in the blood, then enter the CT >>> macrophages*

Functions :

- *Trans- migration &differentiation to tissue (macrophages)*
- they can leave bloodstream or blood circulation and enter to the tissue via transcytosis
- *Immunologic function:*
  - *Phagocytosis and intracellular digestion of bacteria, virus*
  - *Ag-presenting cell*





Diffuse mononuclear phagocytic system :is cells originated from monocyte blood cell; it take different name according to part of body

It transmitted by transcytosis: it attach to endothelium and travel from lumen to CT does not inter endothelium

Abnormal Monocytes count:

- ***Monocytosis= increase number***

  Causes:

  1. **Malaria**
  2. **Chronic infections (glandular fever , syphilis, T.B.)**
  3. **Lymphomas & Leukemia.**

- ***Decrease in number of Monocyte***

  Bone marrow depression

  1. **drugs**
  2. **Irradiation**
  3. **Severe chronic diseases**

Lymphocyte

- ***Differential count:*** ***20-30%***
- ***Size :*** ***9-12*** **microns** **second most numerus**
- **According to the sizes:**

  1- large lymphocytes.

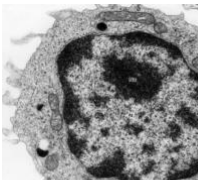
  2- Medium-sized lymphocytes.

  3- Small lymphocytes:

  - **Diameter = RBC.**
  - **Most numerous.**
- **Functionally mature.**
- **It enters the circulation to reaches the lymphatic organs to become active and then be maturity and turns into the first two types**

3 functional types:

1) T lymphocytes:



- ***Start development in bone marrow.(immature)***
- ***Differentiate in thymus(site of maturation).***
- ***Cell-mediated IR.***
- ***T cell can't distinguish antigen but antigen presenting cell help be distinguish it when T cell distinguish antigen be active and distracted antigen by 3 type of T cell (T helper ;T toxic ; T suppressor) after that it storage in body as memory cell and the lifespans be from months to year***

2) B-lymphocytes:

- ***Develop & differentiate in bone marrow.***
- ***Humoral immune response.***
- ***In activation be B cell and plasma cell***
- ***Plasma cell come from activation of B lymphocytes (cartwheel nucleus ,v- charge because it have Golgi apparatus, basophilic because it produces antibodies which is protein in nature***

3)Natural killer cells: does not have AG markers like B,T

- *Develop in bone marrow.*
- *Lack CDs of B or T.*
- *Are null cells(non B, nonT).*
- *They don't enter the thymus to be competent.*
- *They act nonspecifically to kill virally infected cells &tumor cell*

the 3 type is morphological same we can distinguishable by AG marker

LM:

- Shape = rounded
- Nucleus: large
- Cytoplasmic: thin rim

No stained granules in the cytoplasm (except small Azurophilic granules)

- Small most common 90%
- Types: B-and T-lymphocytes (morphologically not distinguishable)
- Null-cells (somewhat smaller size). Non B Non T

EM:

- Nucleus: dense clumps.
- Cytoplasmic: thin rim

Many free ribosomes & few mitochondria + centrioles

- No specific granules
- Azurophilic granules = lysosomal hydrolytic enzymes.
- ▲▲The cell coat = antigenic markers.

*****Centrioles need for division (active cell)*

Antigenic markers of lymphocyte

The cell coat : *Large no. of cell receptors.*

1. ***Major histocompatibility complex (MHC)***

   Glycoprotein + specific a.a. sequence.
   - *Tissue typing & antigenic recognition.*
   - *2 subclasses: MHC I & MHC II.*
2. ***The cluster of differentiation antigens (CDs):***
   - *Cell- surface glycoprotein + specific a.a. sequence.*
   - *Expressed on different types of lymphocytes.*
   - *Marker proteins upon which Functional types of lymphocytes(B,T SUB TYPE).*

Major histocompatibility complex

MHC I: (RBC don't have MHC I)

- *On all nucleated cells.*
- *Glycoprotein + specific a.a. sequence.*
- *Tissue typing.*
- *Endogenous antigenic recognition:*
  - *virus- infected cells.*
  - *malignant cells*

1,2 is important for organ transplantation

MHC II:

- *Expressed on antigen-presenting cells.*
- *Glycoprotein + specifica.a. sequence.*
- *Tissue typing.*
- *Exogenous antigenic recognition:*
- *Phagocytosed foreign Ags.*

Function of Lymphocytes :

- *After stimulation T-cells and B-cells become :*
  Memory cells and Effector cells
- *B cells form plasma cells, function in humoral immunity via immunoglobulins (Antibody-mediated).(antibodies react with antigen)*
- *T cells function in cell-mediated immunity*
  - Effector T-cells: T helper cells, T suppressor cells, cytotoxic T cells
  -Some T cells with "memory" of antigen exposure survive long periods; immunization
- *Null Cells are composed of:* **stem cells and Natural killer cells**

Life span:months---Years

plasma cells :

- Origin: from activated B lymphocytes .
- Have cartwheel nucleus

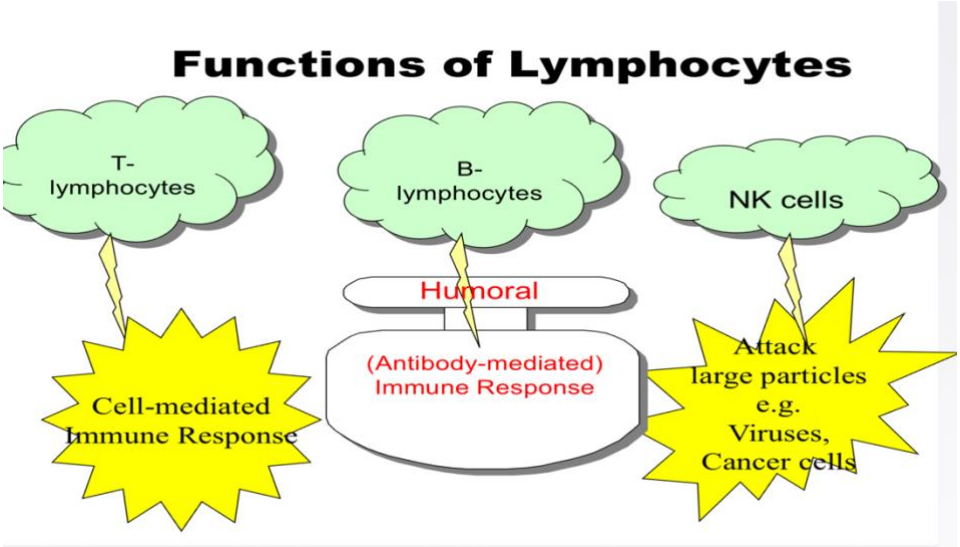
Have large negative golgi image

- Cytoplasm : basophilic
- Form antibodies

NK cells kill some foreign and virally alerted cells

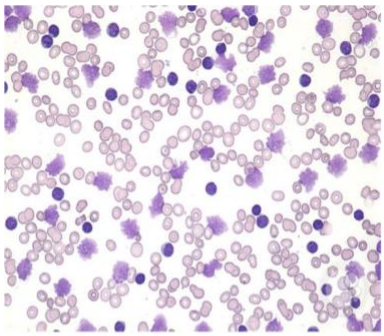
Attack large particles e.g. Viruses, Cancer cells

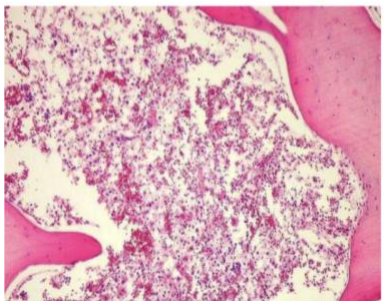
Immune system: 1* skin and mucus secretion ---- 2* first line of defense (neutrophils cell+ macrophage +natural killing cell +complementary systems (doesn't leave memory)-----3* B,T cell (keep memory)



Abnormal

Lymphocyte count:





1. ***Lymphocytosis:***

   Causes:

   Physiological: in children

   Pathological:

   - **1- chronic infections tuberculosis, syphilis,**
   - **2- leukemia, Lymphoma.**

2. ***Lymphopenia:***

   Bone marrow depression.

   - **Drugs**
   - **Irradiation**
   - **Severe chronic diseases**

Abnormal in Leukocytic count:

Leukocytosis

Leukocytosis

- Infection

Or Inflammations

- Allergic reaction
- Leukemia
- .
- .

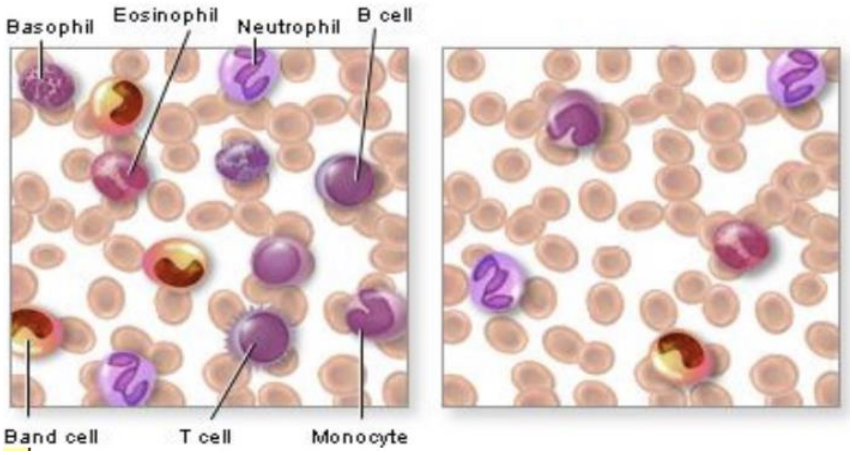
Leukopenia

- Bone marrow depression
  -drugs
  -Irradiation
  - Severe chronic diseases
- Typhoid fever
- Measles

Leukopenia

High WBC count

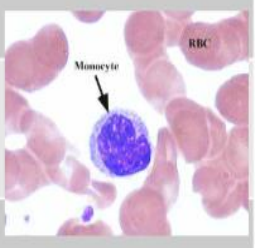
Low WBC count

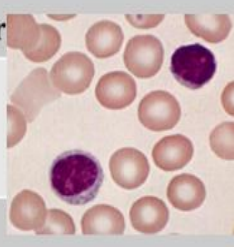


Acquired Causes of decrease in number

Decreased Production	Increased Destruction	Shift to Marginating Pool
Bone marrow	Peripheral circulation	Move from the circulating pool to attach along the vessel wall
Medication: Chemotherapy Antibiotics, etc	Autoimmune diseases (Rheumatoid arthritis, SLE, etc)	Severe infection Endotoxin release Hemodialysis Cardiopulmonary bypass

	Monocyte	Lymphocyte Subsets T, B, natural killer
Number	3-8% of WBCs	**20-30 % of WBCs** **Next most common after**
Size	**12-20 µm** diameter	9-11 µm diameter Small , medium , large
Shape	Spherical	Spherical
Structure	Spherical , Nucleus kidney-shaped No obvious granules	Spherical , Nucleus indented No obvious granules
Life span	Circulate for 3-4 days before enter into tissues and organs	variable life spans Month – years (memory cell)
Function	Precursor of macrophages in tissues Macro = "big"; phage = "eat" Phagocytic function	**B Cells** involved in humoral immunity **T Cells** involved in cell-mediated immunity • T helper cells, • T suppressor cells, • cytotoxic T c & memory cell
Abnormality	Monocytosis: is an abnormal increase in the number of blood monocytes. It occurs in diseases like malaria, typhus, viral infections	Lymphocytosis: It is an abnormal increase in the number of lymphocytes as in: -lymphatic leukaemia - chronic infections e.g. tuberculosis, syphilis, whooping cough.





البحر أضيق من مطامح همتي

والشمس بعض توقدي ويقيني