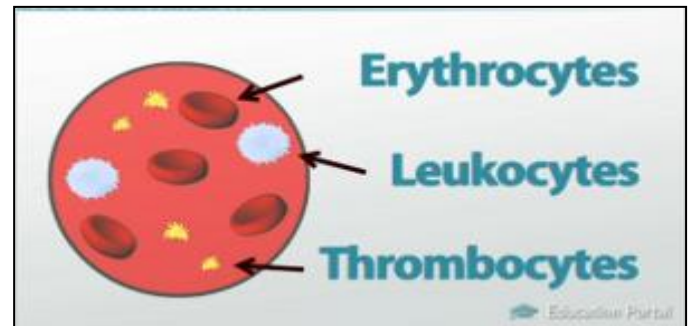


Lect:(2)

Clinical hematology:

There are three types of cellular elements in the blood-erythrocytes(red cells), leukocytes (white cells), and thrombocytes (platelets). Each has its own functions and differs clearly from the others. In health, destruction is balanced by production and the quantity of circulating cells remain remarkably constant.



Types of living cells in the blood

Erythrocytes(red cells):

Erythrocytes, or red blood cells, are the most abundant cell type in the human body. Additionally, erythrocytes are **enucleated**, which means they don't have a nucleus. In the human body, one of the most important connective tissues is **blood**. Blood is considered a connective tissue because it consists of a non-living fluid in which living cells are suspended.

Blood has three main functions:

A-Transportation:

- 1-This allows oxygen to be transported around our body to our tissues and organs (and carbon dioxide to be taken away).
- 2- Hemoglobin is largely comprised of iron, which when combined with oxygen, gives blood its red color.

B- Regulation:

- 1-Blood helps cycle nutrients and hormones throughout our bodies.
- 2-Blood also helps us maintain homeostasis by regulating our internal body pH and temperature as well as how much water is in our bodies at a given time.



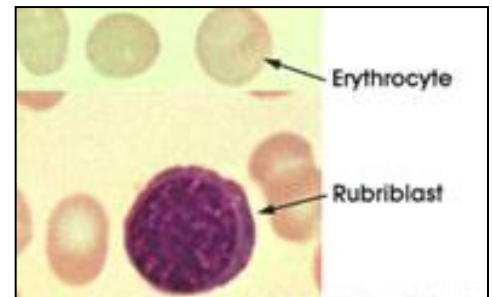
B- Protection:

- 1- Blood is also vital in protecting our bodies.
- 2- Blood loss is controlled with clotting mechanisms.

Erythrocyte series:

1-Rubriblast:

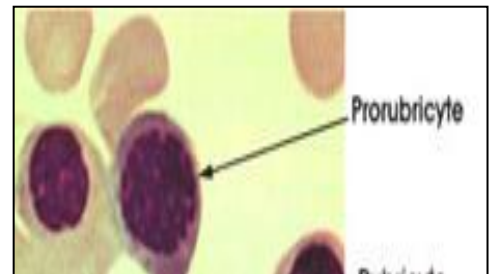
First cell in the erythrogenic series, it is Large round cell, contain large round nucleus and thin rim of blue cytoplasm. Which site in bone marrow.



Rubriblast shape

2-Prorubricyte:

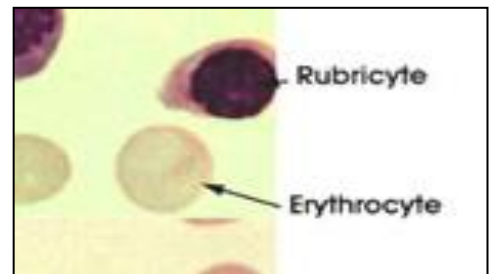
It is similar to the rubriblast but smaller in size, also in the stage start for division. Which site in bone marrow.



Prorubricyte shape

3-Rubricyte:

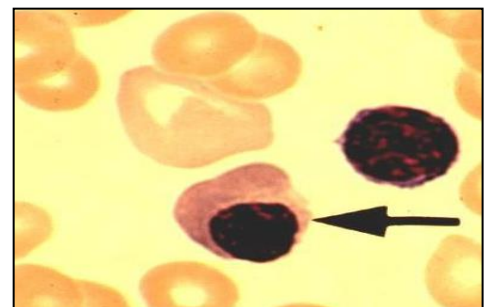
It is smaller than the Prorubricyte, and sub divided into basophilic, polychromatophilic and normochromic according to hemoglobin amount, Which site in bone marrow.



Rubricyte shape

4-Metarubricyte:

The nucleus is small, pyknotic (kidney shape) and appears as a dark blue homogeneous mass without any distinct chromatin structure. The cytoplasm stains similarly to the mature erythrocyte. Which site in bone marrow.

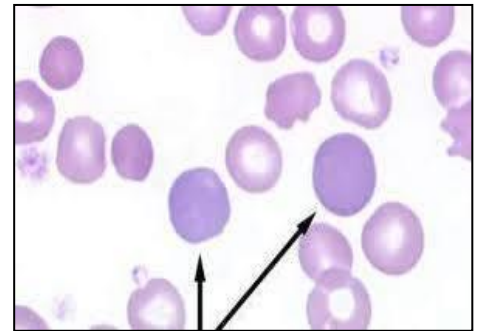


Metarubricyte



5-Reticulocyte (polychromatophilic cell):

This cell is large than the mature erythrocyte and is non-nucleated, may contain a small round nuclear remnant called a Howell-Jolly body and the cytoplasm stains slightly basophilic. However, when stained with new methylene blue or brilliant cresyl blue, precipitated ribosomal RNA (reticulum) can be demonstrated within the cell.



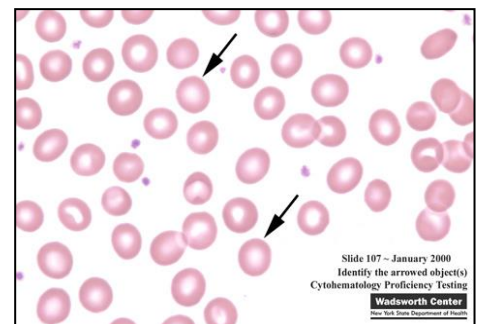
Reticulocyte

Note:

Cells are not found in health in the peripheral blood of the horse, cow, sheep, and goat. This means that the reticulocyte ripens in the bone marrow in these species. Dogs and cats may normally have 1-1.5 % reticulocytes in the peripheral blood.

6-Erythrocyte:

These are the mature non-nucleated red blood cells, these cells stain buff or reddish color. Which site in peripheral body.



Erythrocyte - normal

Factors that affect blood parameters:

- 1-Age; young dogs have total erythrocytes count less than adult.
- 2-Breed; Arabian horses with erythrocytes smaller than other breeds.
- 3-Environment; high altitude adapted animals with high parameters.
- 4-Stress; increased total erythrocytes count, PCV and Hb



Aged or damaged erythrocytes normally:

Aged or damaged erythrocytes have changes in either their cell membranes or cytosolic enzymes that allow them to be recognized by macrophages within the spleen and liver. These erythrocytes are subsequently phagocytosed by the macrophages and removed from circulation. Additionally, a small percentage of “old” or abnormal erythrocytes are removed from circulation through intravascular hemolysis

Average erythrocyte life span in varies animals:

- 1-In dogs, it varies between 100-130 days with an average being 118 days.
In cats, it varies between 70 and 80 days.
- 2-In horses, it varies between 140 and 150 days.
- 3-In adult ruminants (cattle, sheep and goats), it varies from 125 to 150 days while in lambs and calves, life span is shorter, ranging from 50 to 100 days.
- 4-Life span of erythrocytes in swine approaches that in human i.e. 100 to 120 days.