Chapter 6 Blood and Hemopoiesis

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Ⅰ. Blood

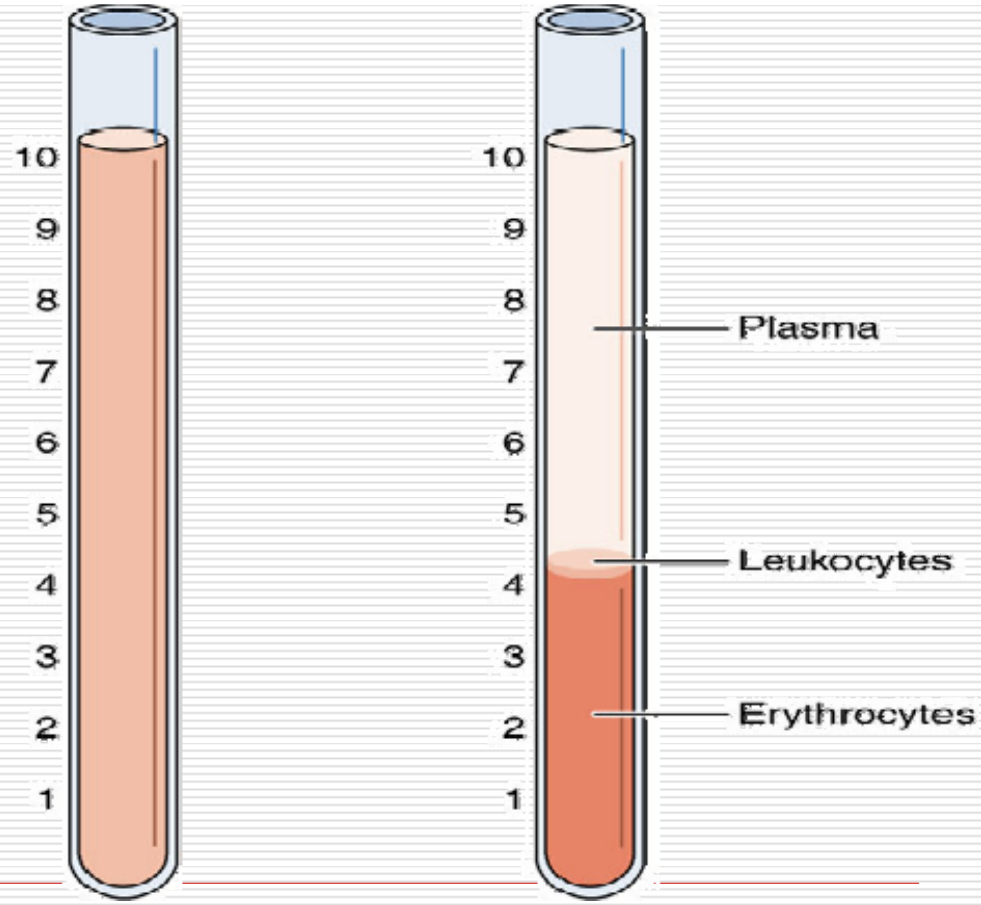
Organization:

blood cell

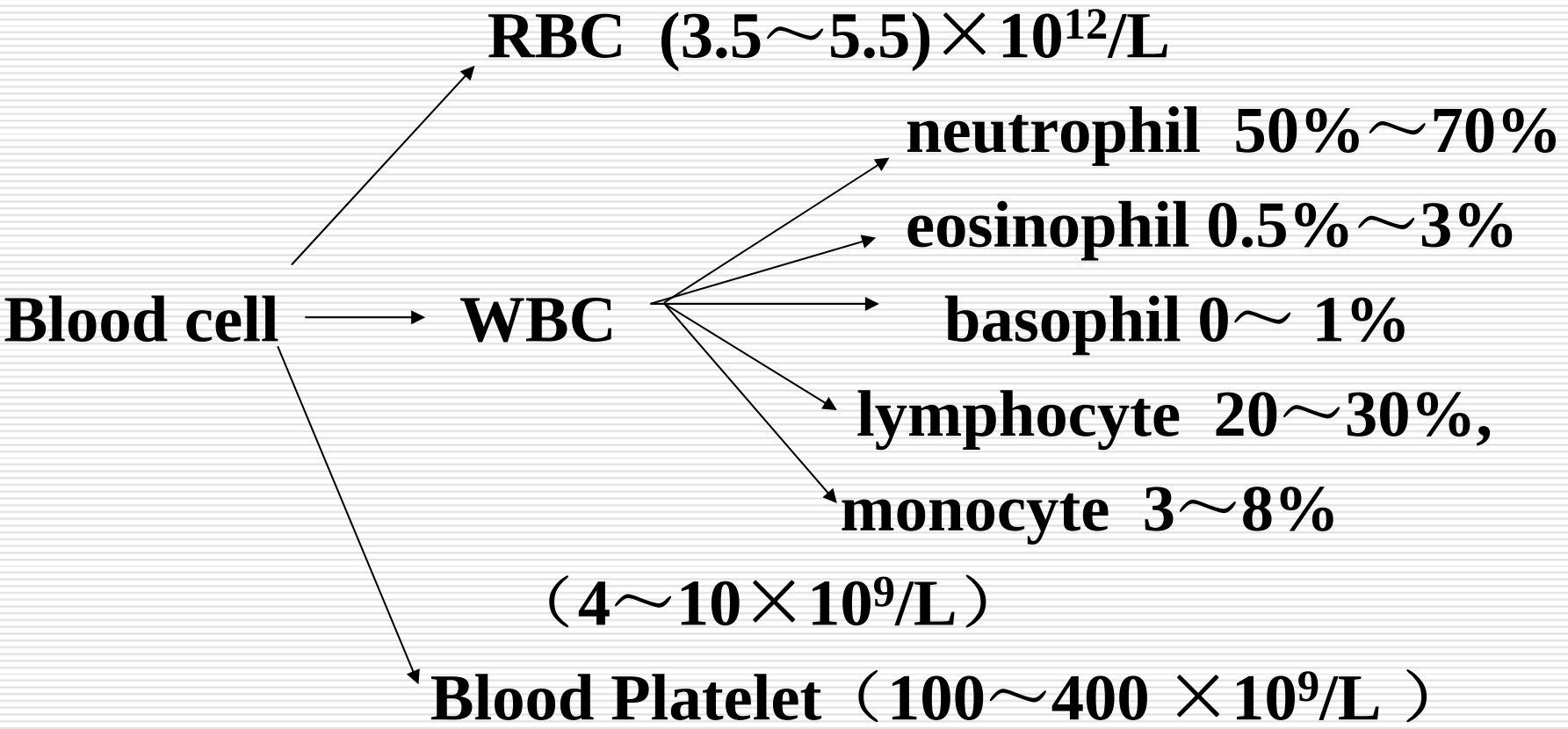
Plasma:

Serum:

Function:



Classification of blood cell

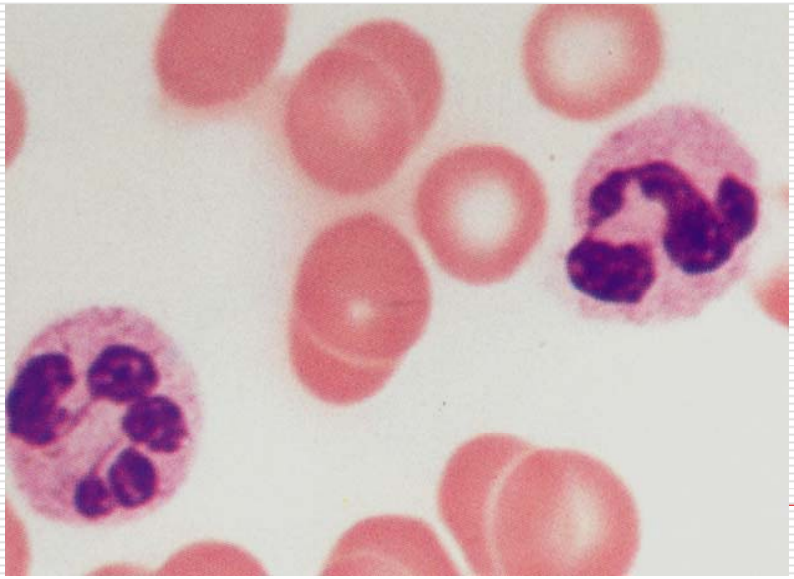


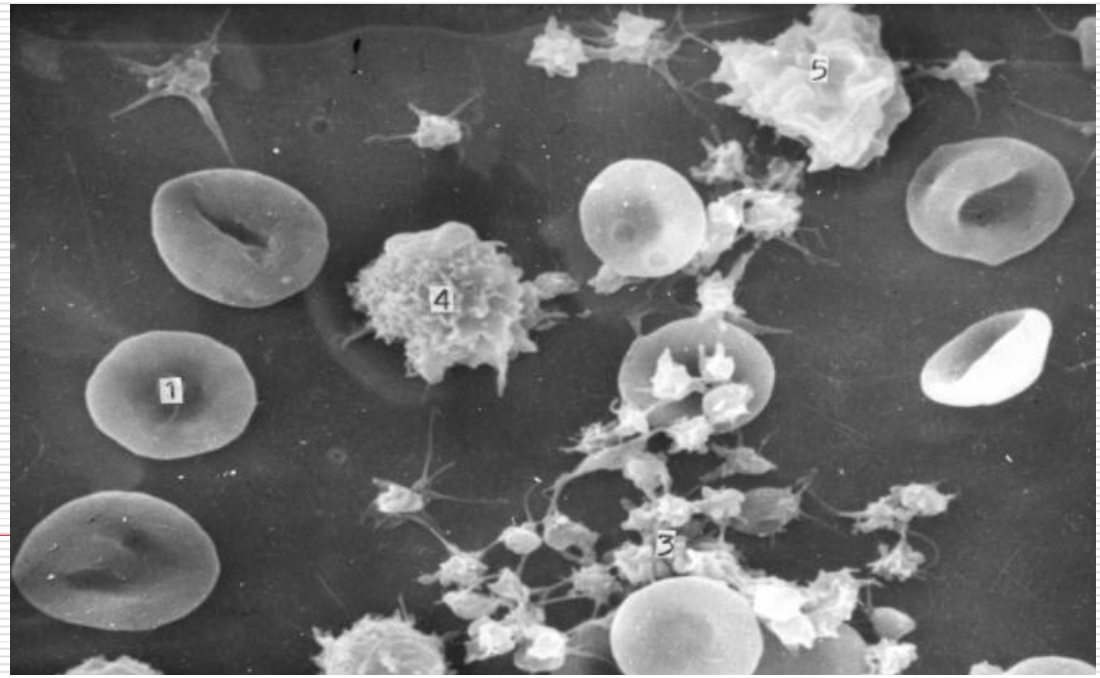
1. Erythrocyte (red blood cell)

7.5-8.5 μ m, biconcave disk shape

without nuclei and organelles

hemoglobin (Hb) :100-120g/L





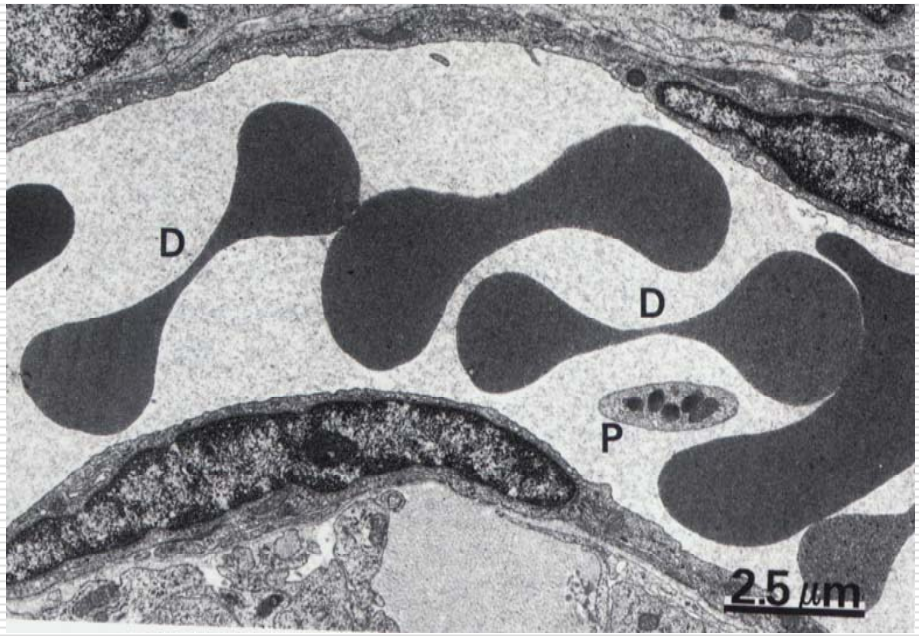
1. Erythrocyte

Characters:

① plasticity

spectrin and actin

(cytoskeleton)



② ABO blood type antigen

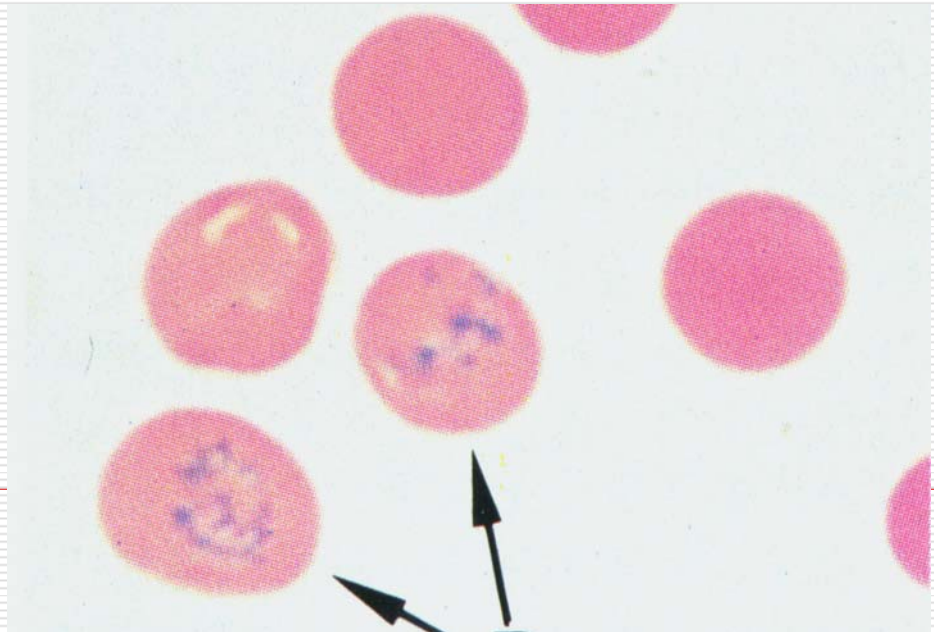
hemolysis ghost

Reticulocyte：

residual ribosome

Percent： Adult 0.5%～1.0% , 3%-6%

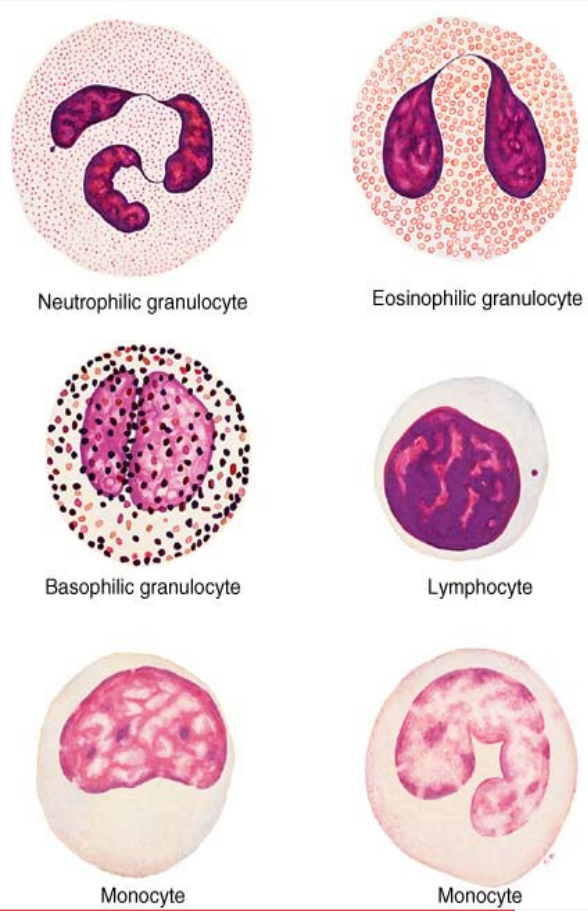
Lifespan： 120 days



2.Leukocyte (white blood cell)

Classification of leukocyte

- Granulocyte
  - neutrophil
  - basophil
  - eosinophil
- Agranulocyte:
  - monocytes
  - lymphocyte



（1） Neutrophil

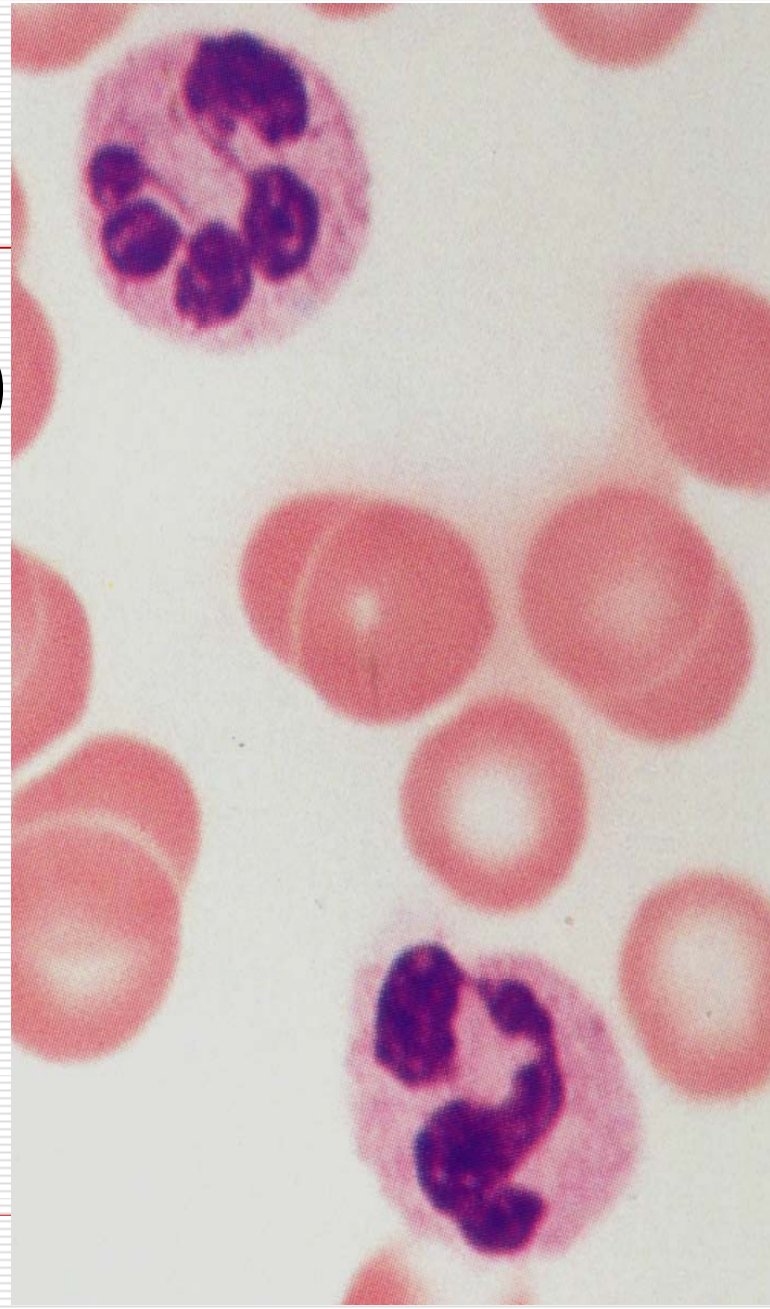
sphere shape (10～12 μ m)

2 ~ 5 lobes of nucleus

pink-staining cytoplasm

containing fine granules

Percent: 50%～70%



（1） Neutrophil

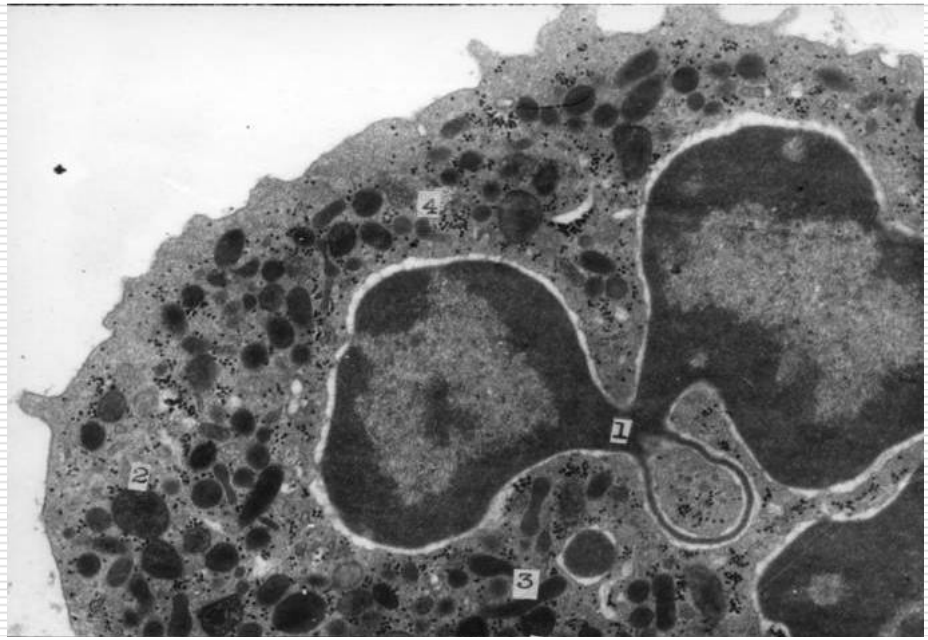
EM:

① azurophilic granules (lysosome)

② specific granules

Function：

Lifespan: 1~3 days



Nucleus left migration

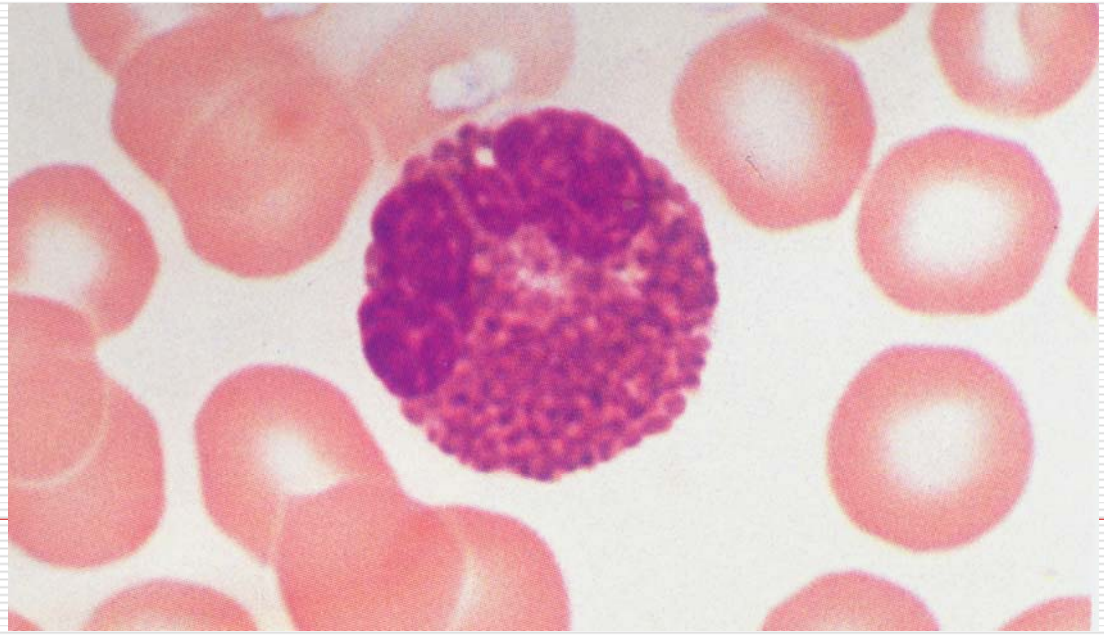
Nucleus right migration

（2） eosinophil

sphere shape (10～15 μ m),

two lobes of nucleus

cytoplasm filled with eosinophilic granules



（2） eosinophil (EM)

The granules surrounded by a unit membrane

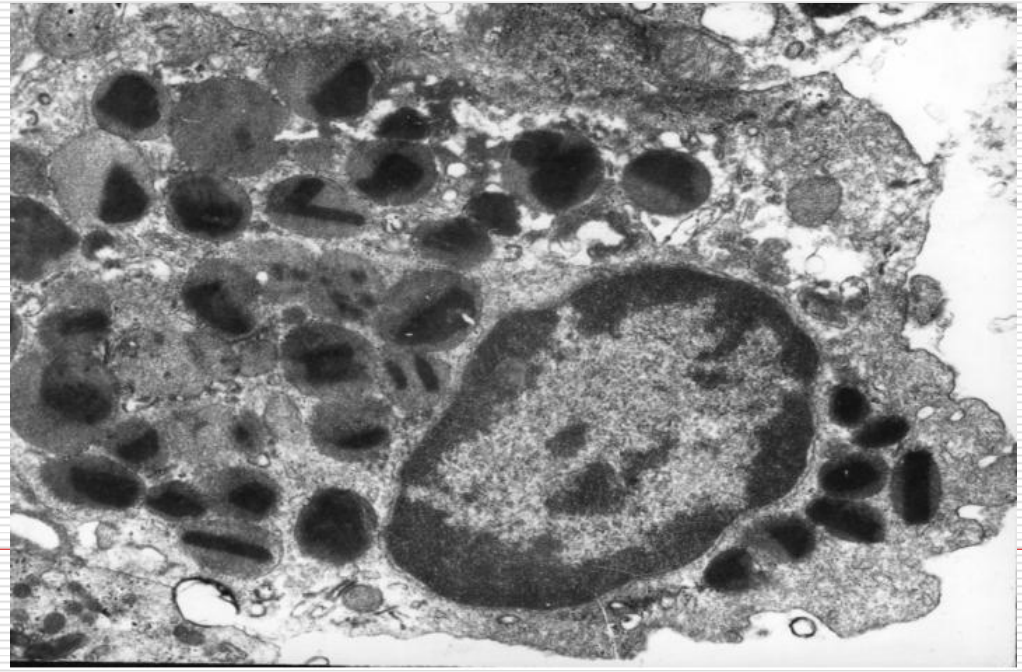
An elongated crystalloid core inside

containing histaminase and arylsufatase

Function:

Lifespan:

8~12 days

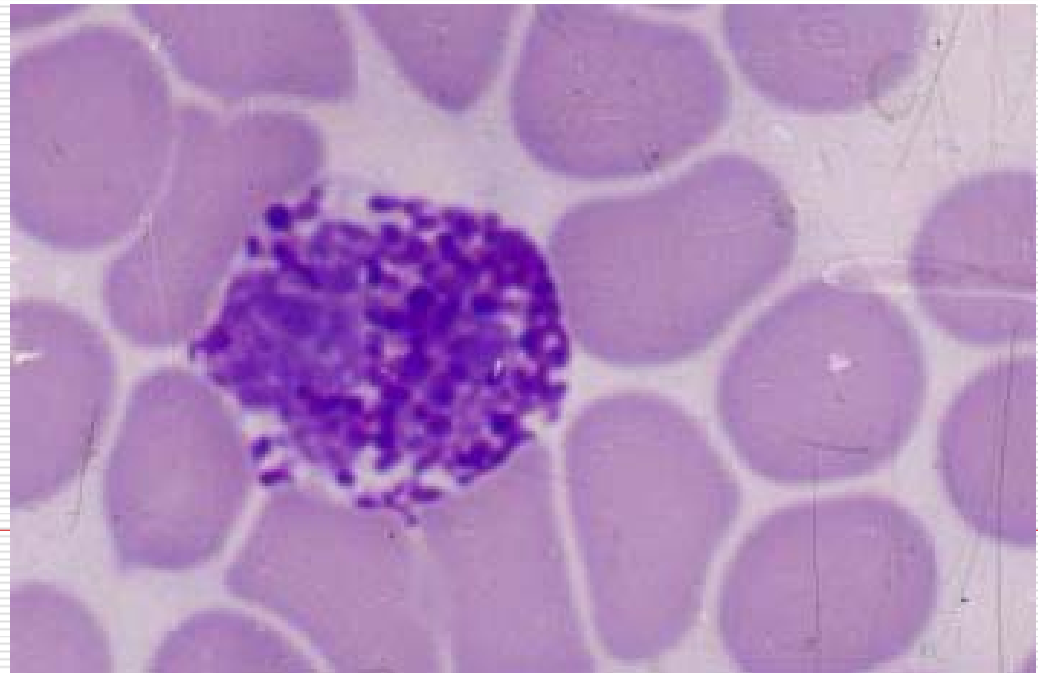


（3） basophil

sphere shape (10～12 μ m),

S-shaped irregular nucleus,

large basophilic granules in cytoplasm



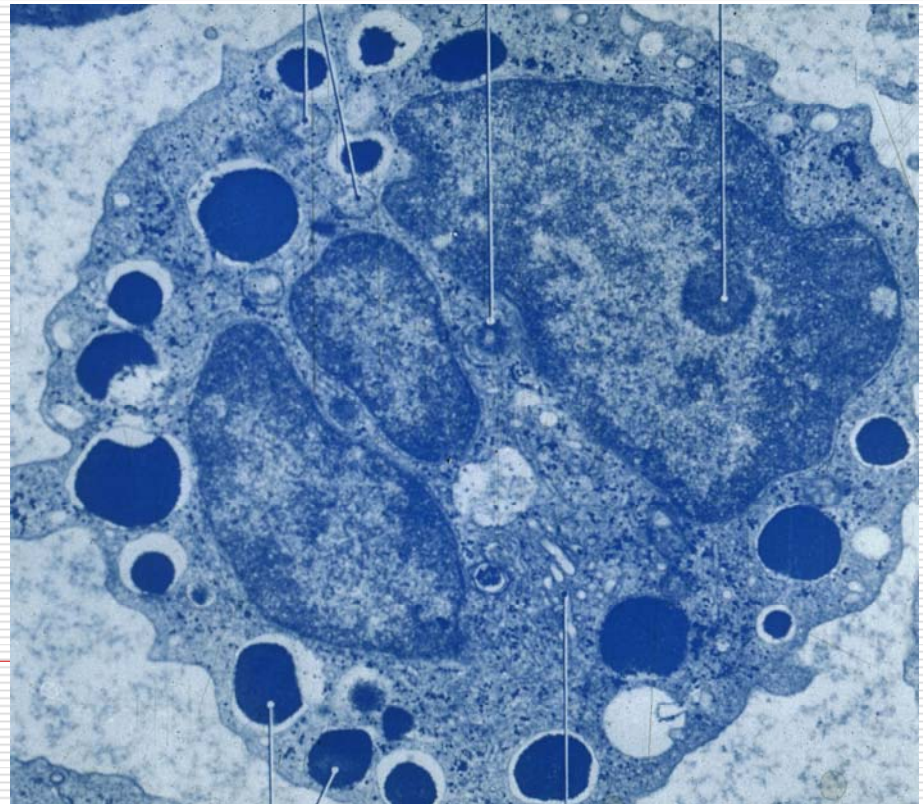
（3） basophil(EM)

the granules bounded by a membrane, containing heparin, histamine and leukotrienes

Function:

Lifespan:

12～15 days



（4）lymphocyte

small, medium and large kinds of cell,

sphere shape

basophilic cytoplasm

spherical nucleus

condensed chromatin

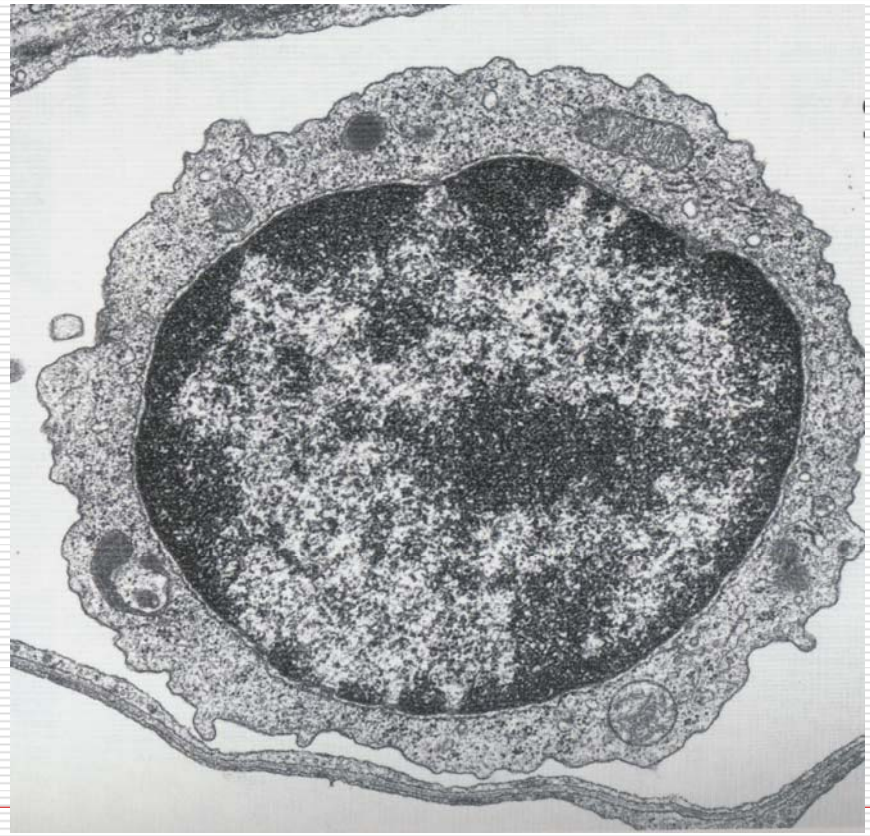
（4）lymphocyte(EM)

azurophilic granules

few organelles

free ribosomes

Function:



(5) Monocyte

oval shape (14～20 μ m)

horseshoe, or kidney-shaped nucleus

basophilic cytoplasm

(5) Monocyte(EM)

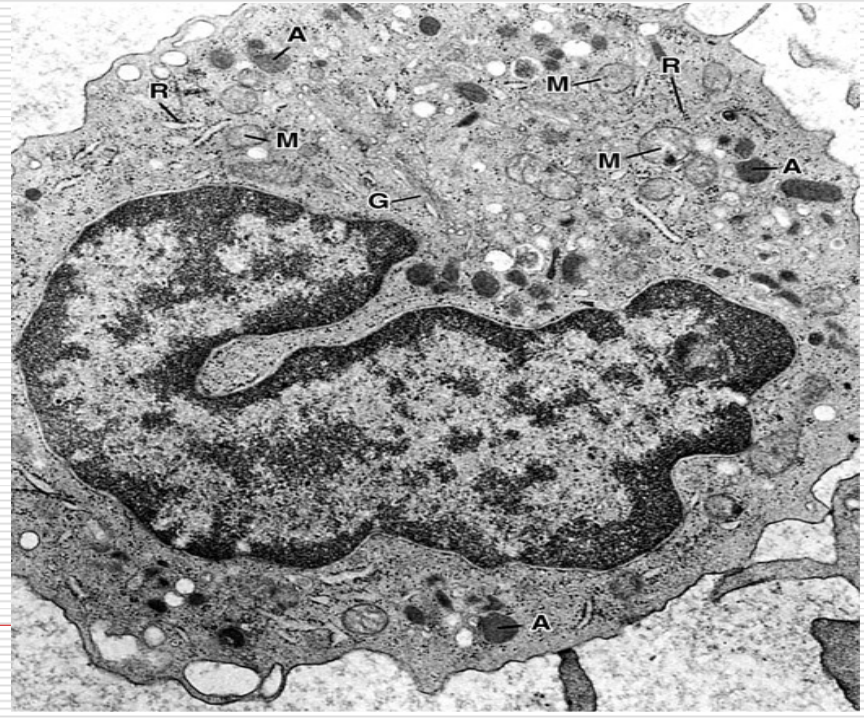
many fine azurophilic granules

some rough ER, few free ribosomes

Function：

Lifespan：

2 months or more



3. Blood platelet

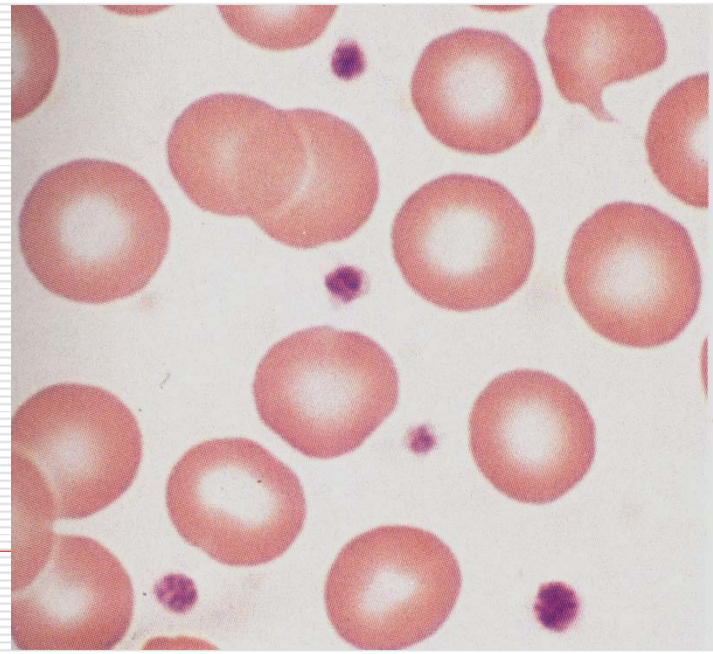
Origin:

cell fragments anucleated by cytoplasm of megakaryocyte in the bone marrow

basophilic cytoplasm

including granulomere

and hyalomere



3. Blood platelet(EM)

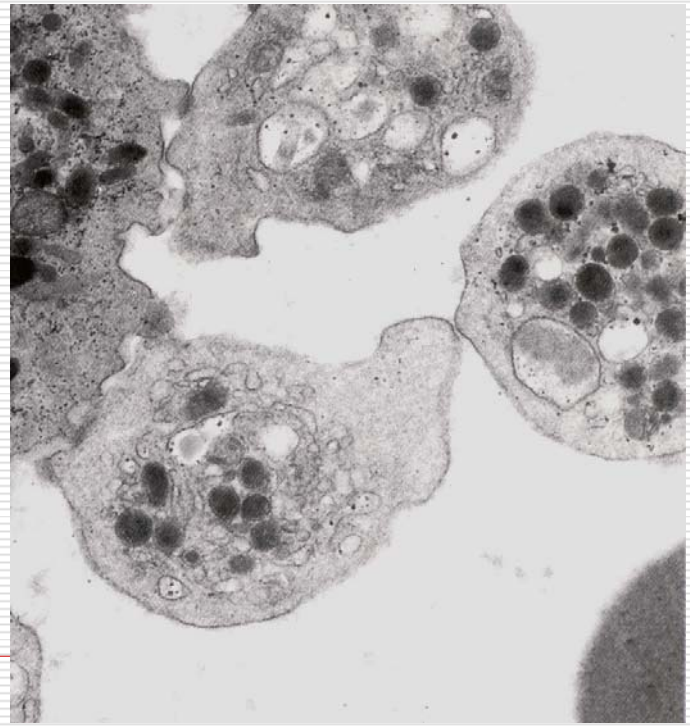
open canalicular system

dense tubular system (granulomere)

microfilament and microtubules (hyalomere)

specific granule

dense granule，



containing ATP、ADP、5-HT、Ca

Lifespan: 7~14 days

＜50×10^9/L : bleeding

Ⅲ. Hemopoietic organ and hemopoiesis

1.Hemopoietic organ: yolk sac → liver → spleen → thymus → bone marrow

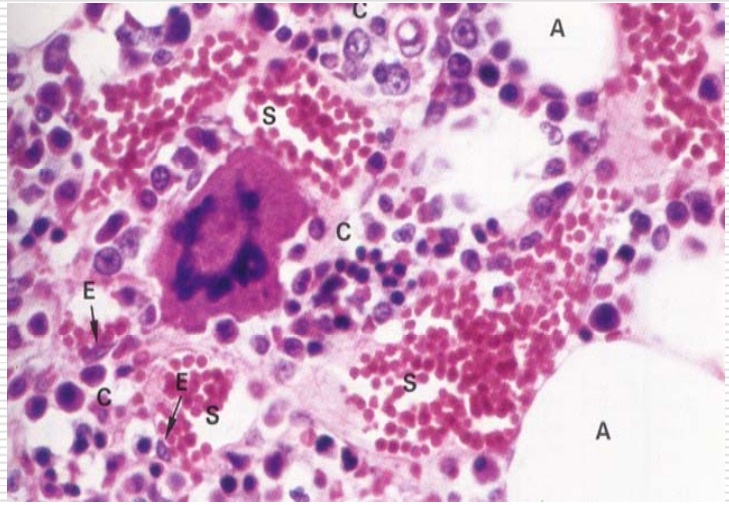
- **Erythrocyte system, granulocyte system, monocyte system and megakaryocyte-blood platelet system**
- **lymphoid tissue and organ → lymphocyte**

2. The structure of the bone marrow

2.1 Hemopoietic tissues

reticular tissue, hemopoietic cell and matrix cell

- **matrix cell**
  - **macrophage**
  - **fibroblast**
  - **fat cell**
  - **mesenchymal cell**



2.2 Blood sinus

2.3 Hemopoietic inductive microenvironments, HIM

(1) Nerve

(2) Microvasculus

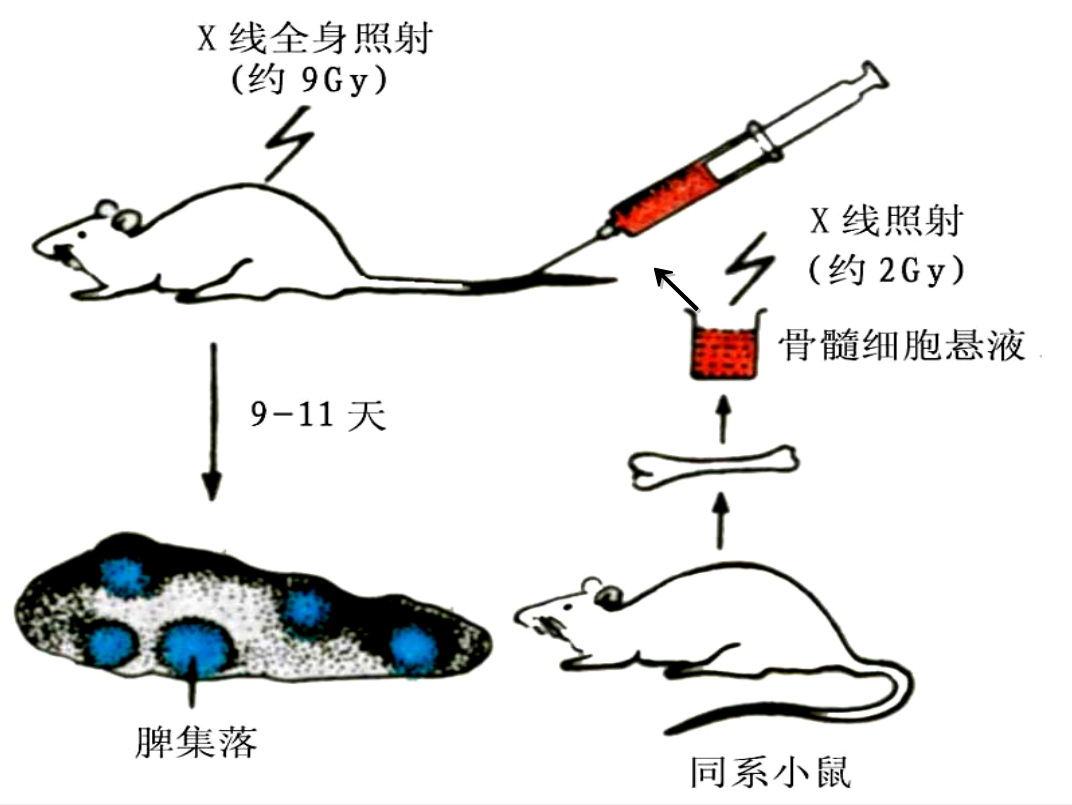
(3) Fibers

(4) Ground substances

(5) Hemapoietic stromal cell

- fibroblast
- macrophage
- endothelial cell
- reticular cell
- fat cells

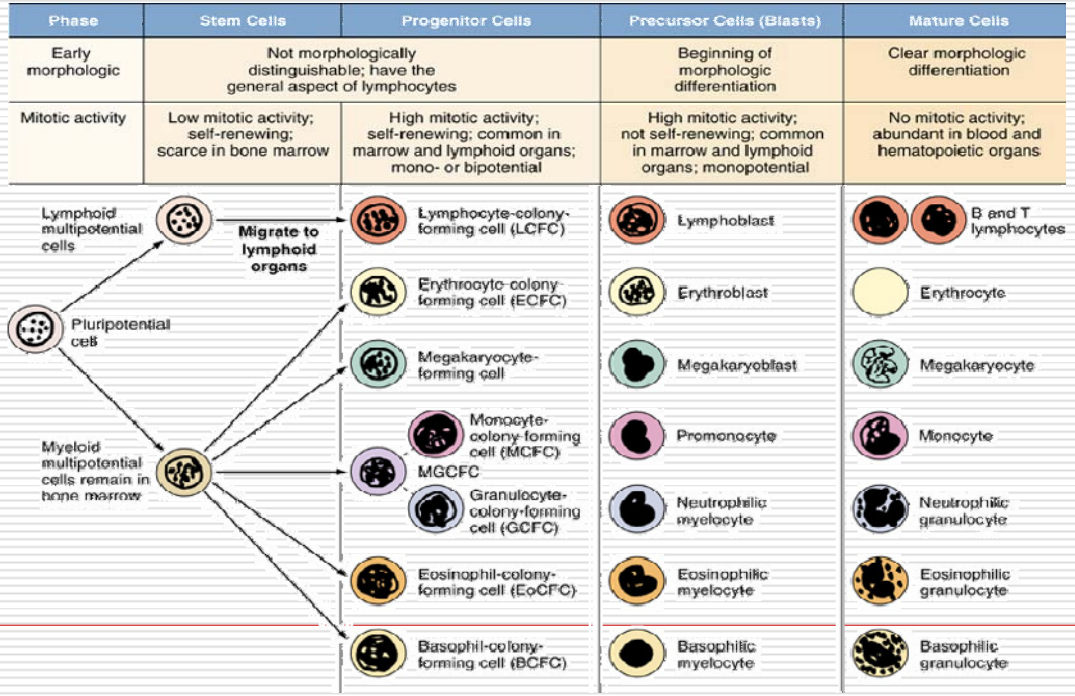
3.Hemopoietic Stem Cell



3.Hemopoietic Stem Cell

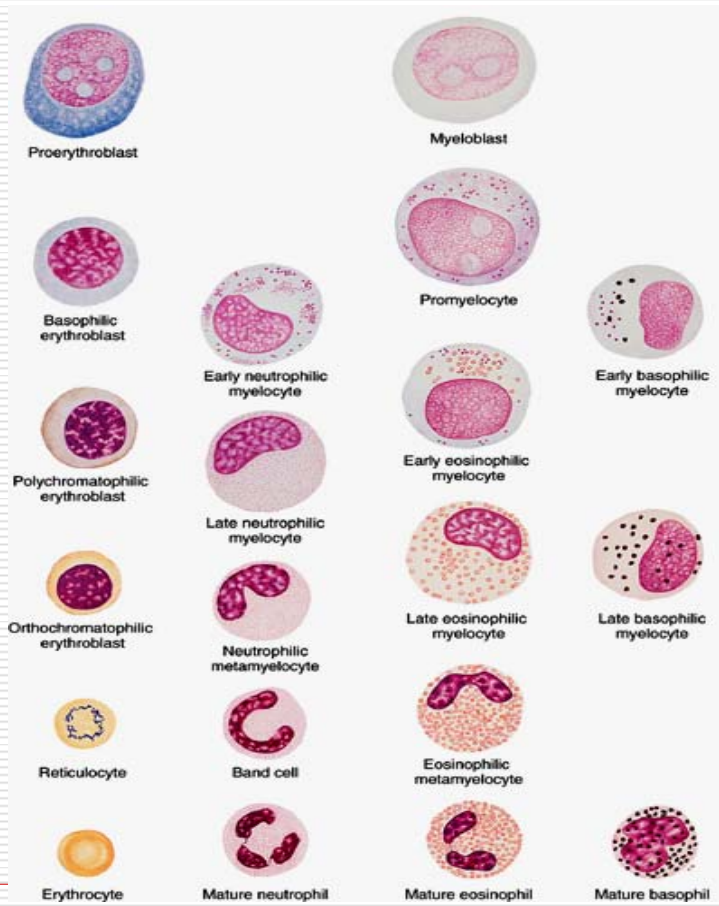
(1) Hemopoietic Stem Cells

(2) Hemopoietic Progenitor cell



4. Morphous Evolution During Hemopoiesis

General pattern:



4.1 Erythropoiesis

proerythroblasts

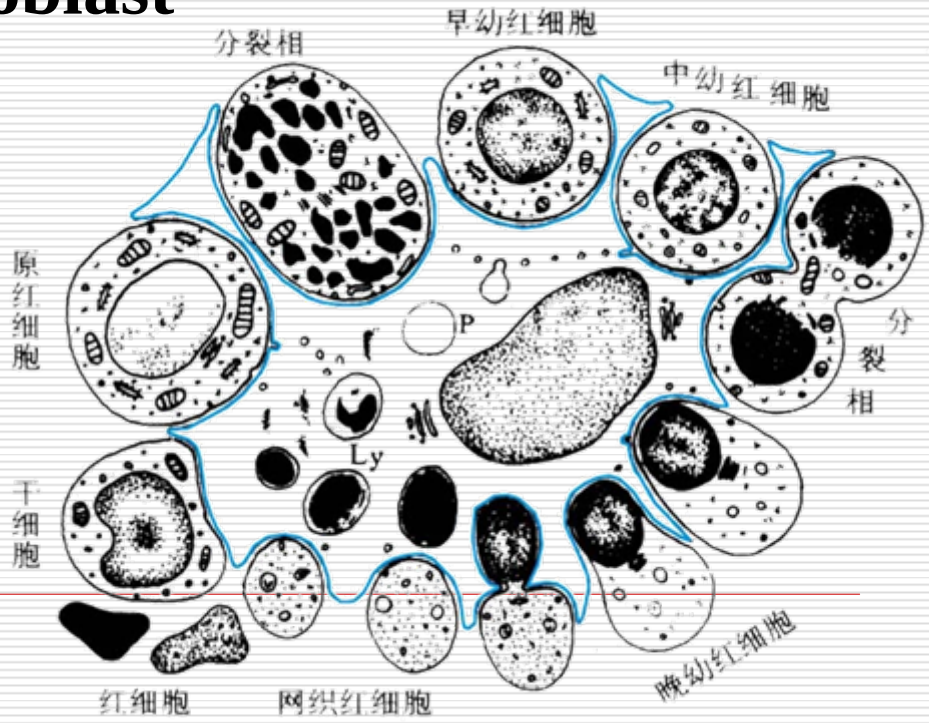
early erythroblast

intermediate erythroblast

late erythroblast

reticulocyte

erythrocyte

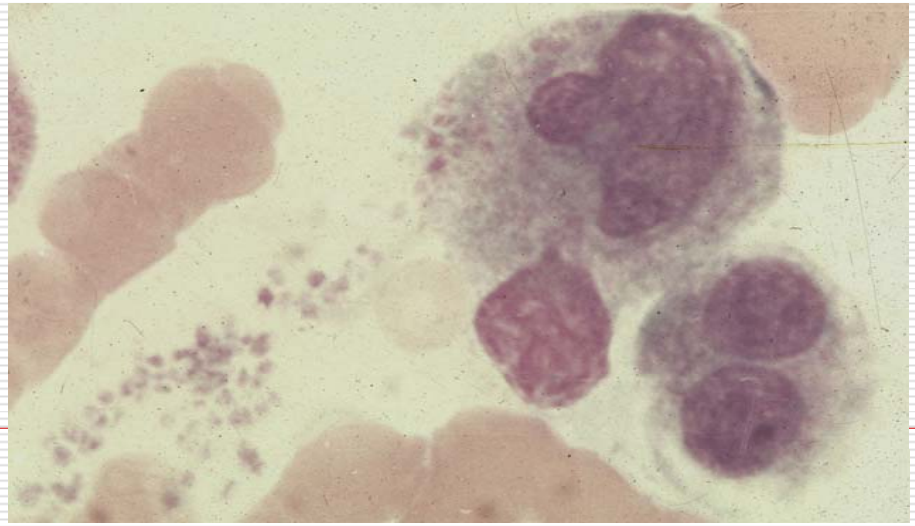


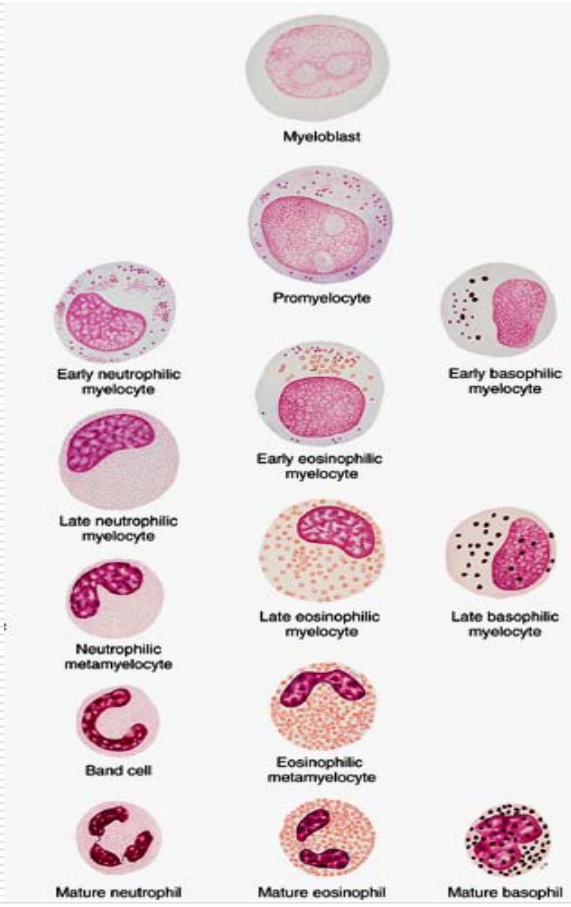
4.2 Granulocytopoiesis

4.3Monocytopoiesis

4.4 Thrombocytopoiesis

4.5 Lymphcytopoiesis





WBC of model（LM）