



Lecture title: Hematology-2-

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Summary:

Erythrocytes:

Normal & Abnormal :

Normal red cell : 2.0 um, Cross- sectional view. , 7.5 um Top view .

Abnormal morphology of Erythrocytes : Normocytic, Microcytic & Macrocytic.

Abnormalities of RBCs :

abnormal erythrocyte morphology :

is found in pathological states that may be:

1-Abnormalities in Size (Anisocytosis).

2-In Shape (Poikilocytosis).

3-In Hemoglobin content.

4-Presence of Inclusion bodies.

1-Variation in erythrocyte size (Anisocytosis).

a-Microcytosis :

Decrease in the red cell size. red cells are

Smaller than normal.

Found in :

- 1- Iron Deficiency anemia.
- 2- Lead poisoning .
- 3- Anemia of chronic disease.



b-Macrocytosis:

Morphology:

Increase in the size of a red cell.

Red cell are larger than normal .

May be or oval in shape, the diagnostic being different.

Found in:

- 1-Folate and B12 deficiency (oval).
- 2-Ethanol (round).
- 3-Liver disease(round).
- 4-Reticulocytosis(round).

2-Variation in Hemoglobin content :

1-Hypochromasia

Morphology:

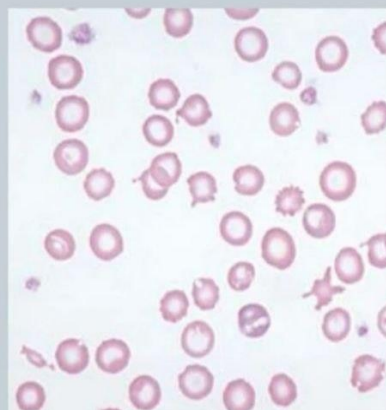
1-Hypochromasia:

Morphology:

Increase in the red cells' central pallor which occupies more than the normal third of the red cell diameter.

Found in:

- Iron deficiency
- Thalassemia
- any of the conditions leading to Microcytosis





2- Polychromasia:

Morphology:

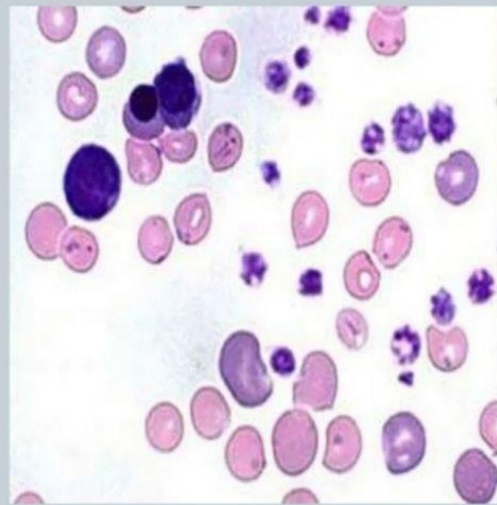
2- Polychromasia:

Morphology:

Red cells stain shades of blue-gray as a consequence of uptake of both eosin (by hemoglobin) and basic dyes (by residual ribosomal RNA). Often slightly larger than normal red cells and round in shape - round macrocytosis.

Found in:

Any situation with reticulocytosis - for example bleeding, hemolysis or response to haemostatic factor replacement.



3-Poikilocytosis:

Abnormality in shape may be of the following types:

- | | |
|---------------------|--------------------------|
| 1-Spherocytosis . | 6-Sickle cells |
| 2-Target cells . | 7-Rouleaux formation |
| 3-Ovalocytes. | 8-Red cell-agglutination |
| 4-Elliptocytosis | 9-Acanthocytosis |
| 5-Tear Drop cells . | 10-Schistocytosis |



RBCs may have different shapes:

1- Spherocytosis: **Morphology:**

Red cells are more spherical.
Lack the central area of pallor on a stained blood film.

Found in:

- Hereditary spherocytosis
- Immune haemolytic anemia
- Zieve's syndrome
- Microangiopathic haemolytic anemia



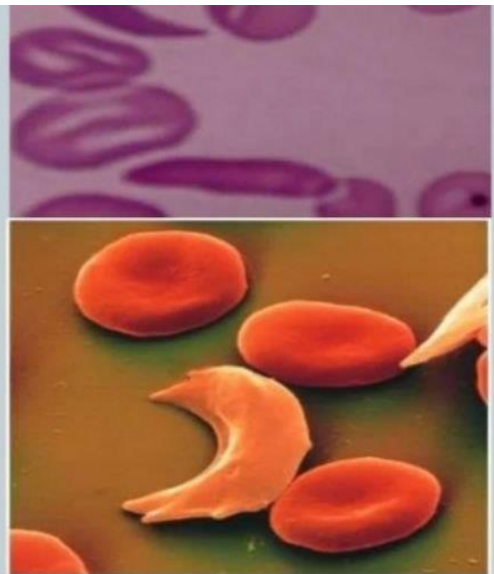
2- Sickle Cells

Morphology:

Sickle shaped red cells

Found in:

Hb-S disease





3-Tear Drop Cells

Morphology:

Red cells shaped like a tear drop or pear

Found in:

- Bone marrow fibrosis
- Megaloblastic anemia
- Iron deficiency
- Thalassemia



4-Rouleaux Formation

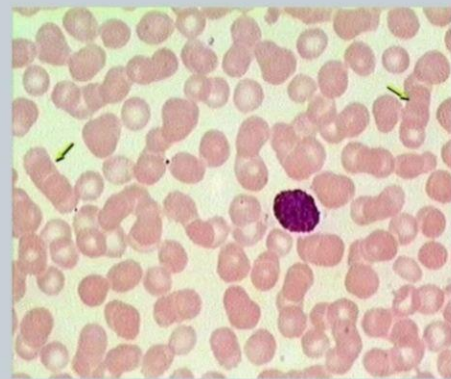
13- Rouleaux Formation:

Morphology:

Stacks of RBC's resembling a stack of coins.

Found in:

- Hyperfibrinogenaemia
- Hyperglobulinaemia



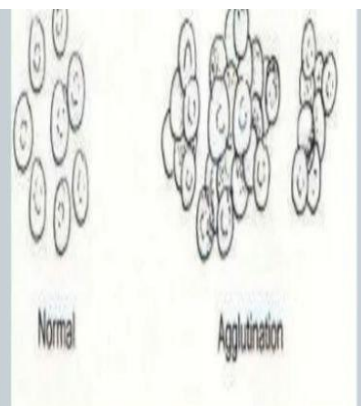
5-Red Cell - agglutination

Morphology:

Irregular clumps of red cells

Found in:

- Cold agglutinins
- Warm autoimmune hemolysis





4-Inclusions in RBC:

Abnormal structures which are present in red cells are called inclusions .these are normally absent in red cells.

These includes:

- 1-Howell-Jolly Bodies .
- 2-Siderocytes .
- 3-Heinz Bodies .
- 4-Basophilic Stippling.
- 5-Parasites of Red Cell

1- Howell-Jolly Bodies:

Morphology:

Small round cytoplasmic red cell inclusion with same staining characteristics as nuclei

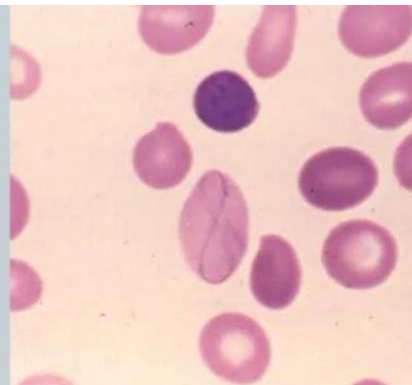
Found in:

- Post splenectomy
- Megaloblastic anemia



2- Cabot Rings:

Reddish-blue threadlike rings in RBCs of severe anemia's. These are remnants of the nuclear membrane and appear as a ring or figure 8 pattern. Very rare finding in patients with Megaloblastic anemia, severe anemia's, lead poisoning, and dyserythropoiesis.





3-Basophilic stippling:

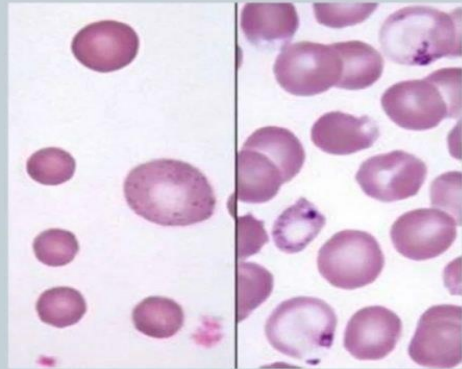
3- Basophilic stippling:

Morphology:

Considerable numbers of small basophilic inclusions in red cells.

Found in:

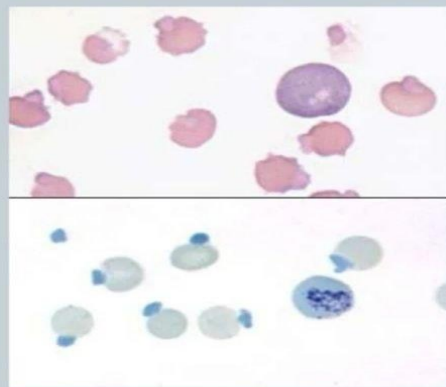
- Thalassemia
- Megaloblastic anemia
- Hemolytic anemia
- Liver disease
- Heavy metal poisoning.



4-Heinz Bodies:

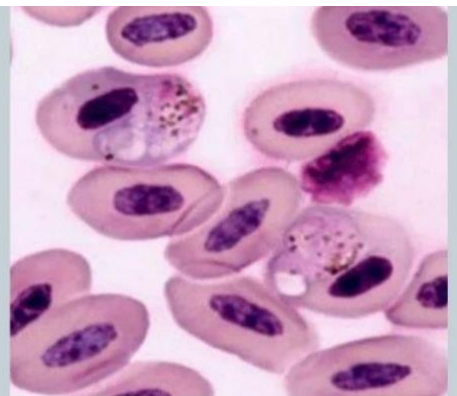
4- Heinz Bodies:

Represent denatured hemoglobin (methemoglobin - Fe^{+++}) within a cell. With a supravital stain like crystal violet, Heinz bodies appear as round blue precipitates. Presence of Heinz bodies indicates red cell injury and is usually associated with G6PD-deficiency.



5-Parasites of Red Cell:

are protozoan parasites which occur in many species of birds and are the cause of avian malaria. Transmitted by mosquitoes, infection with *Plasmodium* can be a cause of hemolytic anemia



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References:

Coles ,E.H. (1986) Veterinary Clinical Pathology. WB Saunders Company Philadelphia and London,