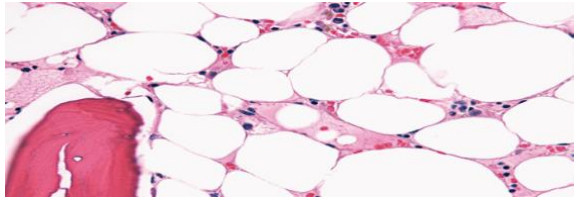
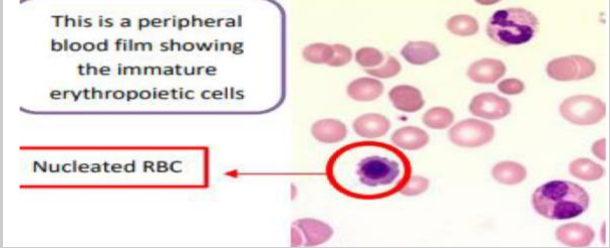
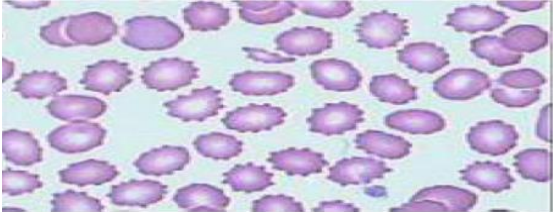

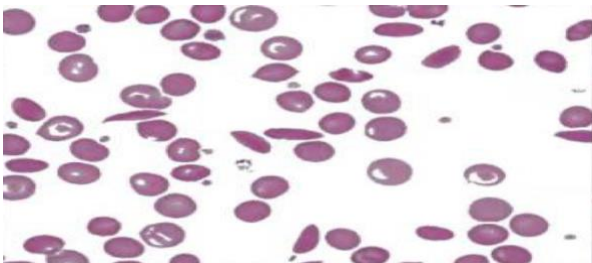
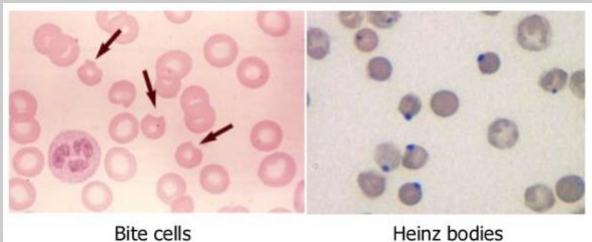


Classification due to morphology blood film	
Anemia of acute blood loss	Normocytic, normochromic RBCs with reticulocytosis
Anemia of chronic blood loss	Microcytic, hypochromic RBCs with low reticulocytes
Iron deficiency anemia	<p>Microcytic, hypochromic RBCs and target cells.</p> <ul style="list-style-type: none"> • Poikilocytosis (small and normal) • Low reticulocytes • Thrombocytosis
Anemia of chronic disease	Normal morphology then microcytic, hypochromic RBCs with low reticulocytes.
Megaloblastic anemia	Macroovalocyte RBCs and hypersegmented neutrophils (>5 lobes)
Aplastic anemia	<p>Biopsy reveals an empty, fatty bone marrow.</p> <ul style="list-style-type: none"> • Pancytopenia on peripheral blood smear • Anemia is normochromic or macrocytic • Decreased hematopoietic cells 
Myelophthistic anemia	Leukoerythroblastic anemia (Immature granulocytic and erythroid precursors commonly appear in peripheral blood)

	<p>Note : Myelophthisic refers to the <u>displacement</u> of hematopoietic bone marrow tissue by fibrosis, tumors or granulomas.</p> <p>Features: Shift to left (high levels of immature cells), nucleated RBCs (peripheral blood), Hypercellular bone marrow (but not erythropoietic cells)</p>  <p>This is a peripheral blood film showing the immature erythropoietic cells</p> <p>Nucleated RBC</p>
<p>Anemia of renal disease</p>	<p>Echinocytes (Burr cells) appear.</p>  <ul style="list-style-type: none"> • Low reticulocytes count
<p>Anemia of liver disease</p>	<p>Acanthocytes (spur cells) appear</p>  <p>They have longer and larger projections than burr cells.</p>
<p>Anemia of hypothyroidism</p>	<p>Most commonly normocytic but can be macrocytic.</p>
<p>Myelodysplastic syndrome</p>	<p>Macrocytic RBCs.</p>

<p style="text-align: center;">Thalassemia</p>	<p>Microcytic, hypochromic RBCs with target cell and nucleated RBCs.</p> <ul style="list-style-type: none"> ● Basophilic stippling (small dots in the cytoplasm of RBCs that are remnants of ribosomes). ● Reticulocytosis
<p style="text-align: center;">Thalassemia major (Cooley's anemia)</p>	<p>Poikilocytosis, nucleated RBCs (peripheral blood). ↑↑ Normoblasts, filling bone marrow spaces and expanding into bone, hemosiderosis (iron overload).</p>
<p style="text-align: center;">Sickle cell anemia</p>	<p>Sickle cells and target cells (secondary to abnormal hemoglobinization) are seen on blood smear in sickle cell disease, but not in sickle cell trait.</p> 
<p style="text-align: center;">Intravascular hemolysis due to G6PD deficiency</p>	<p>Oxidative stress precipitated hemoglobin as Heinz bodies. Heinz bodies are removed from RBCs by splenic macrophages, resulting in bite cells.</p>  <p style="text-align: center;">Bite cells Heinz bodies</p>

Immune hemolytic anemia

❖ **IgG mediated disease (Warm type) can lead to extravascular hemolysis.**

Spherocytes (very small without pale center) and **polychromasia** (due to reticulocytosis, reticulocytes appear blue).

-Mild chronic anemia.

❖ **IgM mediated disease (Cold type) can lead to intravascular hemolysis.**

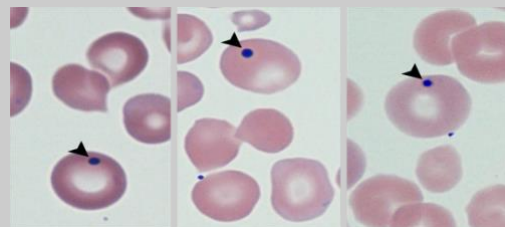
RBCs agglutination; IgM binds 5 RBCs thus creating agglutination.

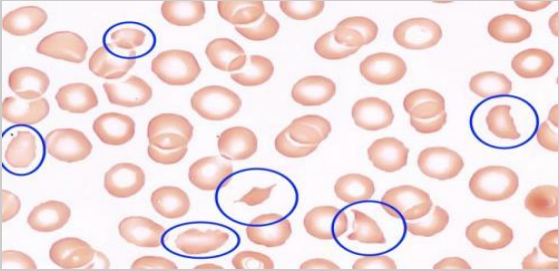
-Can be acute (associated with *Mycoplasma pneumoniae* and infectious mononucleosis) **or chronic** (associated with B-cell lymphoma).

Heredity spherocytosis

Spherocytes with loss of central pallor.

Treatment is splenectomy; anemia resolves, but spherocytes persist and Howell-Jolly bodies (fragments of nuclear material in RBCs) **emerge on blood smear.**



<p>Paroxysmal nocturnal hemoglobinuria</p>	<p>Intravascular hemolysis occurs episodically, often at night during sleep.</p> <p>RBCs, WBCs, and platelets (Destroyed platelets release cytoplasmic contents into circulation, inducing thrombosis which is the main cause of death) are lysed.</p>
<p>Traumatic hemolysis</p>	<p>Schistocytes are seen in mechanical valve induced (prosthetic heart valves and aortic stenosis) and <u>microangiopathic hemolytic anemia</u> which is intravascular anemia results from vascular pathology; RBCs are destroyed as they pass through the circulation.</p> <ul style="list-style-type: none"> • Microthrombi produces schistocytes on blood smear. 

Notes :

- ❖ **Microcytic anemia reflects hemoglobinization problem.**
- ❖ **Macrocytic anemia reflects stem cell disease and maturation.**
- ❖ **Target cells are found in iron deficiency anemia, thalassemia and sickle cell anemia.**