**Pathological Analysis Department Title of the lecture : Hemolytic Anemia**

## Lec3-10

**Hematology**

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**Hemolytic Anemia**



There are two main mechanisms whereby red cells are destroyed in haemolytic anaemia.

# intravascular haemolysis

they broken down directly in the circulation in a process known intravascular hemolysis, free hemoglobin is released which rapidly saturates plasma haptoglobins and the excess free hemoglobin is filtered by the glomerulus. If the rate of hemolysis saturates the renal tubular

re absorptive capacity, free hemoglobin enters urine.

# 2-(extravascular haemolysis)

Red cell destruction usually occurs after a mean lifespan of 120 days when the cells are removed extravascularly by the macrophages of the reticuloendothelial (RE) system, especially in the marrow but also in the liver and spleen..

The breakdown of **haem** from red cells liberates iron for recirculation via plasma transferrin to marrow erythoblasts,

**protoporphyrin** which is broken down to bilirubin. Bilirubin circulates to the liver where it is conjugated to glucuronides which are excreted into the gut via bile and converted to stercobilinogen and stercobilin(excreted in faeces)

**Globin chains** are broken down to amino acids which are reutilized for general protein synthesis in the body.

## Three proteins remove it’s from the plasma and they are 1-Haptoglopin (HP)

It is alfa protein Produced from the liver

The first protein which remove the toxic iron immediately after hemolysis

## Hemopexin:

It is beta protein Produced from the liver

The **second** protein which remove the toxic iron ,Its work start after the depleted of haptoglobin

## Meth-hem -albumin.

1. if the haptoglobin and hempexin depleted and the hemolysis is sever the free iron compound with **albumin** and called **methhemalbumin**
2. When the liver produce new **haptoglobin and hemopexin** they take the toxic iron from albumin to carry it into the liver

## Hemolytic anemia classification

* 1. **Inherited hemolytic anemia**

They are genetic ,They has no therapy ,They are permanent They are chronic ,They starting early in the life ,Some starting after 7 month of the birth and Some needs other factors to starting

## Types of Inherited hemolytic anemia

1. Related to Hb disorders
2. Enzymopathies: related to enzymes deficiency of RBC (G6PD and PK)
3. Membrane disorders**:**

## Hemoglobinopathies:

1. **Quantitative defects :**

absence of one or tow or three or four chain of hemoglobin

## Structure defects:

the abnormality in the **sequence of amino acids** on the beta chains **of hemoglobin only**

## Enzymopathies:

**Enzyme Defects:** Absence or decreased function of a metabolic enzymes (G6PD or PK)

1. **Membrane Defects:** Abnormalities in the proteins that make up the cytoskeleton of the cell membrane

## 2-Acquired hemolytic anemia

Destruction of red blood cells (RBCs) not due to genetic or congential disorder They has therapy ,They are not permanent ,They are acute ,They starting late in the life

## Caused by factors during the life such as

Malaria ,Antibodies against RBC ,Toxins ,Chemicals ,Drugs

## Diagnosis of Hemolytic Anemia?

Two main principles

1. One is to **confirm** that it is hemolysis
2. Two is to **determine** the cause

## The study of hemolysis in the laboratory must include:

1. CBC (anemia)
2. Blood film study
3. Reticulocyte count
4. Plasma hemoglobin **(increased)**
5. Serum Haptoglobin (HP) **(absent)**
6. Serum Hemopexin **(absent)**
7. Methemalbumin **(positive)**
8. Serum bilirubin