Agranular leukocytes

Differential count: 3 - 8% → بالنسبة للبقية

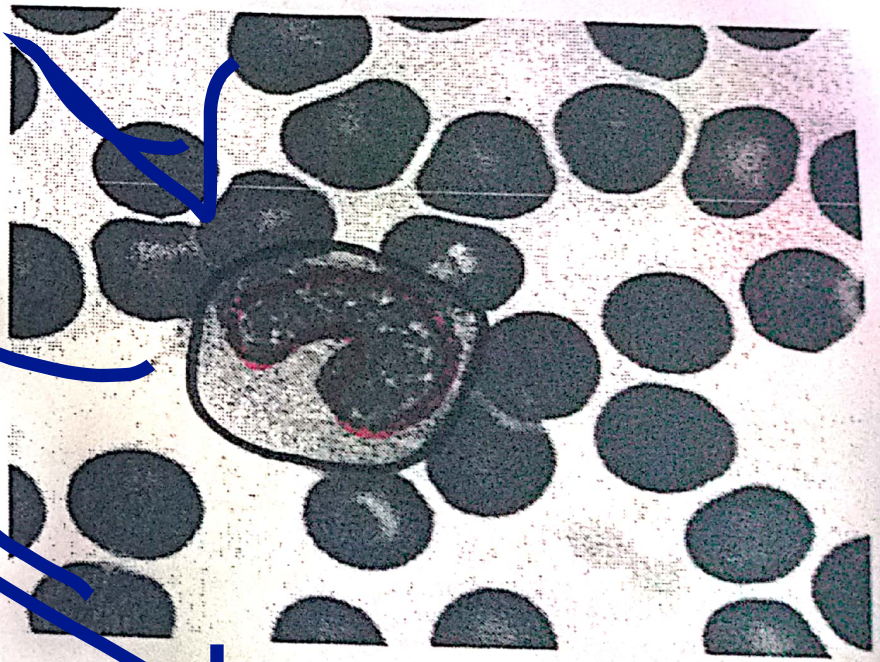
Size : 20 microns = largest cell

Shape : rounded (spherical)

1-Monocyte

LM:

- **Largest** in blood film
- **Nucleus:-**
  - Large, eccentric , Kidney- shaped **(Indented)**



- **Cytoplasm:-**
  - **Abundant, Pale basophilic,**
  - **Finely granular.**

تميزها عن lymphocytes

ناعم

non specific granules

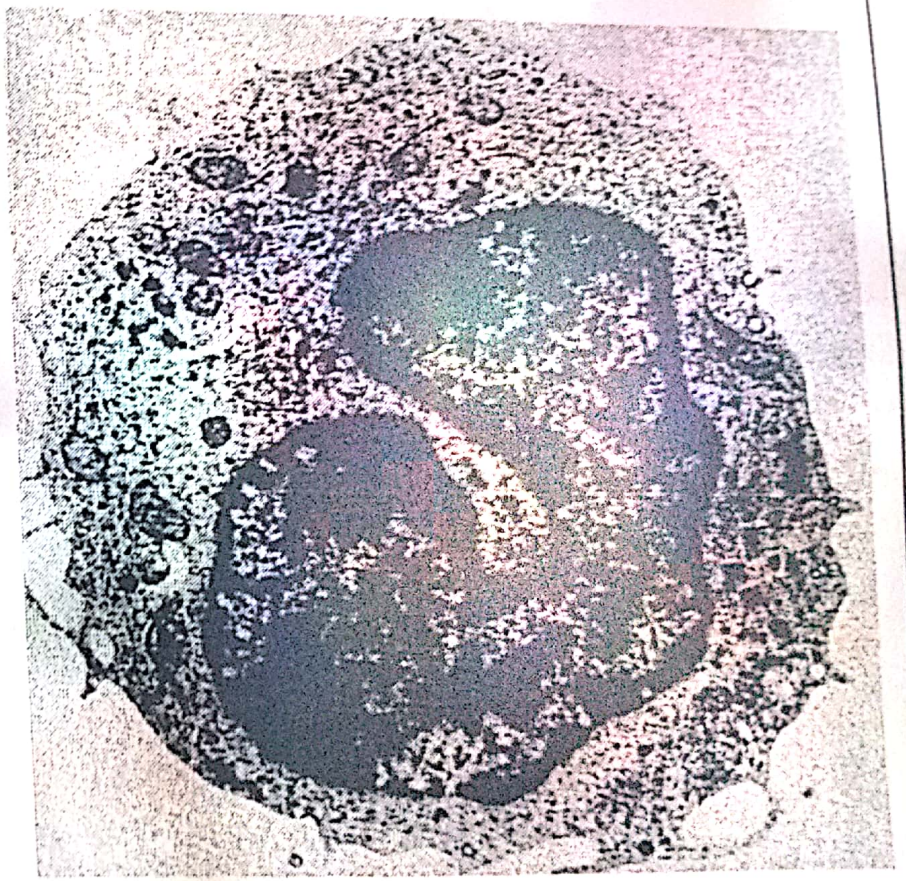
تتحول الى macrophage
الى تتحرك ا من
Blood → Tissue (lysosom) وبنشها تلي

Monocyte

EM:

❖ **Irregular = Pseudopodia** → حتى تتحرك

- **Nucleus:** Large, eccentric kidney-shaped **(Indented)**
- **The cytoplasm contains a moderate amount of organelles.**
- **Non specific (Azurophilic granules) few small dense granules containing lysosomal hydrolytic enzymes.**



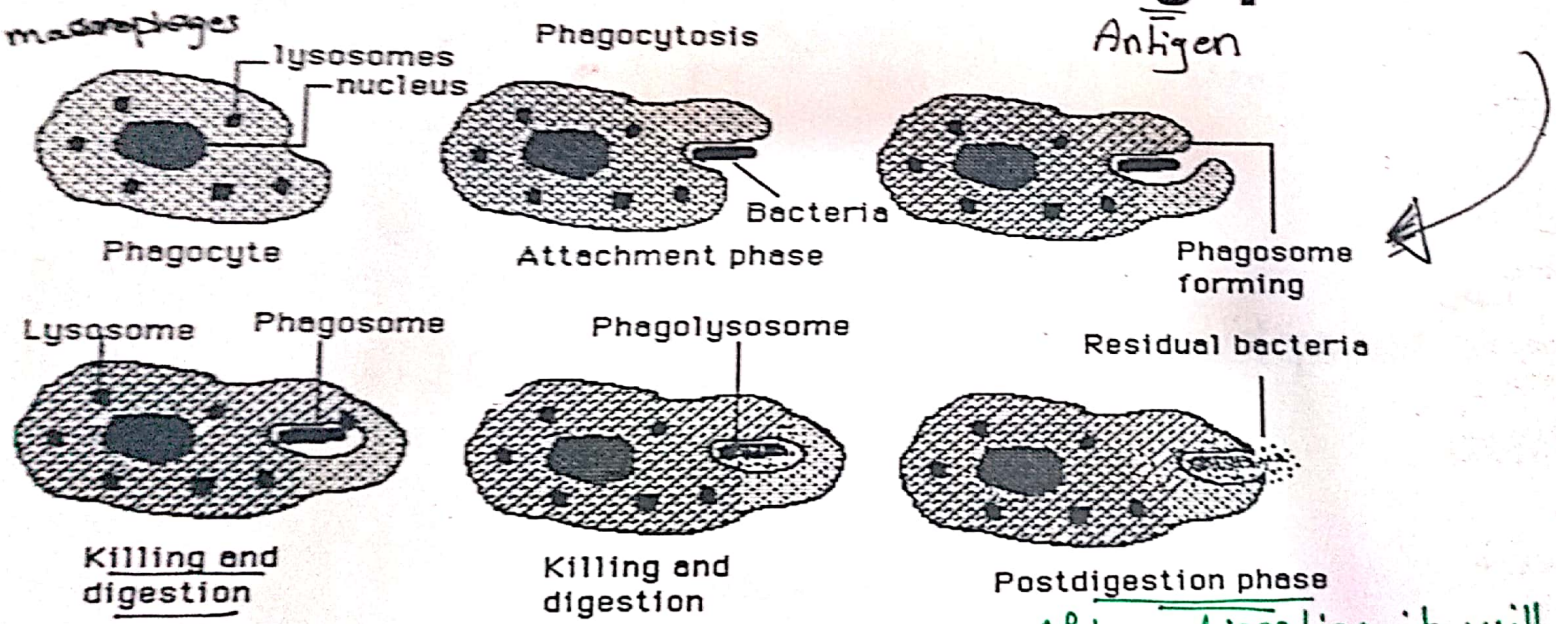
- **Life span :** 1-2 days circulation in the blood, then enter the CT
- and trasform into macrophages

monocyte (Blood) → macrophages (Tissue)

* the 2nd cell in the first line defense
* 1st neutrphilic

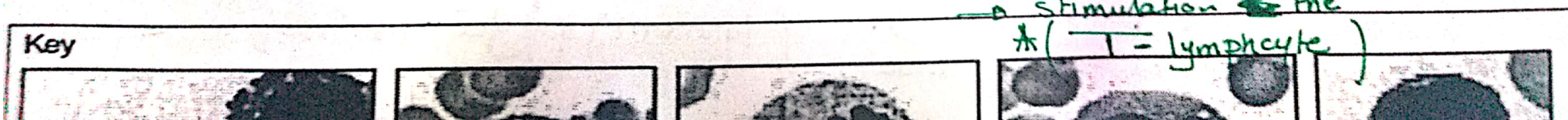
Function

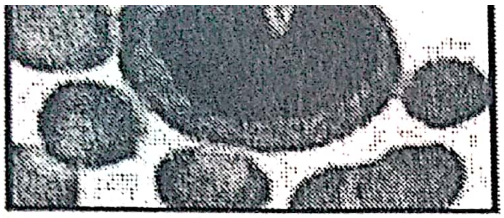
- Trans- migration & differentiation to tissue MACROPHAGE
- **Immunologic function:**
  - ➢ Phagocytosis and intracellular digestion of bacteria, virus
  - ➢ Ag- presenting cell

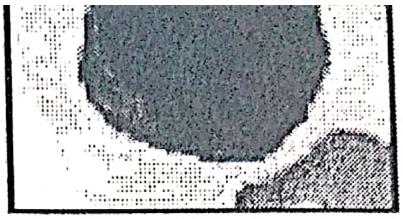


After digestion it will do "exposure" on surface

→ stimulation the (T = lymphcyte)

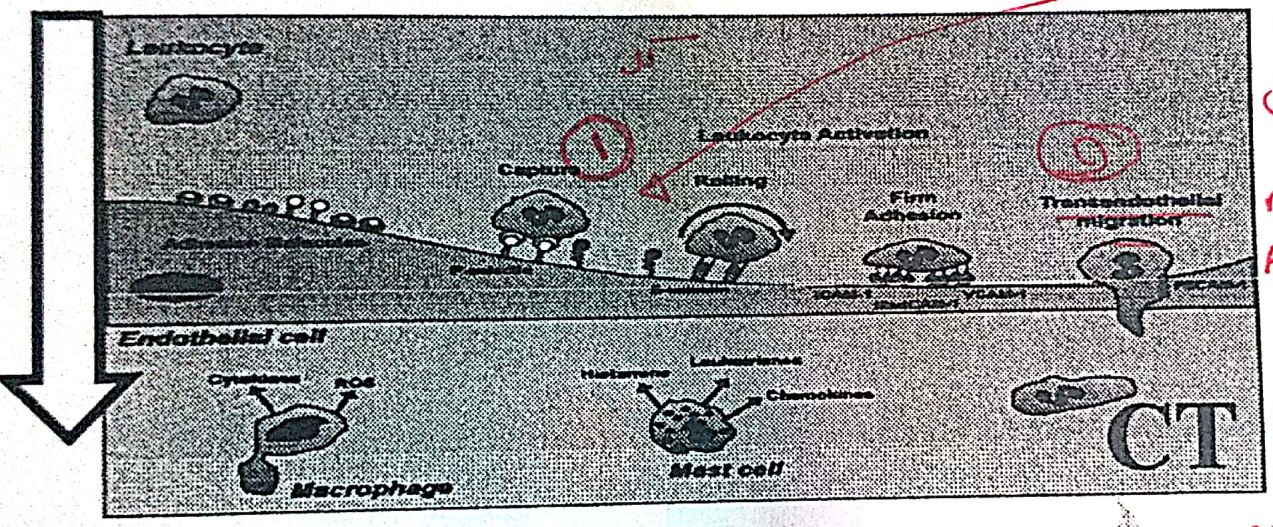






utrophil Monocyte Lymphocyte

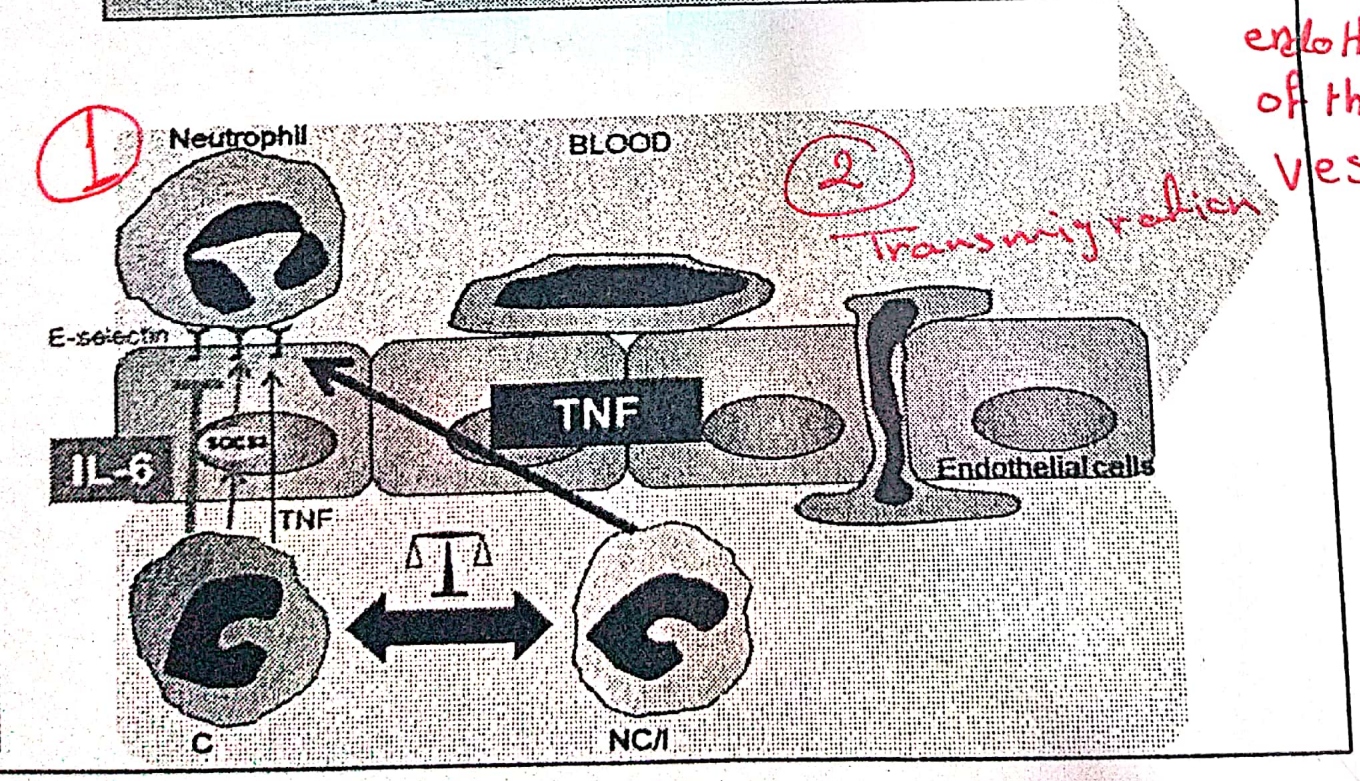
- Circulate from region to another &
  Function in CT= **Immunological function**



1

كل خلايا الـ (WBCs) عندها receptor on their membrane ↓ to

Adhesion on the endothelium of the blood vessel



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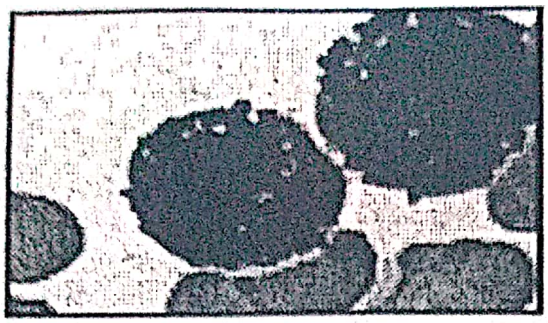
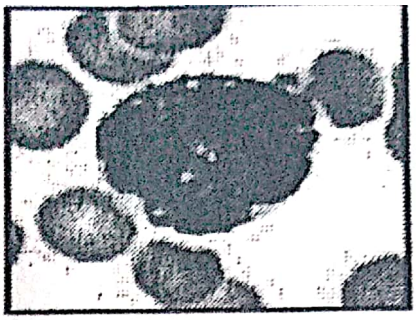
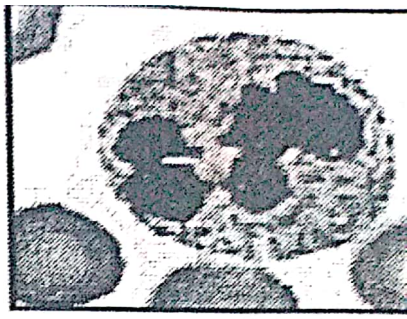


Basophil



Eosinophil

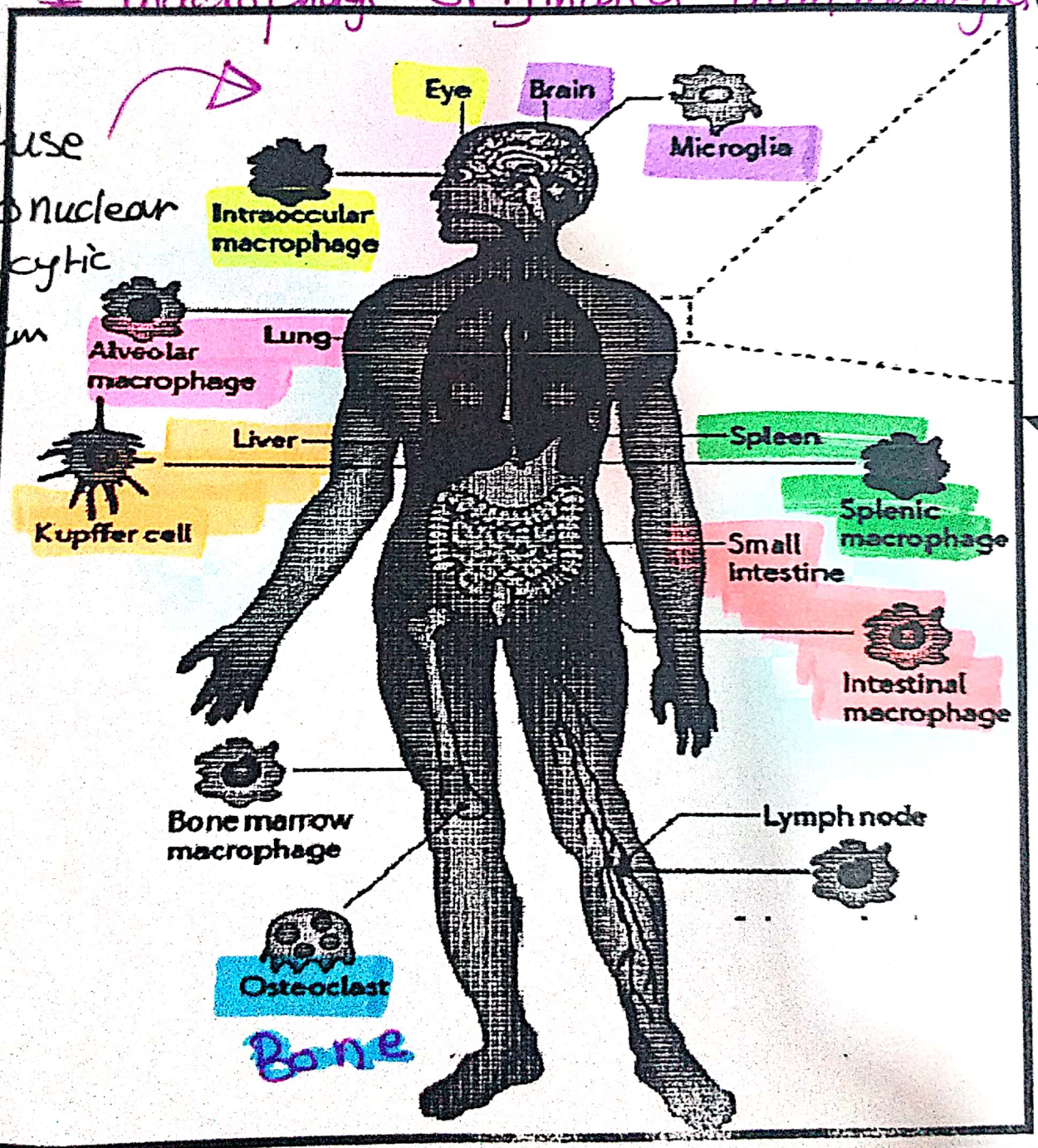


Neutrophil

* macrophage originated from monocyte

Circul
Functi

diffuse mononuclear phagocytic system



E-selectin

IL-6

C.T → histocyte

Abnormal Monocyte count

Monocytosis= increase number

Causes:

1- Malaria

2- Chronic infections (glandular fever , syphilis, T.B.)

3-Lymphomas & Leukemia. → سرطانات الدم

⇩ ⇩ in number of Monocyte

- **Bone marrow depression** => suppression
  - **drugs**
  - **Irradiation**
  - **Severe chronic diseases**

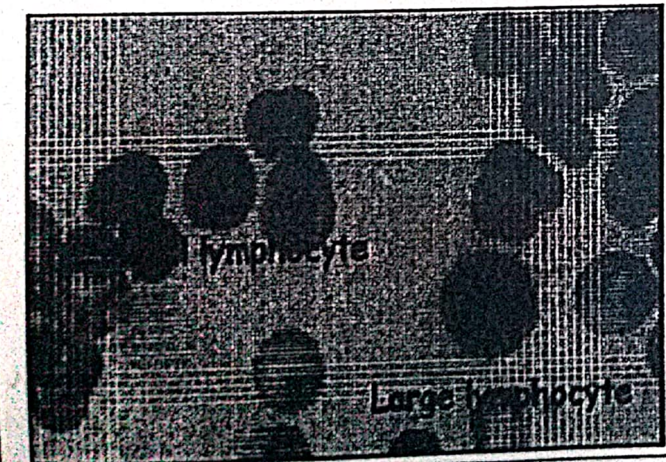
lymphocyte

- **Differential count: 20-30%**
- **Size : 9-12 microns**
- **According to the sizes:**
- **1- large lymphocytes.**
- **2- Medium-sized lymphocytes.**
- **3- Small lymphocytes:**

1. **Diameter = RBC.**

❖ **Most numerous.**

❖ **Functionally mature.**



➤ **3 functional types:**

➤ **T lymphocytes:**

- **Start development in bone marrow.**
- **Differentiate in thymus.**
- **Cell-mediated IR.**

➤ **B-lymphocytes:**

- **Develop & differentiate in bone marrow.**
- **Humoral immune response.**

➤ **Natural killer cells:**

- **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 cells

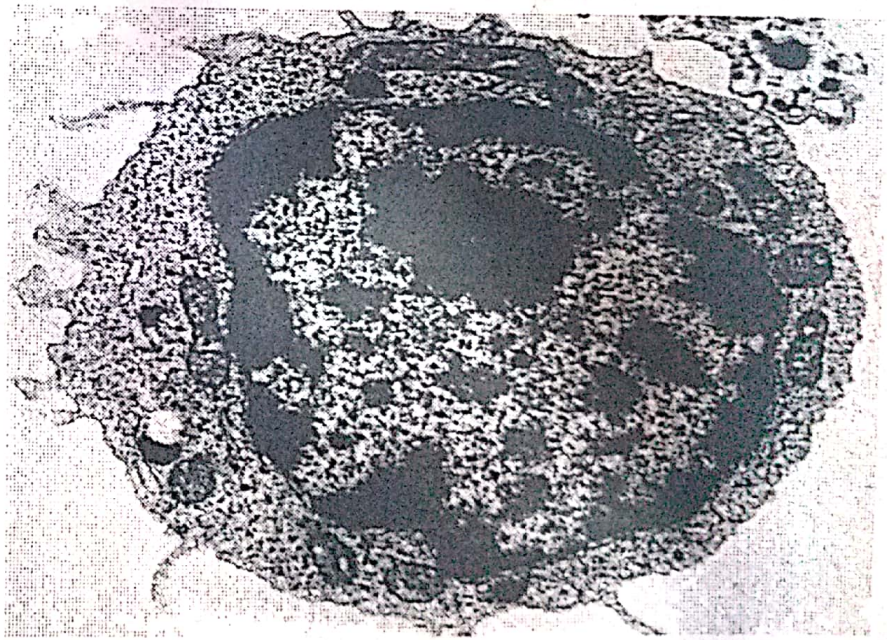
Lymphocytes

❖ LM:

- ➢ **Shape = rounded**
- Large nucleus, thin cytoplasmic rim (small indentation)
- ➢ 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.
- ➢ **Cytoplasm** thin rim
- No specific granules
  Lysosomes= small & dense
  Azurophilic granules
- Many free ribosomes& few mitochondria + ~~**2centrioles.**~~
- ▲▲ **The cell coat = antigenic markers.**
  - RBC = ABO group
  - platelets = Adhesion



Antigenic markers of lymphocyte

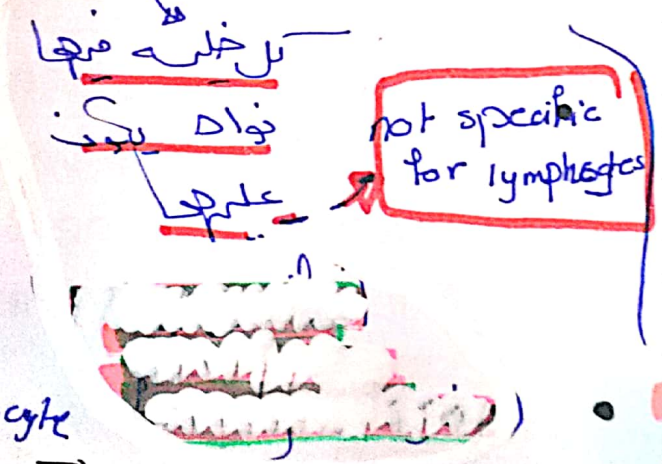
Type of EM
scan Transmission

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.**

Expressed on Ag-presenting cell
number

Ag-presenting cell
macrophage (MHC I, II)
B-lymphocyte (MHC I, 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.**
   - **موجود في B, T بكل انواعها.**

Abnormal lymphocyte count

1-Lymphocytosis:

Causes:

similar to RBCs

Physiological: in children

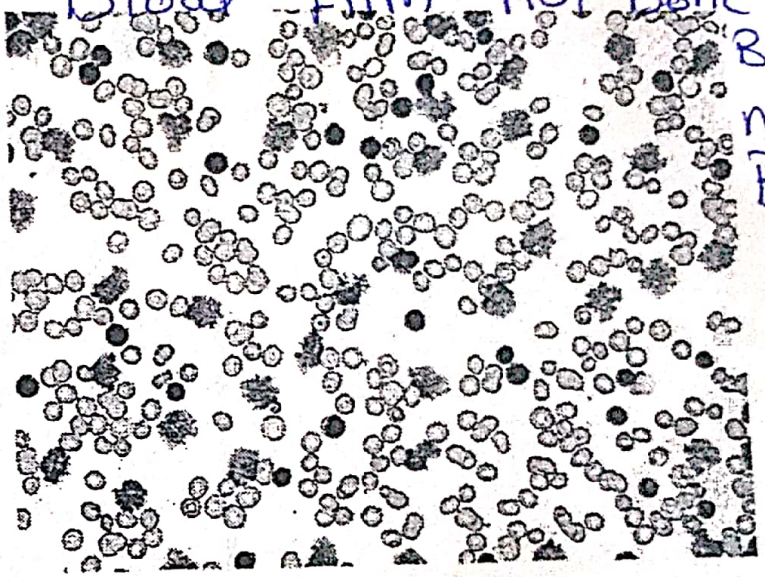
Pathological:

1-chronic infections tuberculosis, syphilis,

2-leukemia, Lymphoma.

Blood film not bone marrow Bequem

no Blood vessel



2-Lymphopenia:

Bone marrow depression.

- **drugs**
- **Irradiation**
- **Severe chronic diseases**

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

Types of bone marrow

The tissue responsible for **Hemopoiesis = formation of balanced amounts of the different blood elements.**

- daily formed = daily destroyed elements

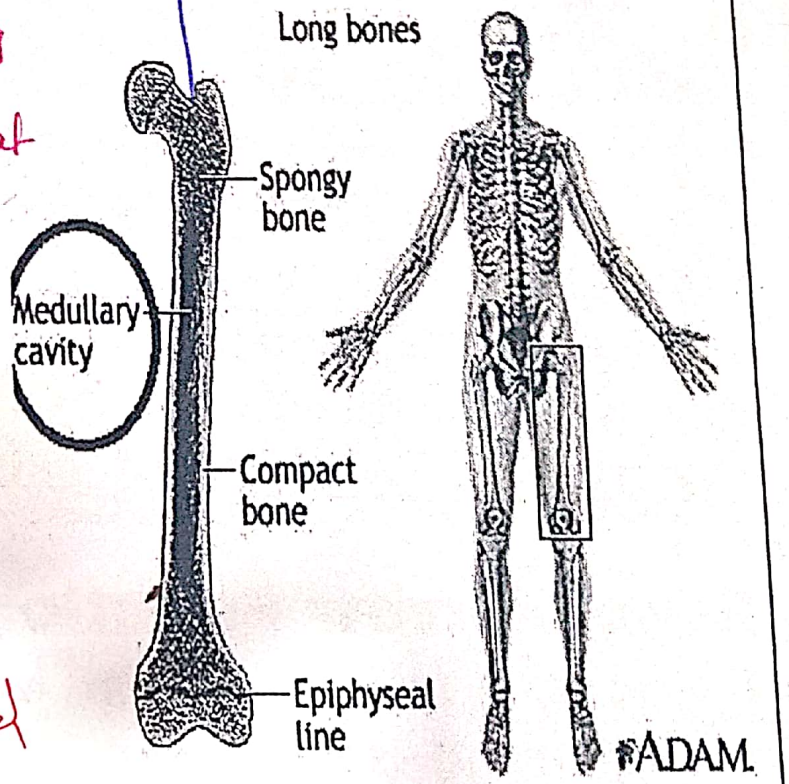
1-Red bone marrow: active

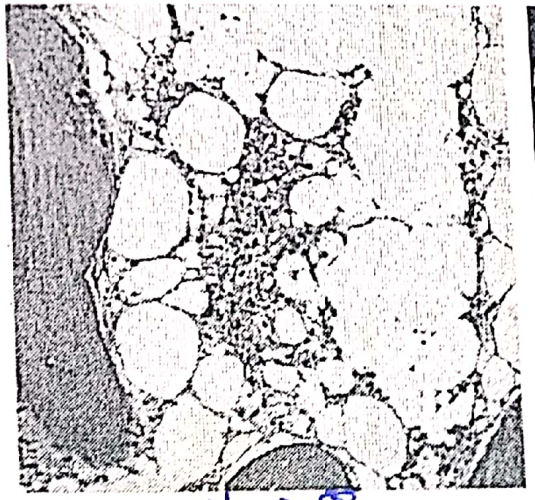
2-Yellow bone marrow:

- inactive. Yellow color ► large number of fat cells.
- can revert to the red type in stress as hemorrhage and anaemia.

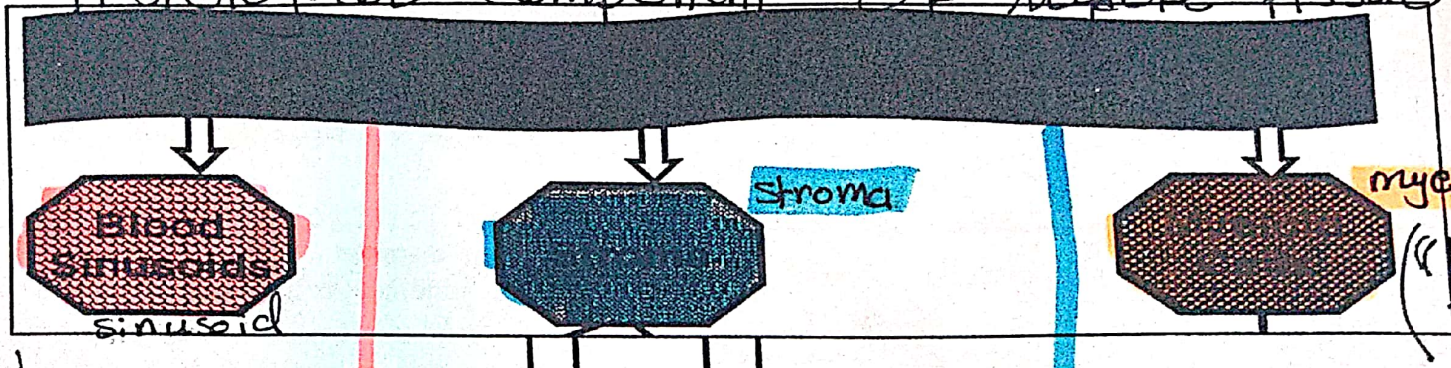
Sites:

1. Central bone marrow cavity in long bones.
2. Multiple marrow cavities between trabeculae of cancellous bone.





Histological component of Myeloid tissue



باقي لأجزاء

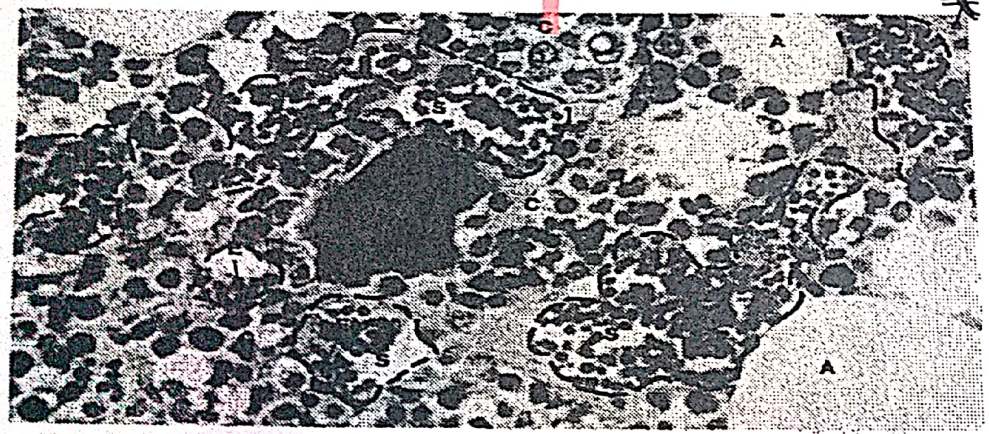
1. Large, turtuous channels.
2. fenestrated endothelium.
3. discontinuous basal lamina.

A- reticular fibers: supporting network

B- stromal cells

1- Reticular cells:
- Modified fibroblasts
- Secrete growth factors.
- Change to adipocytes.

2- Macrophages:
- Blood monocytes.
- Phagocytosis of malformed elements.
- Storage of Fe.



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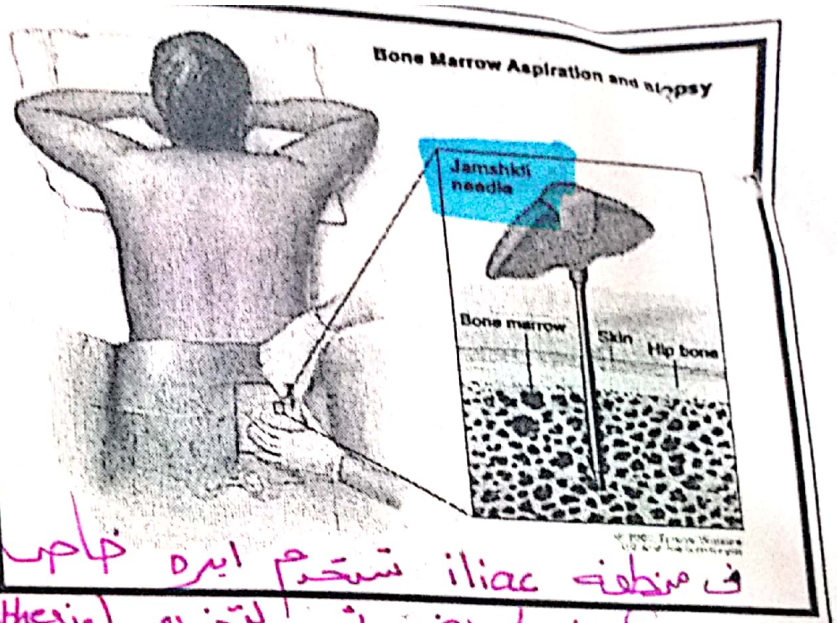

في منطقة iliac تستخدم ابره خاصه (anesthesia) ويكون المريض تحت التخدير

Bone Marrow Functions

Production of blood cells hemopoesis
(controlled by growth & releasing factors).

Destruction of old RBCs → Bone marrow
→ liver
→ spleen

macrophage لانهم فيهم ليس

Storage of iron derived from break down of Hb in macrophages

months – years
(memory cell)

Stimulation = Ag دخول

lymphocyte

T-lymp
B-lymp
Memory cell

Ag لو اجا نفس
مره اخرى تتعرف
وتقوم ←
2dry immune response

Effector cell

B-lymphocyte
تتحول
Plasma cell ⇒ تفرز Anti-bodies
تكون تفاعل
Ag-Anti Bodies reaction (Humoral immunity)

T-lymphocyte
تقل بنفسها
* cytotoxic Tcell
→ Digestion of Ag
* T-help
→ Ask for help* mono-cyte
* B-lymp
* suppresor cell
→ stop the reaction

lymphocyte
لانها خلايا مناعيه لا تعمل الا عند دخول محفز

T-lymp when it stimulate ?
After « make some process and exposure » (Ag-presenting)
By : * B-lymp
* macrophage

(cell-mediated IR)

* Null cell :- similar to lymphocyte
But smaller

* from stem cell

Dont have specific function