

Notes for the 2nd histology lab

Note : Please refer to the slides and see the morphological characteristics of each cell , as the practical exam will be in the form of figures .

SLIDE #2

Erythropoiesis

The first cell to be recognized is called **Proerythroblast** , it is not a stem cell and not a progenitor cell , it's an advanced stage (last precursor cell) , it's properties :

- 1- Large in size.
- 2- Large nucleus occupying most of the cytoplasm .
- 3- Basophilic cytoplasm (contains ribosomes that is responsible for synthesizing the Hemoglobin).
- 4- No Hemoglobin in the cell.

As the cell grows , it undergoes three major changes :

- 1- Decrease in the size.
- 2- Progressive destruction of organelles (Loss of ribosomes – decrease basophilia).
- 3- Increase in Hemoglobin concentration (Increases Eosinophilia).

The next cell to be seen is the **Basophilic Erythroblast** or **Early Normoblast** .

At this stage the cell will start synthesizing Hemoglobin but the concentration of ribosomes is higher so it will appear basophilic .

The next cell to be seen is the **Polychromatophilic Erythroblast** or **Intermediate Normoblast** .

The cytoplasm has an blue regions as well as red regions, indicating the presence of considerable amount of hemoglobin in the cell .

The next cell to be seen is the **Orthochromatophilic Erythroblast** or **Late Normoblast** or **Acidophilic Erythroblast**.

The cytoplasm resembles the cytoplasm of the mature RBC , which means that most (NOT ALL) the hemoglobin have been synthesized , with the presence of small amount of ribosomes . At this stage the cell will remove its nucleus .

The next cell is the **Reticulocyte** (Not in the slide).

It is a bit larger than the mature RBC, and it can't be recognized by the classical stain, we need cresyl blue to see it (supravital stain).

Don't forget that the reticulocyte is the form that the RBC will be removed in, then it will be converted to a Mature one.

The erythropoiesis takes about 1 week, and it needs:

1) erythropoietin 2) folic acid 3) Vitamin B12 4) protein precursors.

Granulopoiesis

The first stage, is the **Myeloblast** (not in the slide), it resembles the erythroblast, having a basophilic cytoplasm and the most important feature of these cells that it lacks any granules.

Then the cell that will be formed, **Promyelocyte**, will develop azurophilic granules, then, if it develops the bright red granules it will be an **Eosinophil**, and if it develops blue granules it will be a **Basophil** and if it adds specific neutrophilic granules it will be a **neutrophil**.

The **Neutrophilic myelocytes** have two types of granules, the nucleus of these cells will start taking a kidney-shape, forming **Metamyelocyte**, further condensation of chromatin in the nucleus will allow it to take a horse-shoe shape, forming a **Band cell** or **Stab cell**, then the nucleus will divide forming a **Mature Neutrophil**.

SLIDE #3

- Although we see 3 lobes in the nucleus of **Eosinophil**, the bright red granules are our guide to recognize these cells.
- We can see how the basophilic granules obscure the nucleus of the **Basophil**.

SLIDE #4

- Kidney-shaped nucleus = **Metamyelocyte**
- Horse Shoe-shaped nucleus = **Band cell** or **Stab cell**
- Lobed nucleus = **Mature Neutrophil**
 - Which these **three** cells increased in concentration in the case of **acute bacterial infection** ?
All of them
 - Which of these cell three cells increased in concentration in the case of **chronic myeloid leukemia** ? Mature neutrophils mainly but might be associated with band and metamyelocyte (in the acute leukemia , the cells arrived the blood in a very early stages).

SLIDES #5+6

- To recognize the **Myeloblast** , large nucleus , small cytoplasm , and most important , it is devoid of any granules , if there is any granules then it is promyelocyte or myelocyte according to the type of granules it contains , if there is only azurophilic , then it's **promyelocyte** . If there is specific granules , then it is **myelocyte** , and it is very difficult to differentiate between these two types of cells .

SLIDE #7

- **Monocytes** are the precursors for the macrophages and play an important role in the immune response and phagocytosis (the doctor didn't talk about its shape and features).

SLIDE #8

- The huge cell , called **Megakaryocyte** , its nucleus is multilobed and it is the mother for the platelets , so it's important cell in the Hemostasis .

SLIDE #9

- This is a bone marrow smear .
- Even the cytoplasm of the Basophilic erythroblast is not acidophilic , it still contains an small amount of Hemoglobin .
- We can see that the nucleus of the orthochromatophilic erythroblast takes an eccentric position to be ready to go out of the cell .

SLIDE #10

- (*The Dr only mentions the feature of each cell , we talked about them previously*).

SLIDE #11

- **A** - Myeloblast
- **B** - Myeloblast + Metamyelocyte + myelocyte or promyelocyte
- **C+D+E+F+G** - all of them are either myelocyte or promyelocyte according to the type of granules it contains .
- **H+I** - Metmyelocyte .
- **K+J** - Band cell
- **L+M+N** - Mature neutrophil
- **O** - Eosinophil
- **P** - Basophil
- Last two are Monocytes

SLIDE #12

- If we know that the WBCs count is 50000 and we asked to know the type of leukemia , we should know that it is a chronic one because the cells that are affected band cell and myelocytes not a blast cells , and these band cell will be a mature one sooner or later so it is a chronic type of leukemia .
- If it was an acute , we should see a promyelocyte and an early precursors , so the patient will suffer from anemia and fatigue and bleeding (because the immature WBCs will grow in the blood , thus preventing the growing of RBCs and platelets) . Also he will suffer from an infections (the immature WBCs cannot provide any protective function)

Sorry for any mistakes .. Good luck

Note : During the lab , the doctor talked about three topics from the theoretical part , so study them to be in the safe side :

- 1- Abnormalities of RBCs .
- 2- Neutrophilia .
- 3- Immediate hypersensitivity .

