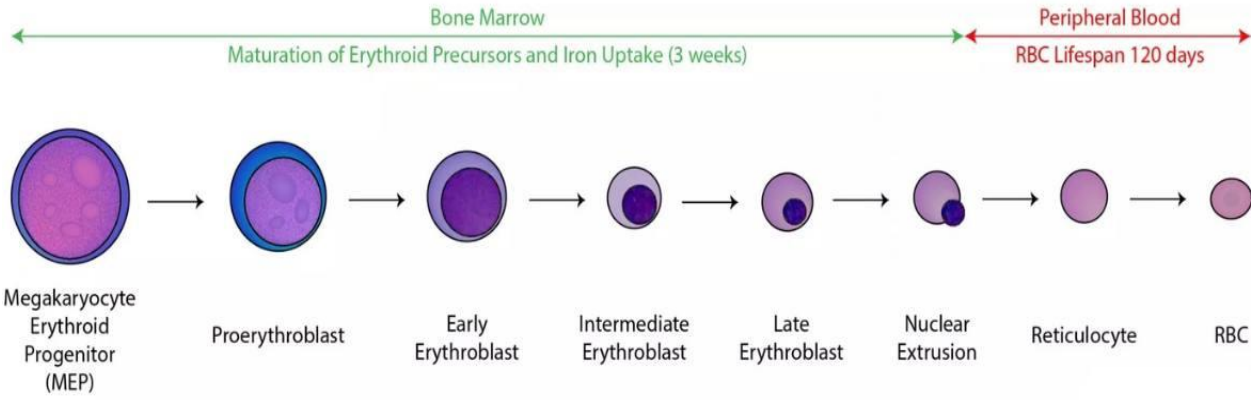
Lecture five:

Erythropoiesis:

Its refers to the formation of erythrocytes.



The bone marrow produces all of the different types of blood cells. Erythropoiesis is an extremely active process.

It is estimated that about 2.5 million erythrocytes (2.5 million/ sec) are produced every second in order to replace those that are continuously destroyed by the spleen and liver.

Regulation of Erythropoiesis (Homeostasis):

1- The primary regulator of erythropoiesis is:

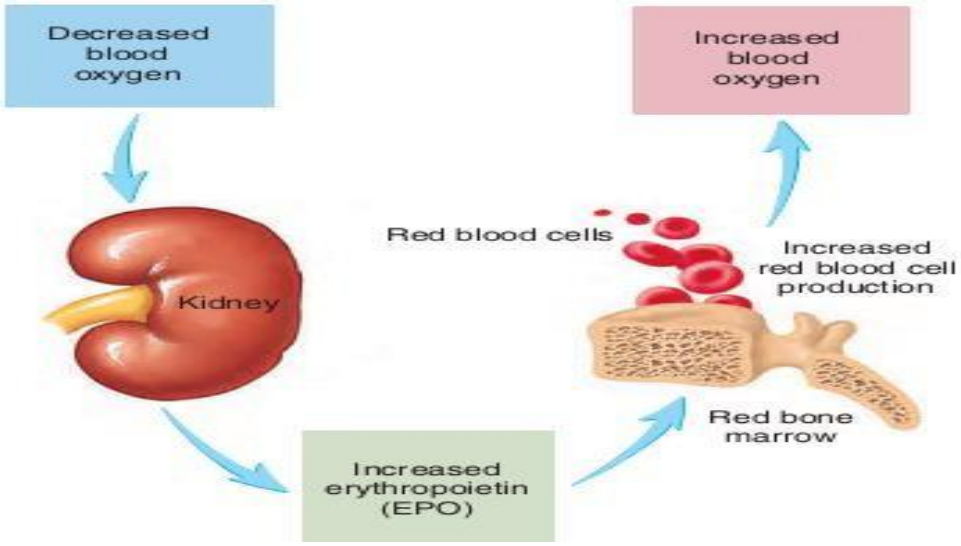
Erythropoietin:

A hormone produced by the kidneys in response to tissue hypoxia when the blood oxygen levels are decreased.

2- One of the possible causes of decreased blood oxygen levels is a decreased red blood cell count.

3- Because of erythropoietin stimulation, the daily production of new red blood cells compensates for the daily destruction of old red blood cells, preventing a decrease in the blood oxygen content.

An increased secretion of erythropoietin and production of new red blood cells occurs when a person is at a high altitude or has lung diseases, which are conditions that reduce the oxygen content of the blood.



The Life span of red blood cells:

When RBCs are delivered from the bone marrow into the circulatory system, they normally circulate an average of 120 days before being destroyed. Even though mature RBCs do not have:

A- A nucleus.
B- Mitochondria.
C- Endoplasmic reticulum.

They do have cytoplasmic enzymes that are capable of metabolizing glucose and forming small amounts of adenosine triphosphate.

Death and Disposal:

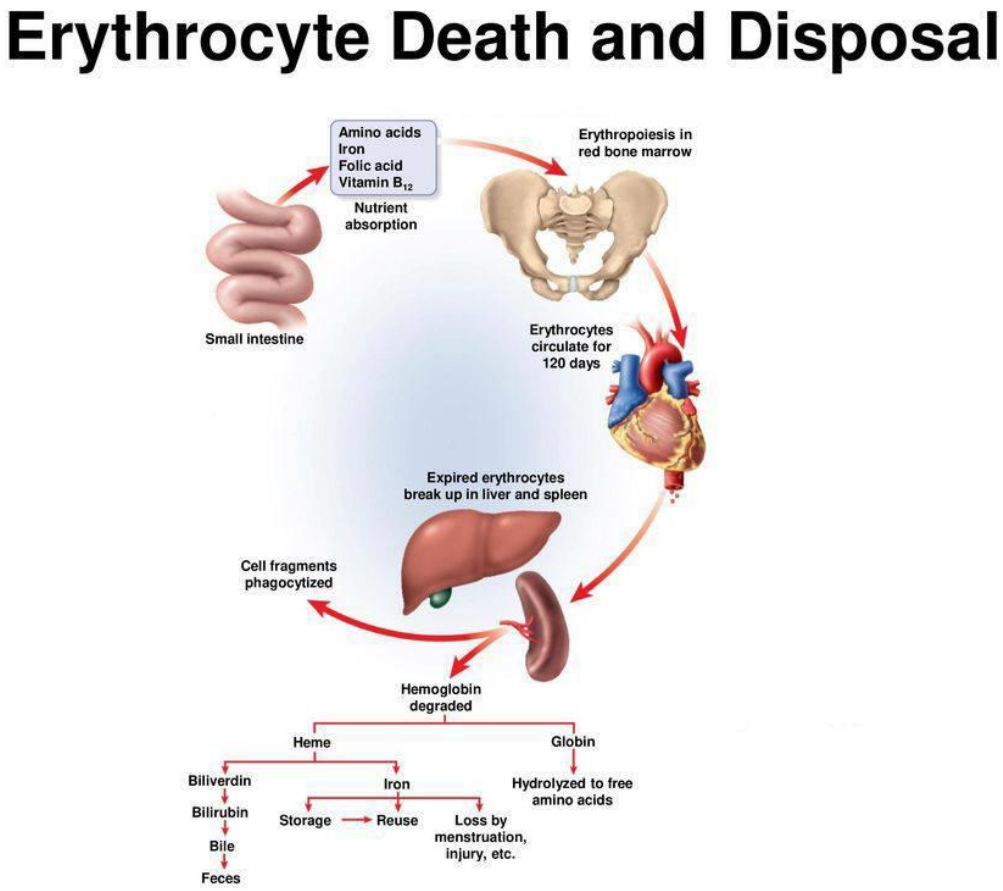
1- The metabolic systems of old RBCs become progressively less active and the cells become more and more fragile.

2- Presumably because their life processes wear out once the RBC membrane becomes fragile,

3- The cell ruptures during passage through some tight spot of the circulation.

4- Many of the RBCs self-destruct in the spleen where they squeeze through the red pulp of the spleen.

When the spleen is removed, the number of old abnormal RBCs circulating in the blood increases considerably.



Destruction of Hemoglobin:

When RBCs burst and release their hemoglobin, the hemoglobin is phagocytized almost immediately by macrophages in any parts of the body, but especially by the:

1- Kupffer cells of the liver.
2- Macrophages of the spleen.
3- Bone marrow.

During the next few hours to days, the macro-phages release iron from the hemoglobin and pass it back into the blood, to be carried by transferrin either to the bone marrow for the production of new RBCs or to the liver and other tissues for storage in the form of ferritin .