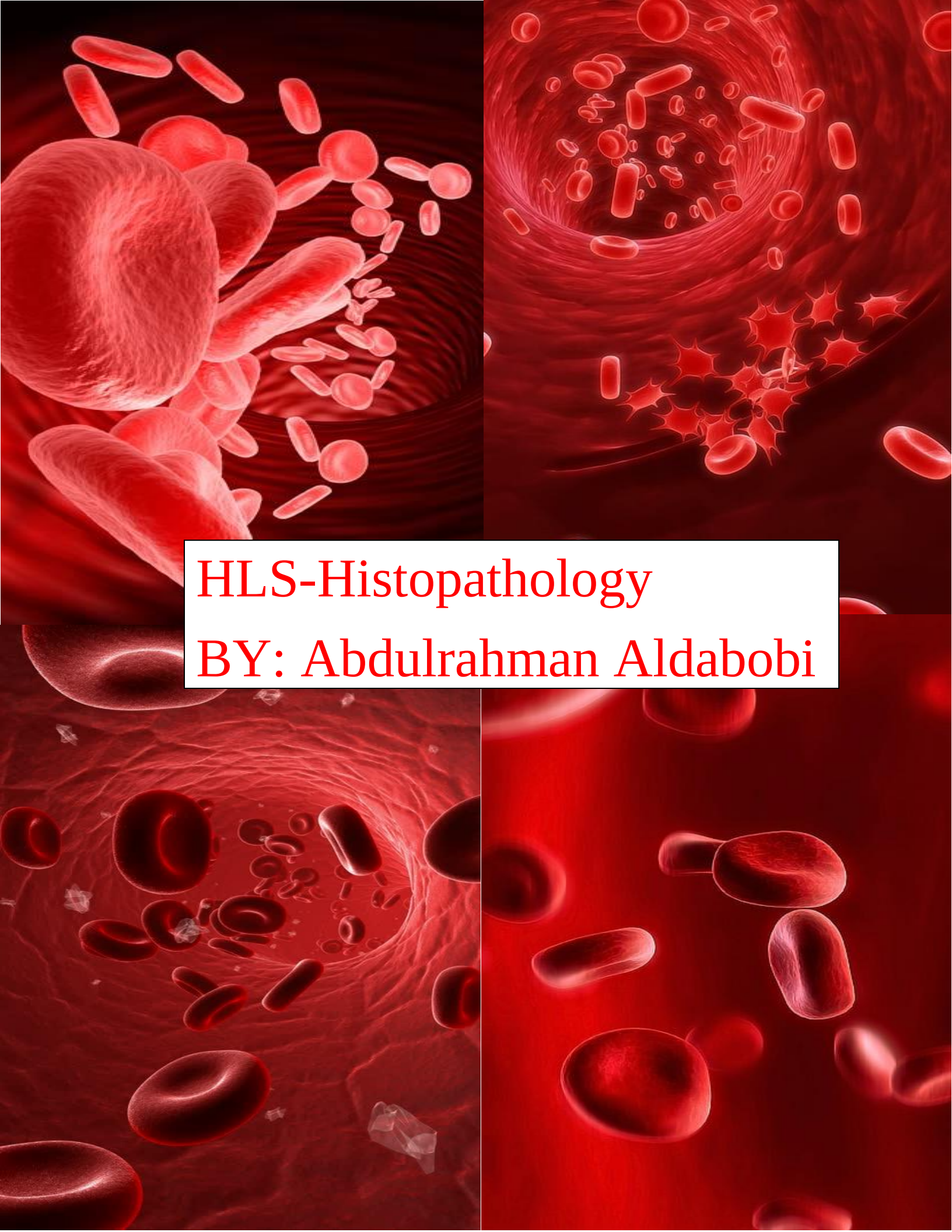
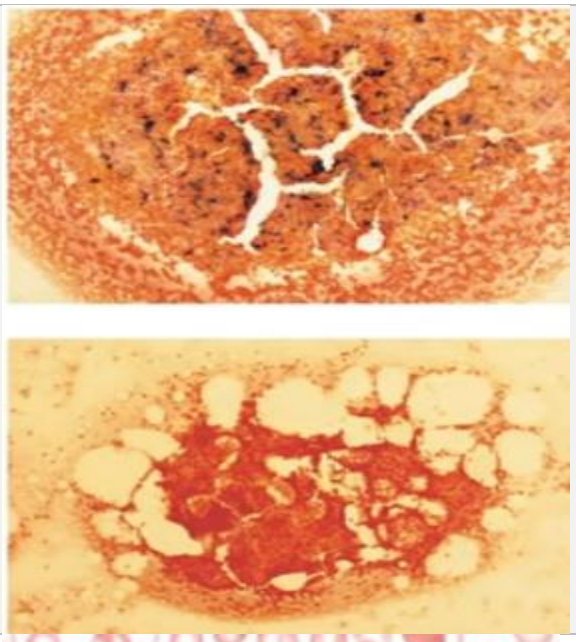
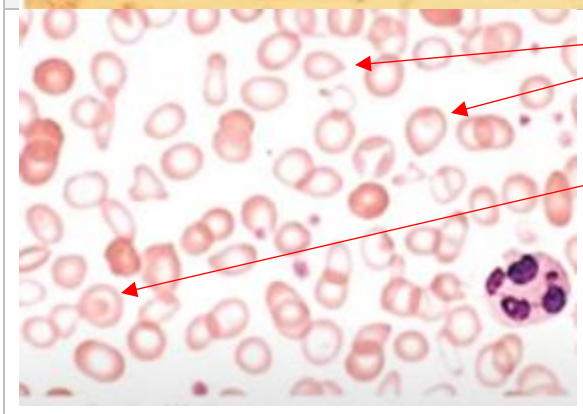
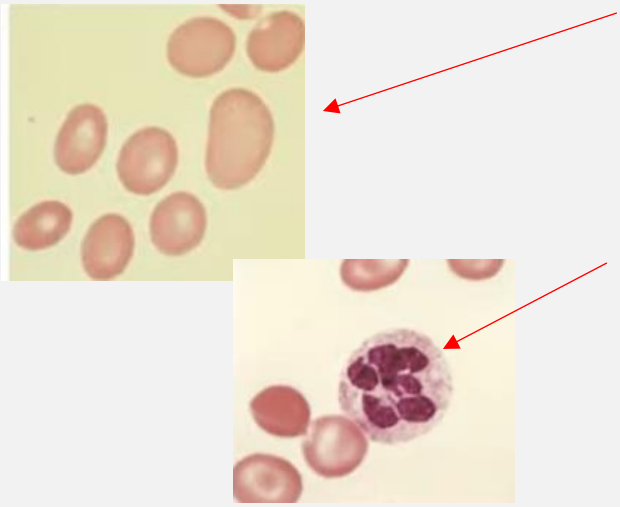
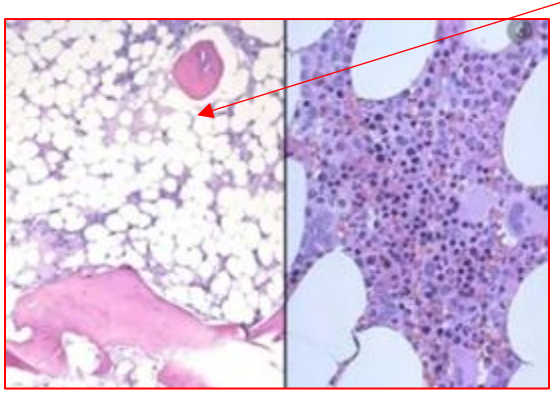
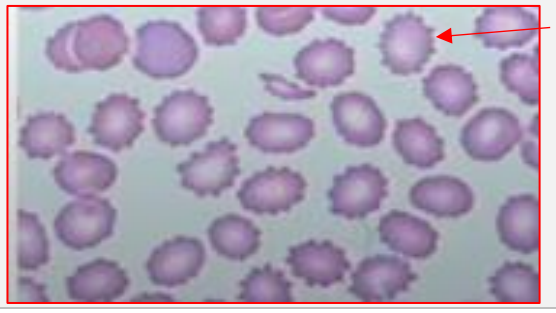
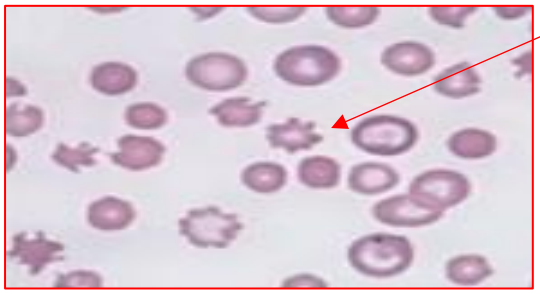
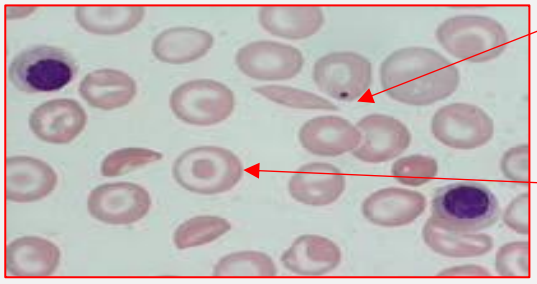
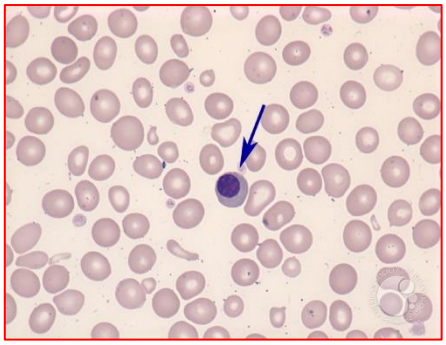
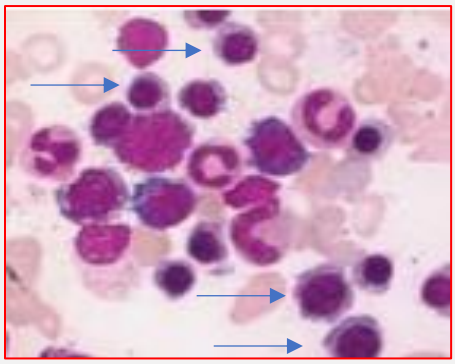
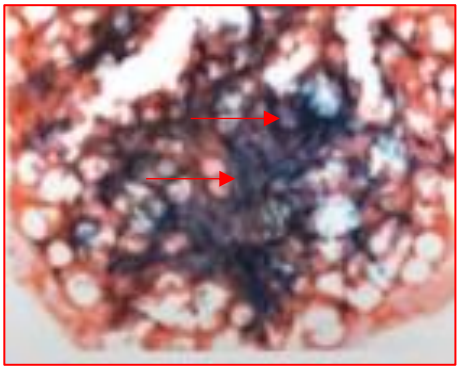
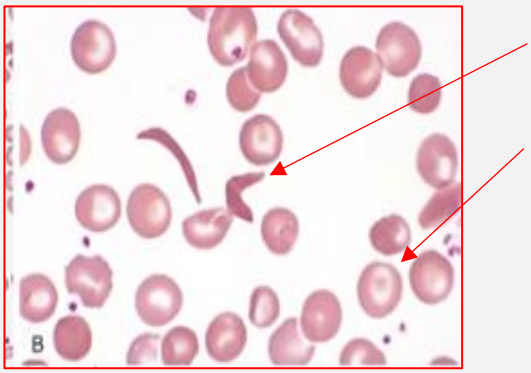


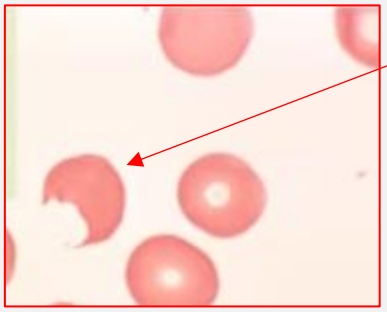
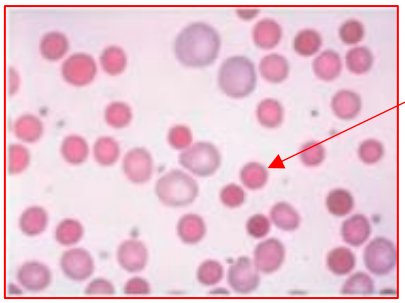
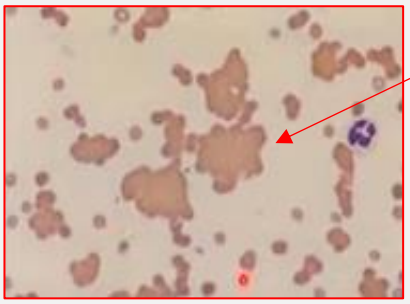
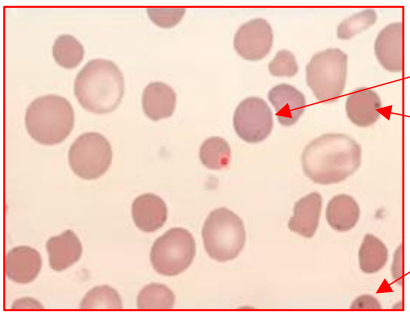
HLS-Histopathology

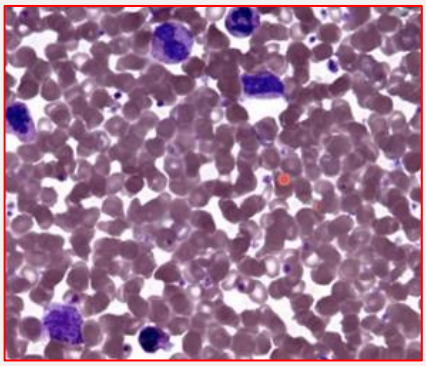
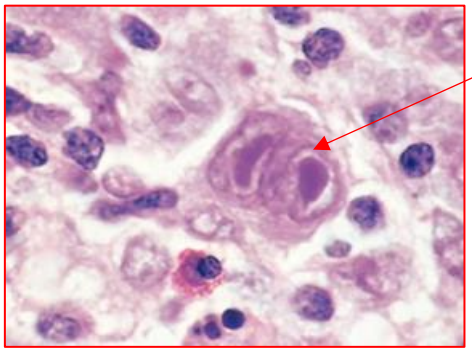
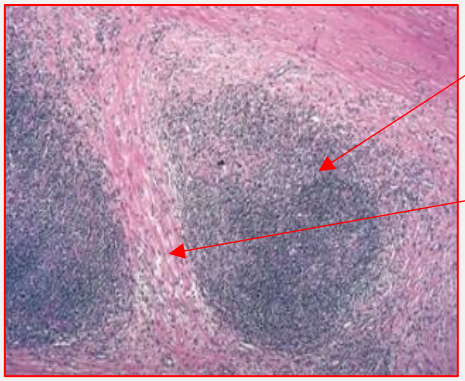
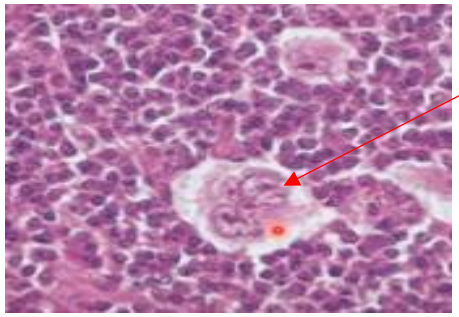
BY: Abdulrahman Aldabobi

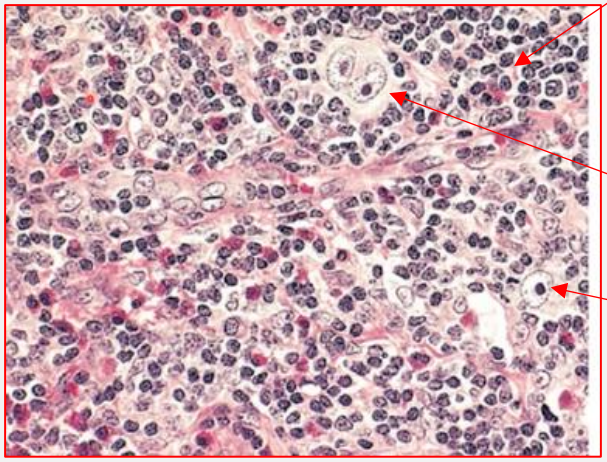
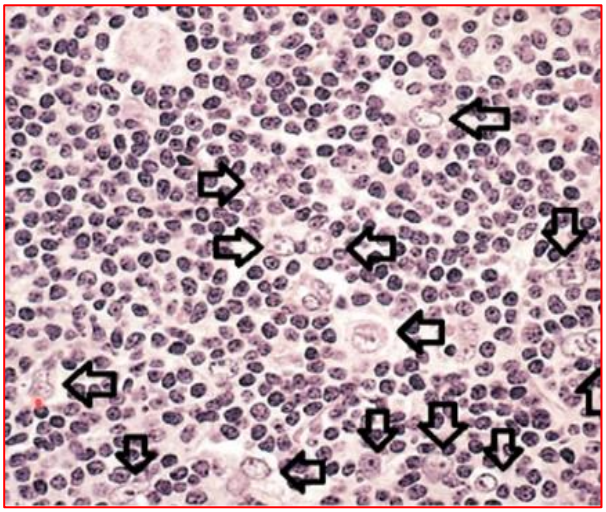
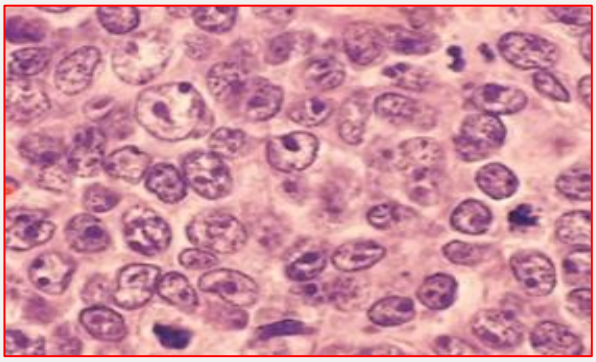
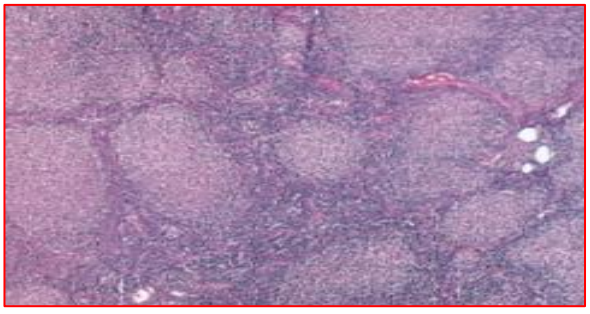
Image	Description	Diagnosis + Notes
	Bone marrow with decreased iron storage	1-Iron deficiency 2-The upper image indicates normal BM with iron represented in the blue dots 3-The lower image is from patient with Iron deficiency
	Poikilocytosis Target cells Microcytic hypochromic RBCs	1-**Iron deficiency Anemia** 2-Poikilocytosis → RBCs with different shape 3-Target cells are RBC with a dark area in the middle of its pale center (not specific)
	Macro ovalocytes Hyper – segmented neutrophil	1-**Megaloblastic anemia** 2-May causes of macrocytes but only megaloblastic anemia causes the oval shape

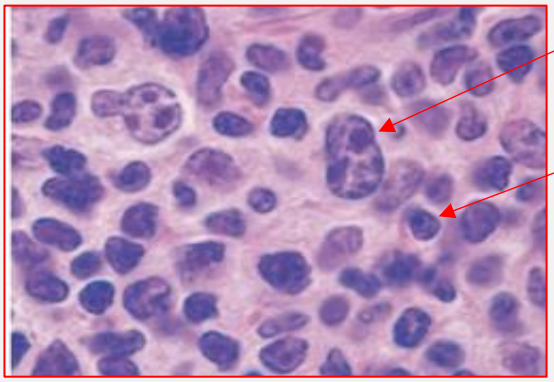
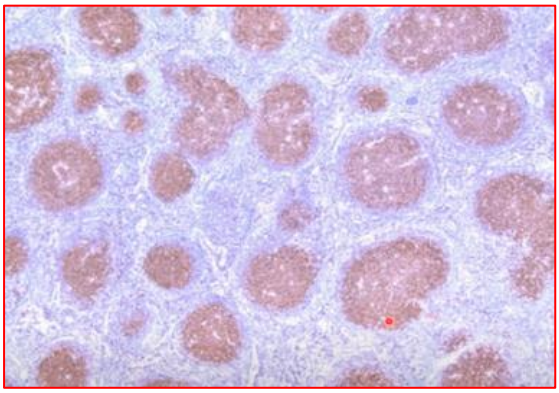
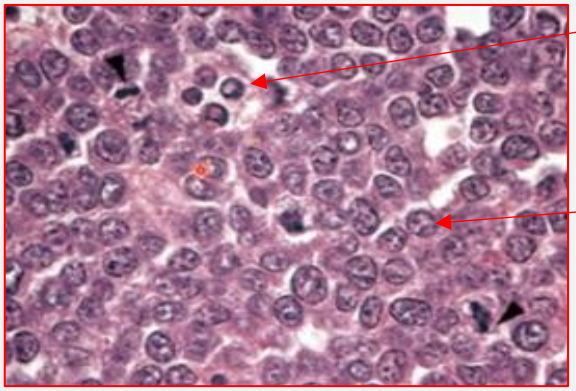
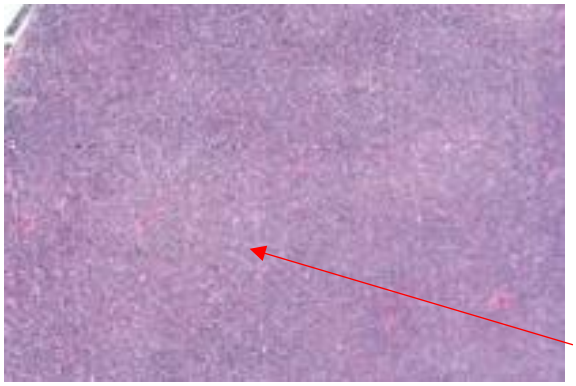
	Fatty Bone Marrow	1-**Aplastic anemia** is characterized by Destruction of hematopoietic cells and BM is replaced by fat (note the white spots in the image to the left) 2- To the right is the normal BM to compare 3-Normoitic to Macrocytic + Pancytopenia
	Echinocytes (Burr Cells) الخلايا الشوكية	1-**Anemia of Renal Disease** 2-The shape is caused by Uremia 3-Uremia can also impair platelet aggregation →Bleeding
	Acanthocytes (Spur Cells)	1-**Anemia of Liver Disease** 2-The shape is thought to be due to impaired liver function 3-Longer and larger than Echinocytes
	Basophilic striplings Target Cells	1-**Thalassemia** 2-Target cell are due to impaired hemoglobinization (not specific) 3-Basophilic Striplings are ribosomal remnants (Also seen in sideroblastic anemia)

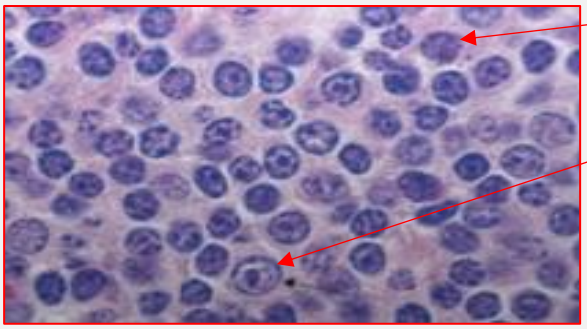
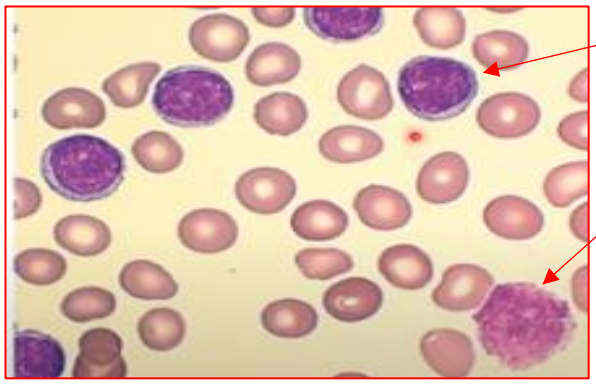
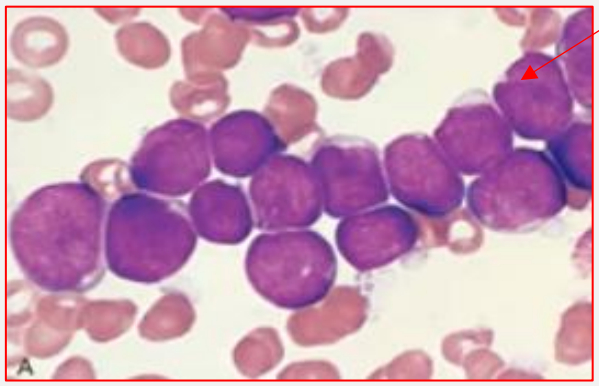
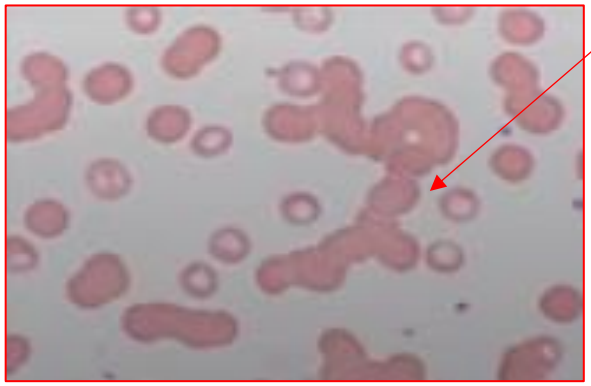
	Nucleated RBC in peripheral Smear	**Beta Thalassemia Major**
	Increased Normoblasts in the Bone Marrow	1-**Beta Thalassemia Major** 2-Normoblasts are nucleated precursors of RBCs found in the bone marrow 3-Normoblasts are usually 1/3 to 1/4 of cells in the bone marrow only
	Hemosiderosis	1-**Beta Thalassemia Major** 2-Increased Hemosiderin in the bone Marrow 3-Thalassemia Major → chronic increased EPO → EPO inhibits hepcidin → unregulated iron intake → Iron deposits in the BM
	Sickle Cells Target cells	1-**Sickle cell anemia** 2-Sickle cells are due to point mutation in the Hb 3-Target cells are seen in any problem with hemoglobinization (Iron deficiency, thalassemia, ….)
	Heinz Bodies	1-**G6PD Deficiency** 2-Denaturation of Hb molecules after 2-3 days from exposure to certain oxidant

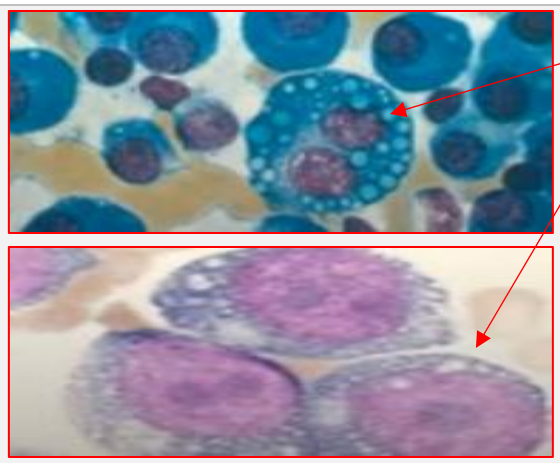
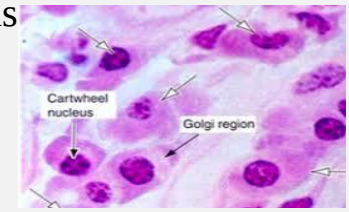
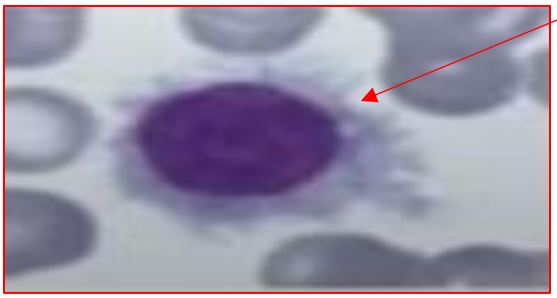
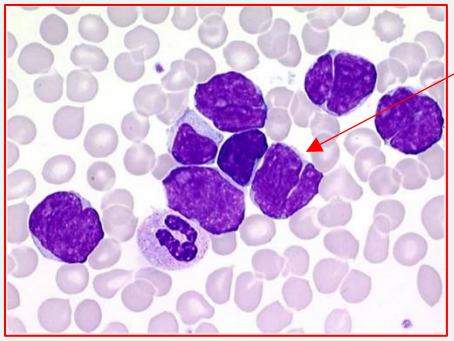
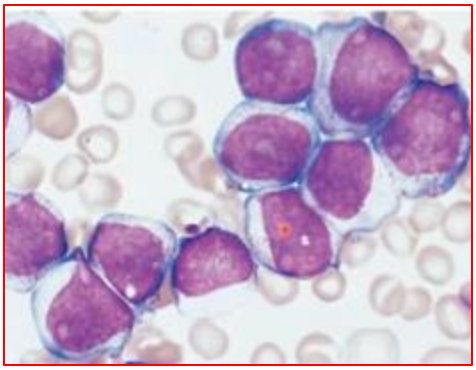
	Bite Cells (Degmacytes)	1-**G6PD Deficiency** 2-Caused by macrophages eating the preformed Heinz Bodies
	Spherocytes Polychromasia	1-**Warm Immune Hemolytic Anemia** 2-Spherocytes – Round RBCS without central pallor (not specific) 3- Polychromasia (multiple colors) → The presence of reticulocytes and spherocytes result in the appearance of different colors of RBCs in the smear
	RBCs clumps	1-**Cold Immune Hemolytic Anemia** 2-IgM antibodies bind 5 RBCs and cause agglutination 3-very small spherocytes can also be seen
	Spherocytes Howel Jolley Bodies	1-**Herediatery spherocytosis** 2-Loss of some cell membrane proteins lead to the loss of biconcavity of RBCs → Spherocytes 3-Defenitive treatment is splenectomy 4-**Howel-Jolley bodies** are DNA remnants in the RBCs due to splenectomy (Usually these dots are removed by spleen) **5-Autosomal DOMINANT**

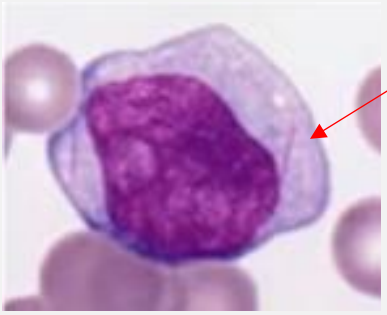
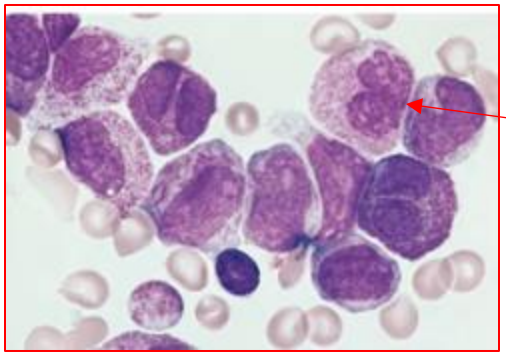
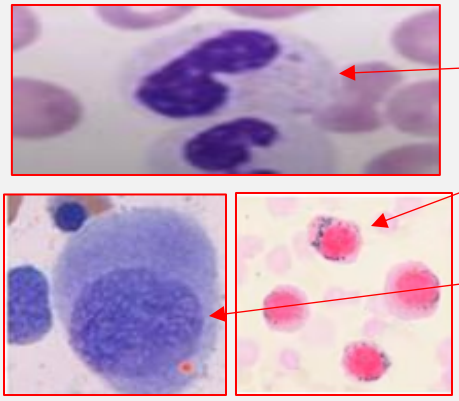
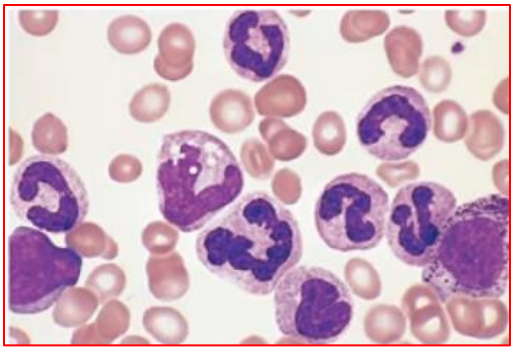
	Too many RBCs are present	1-**Polycythemia** 2-Can be relative or absolute 3-Absulote polycythemia can be primary (Polycythemia Vera) or secondary
	Reed-Sternberg cells	1-**Hodgkin Lymphoma** 2- Giant multinucleated, prominent nucleolus, eosinophilic lymphocyte 3- Hodgkin cells are the same but with one nucleus (both can be found in the lymph node) 3-Positive for CD30 and CD15 4-Negative for CD20, CD3, CD45
	Lymphocyte nodules Fibrous tissue	1-**Nodular sclerosis** 2-Most common type of Hodgkin Lymphoma 3-Characterized by Lymphocyte nodules separated by fibrous tissue
	Lacunar Cells	1-**Nodular Sclerosis** 2-Reed-Sternberg cell with peripheral cytoplasmic retractions (Empty on the periphery)

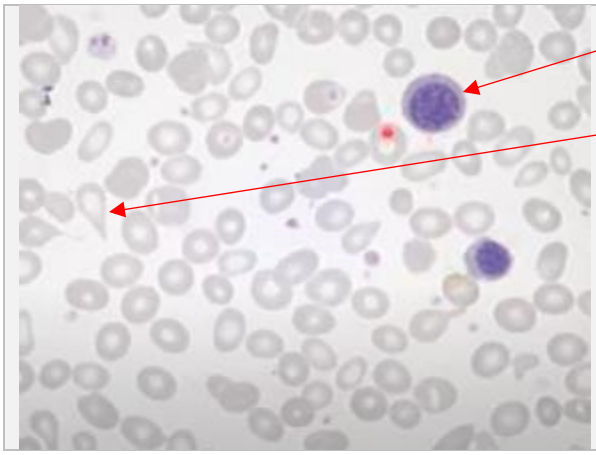
	Lymphocytes nodules RS cells Hodgkin cells	1-**Mixed cellularity** 2-Same as nodular sclerosis but with no fibrous bands 3-More common in older patients 4-Associated with EBV
	Popcorn Cells	1-**Lymphocyte predominant Hodgkin Lymphoma** 2- Giant cells with Multilobated vesicular nucleus and small blue nucleoli 3- Cells were called Lymphohistiocytes. 4- Arranged in nodules with no fibrous bands 5- express B-cell markers → CD45 and CD20 and negative for CD30 and CD15
	Large B-cells	1-**Large diffuse B-Cell Lymphoma** 2-No nodules at lower magnification 3-At higher magnification → Large cell with irregular nuclei and small nucleoli 4-CD20 Positive
	Follicles within the lymph nodes	1-**Follicular Lymphoma** 2-Lymph nodes are filled with follicles affecting its architecture

	Centroblasts Centrocytes	1-**Follicular Lymphoma** 2-Centrocytes are small and differentiated → Predominant → Low grade lymphoma 2-Centroblasts are large and undifferentiated → Predominant → High Grade Lymphoma
		Follicular Lymphoma with immunohistochemistry testing for Bcl2 Used to differentiate between Follicular Lymphoma and Reactive follicular hyperplasia
	Tingible bodies Intermediate lymphocytes	1-**Burkkit Lymphoma** 2-Hight rates of mitosis → Nuclear depri engulfed by the macrophages 3-B-Lymphocytes are intermediate in size and monomorphic (The same shape) and usually round 4-Starry like appearance → Pale areas resemble the sky and crowded areas resemble the stars
	Lymph node with no apparent architecture Proliferation centers (Pale)	1-**Small Lymphocyte Lymphoma** 2- LN with no architecture and pale areas called proliferation centers (prolymphocytes with larger nuclei and abundant cytoplasm → pale)

	Lymphocytes Prolymphocytes	1- **Small Lymphocyte Lymphoma** 2-Lymphocytes predominant in early stages of the disease 3-Prolymphocytes predominant in the ate stages of the disease
	Prolymphocytes Smudge cells	1-**Chronic Lymphoblastic leukemia** 2-Smudge cell are dead lymphocytes
	Lymphoblasts	1-**Acute Lymphoblastic leukemia** 2-Lymphblasts are large with high N/C ratio and with pale (open) chromatin 3-Agranular (Vs. Myelogenous) 4-Positive TdT 5-CD22+ → B lymphoblast 6-CD10+ → T Lymphoblast
	Rolex Formation of RBCs	1-**Mutible Myeloma** 2-Different from agglutination in that agglutination happens in many directions

	Abnormal plasma cells	1-**Mutible Myeloma** 2-Plasma cells with more than one nucleus and cytoplasmic vacuoles contains immunoglobulins 3-Have a prominent nucleolus instead of the characteristic Kary-Wheel nucleolus 
	Hairy lymphocytes	1-**Hairy cell leukemia** 2- Few with prominent cytoplasmic projections
	Neoplastic lymphocytes / Sezary cells	1-**Mycosis fungoides** 2-CD4+ cell causing erythema and may progress to plaques and tumor 3-Neoplastic lymphocyte with irregular nuclear membrane resembles a cerebriform 3- Called Sezary syndrome if causing leukemia
	Granulocytes precursor Aur Rods	1-**Acute Myeloid Leukemia** 2-similar to lymphoblasts but larger and with more cytoplasm (N/C is still high) and with granules 3-Pale nuclei 4-Expresses CD34, Myeloperoxidase, CD13 and CD33 5-Negative for Tdt

	Aur Rods	1- **Acute Myeloid Leukemia** 2-Aggregations of Myeloperoxidase enzyme produced by these cells
	Neoplastic Promyelocytes with Cleaved nucleus	1-**Promeylocytic Leukemia** 2- To differentiate between it and AML → It is heavily granulated and CD34 negative + Nucleus resembles number 8 3-Aur Rods can be also present 4-Associated with DIC 5-Treated with trans
	Myeloid cells Ring Sideroblasts Megakaryocyte	1-**Myelodysblastic Syndrome** 2-Impaired maturation 3-RBCs → Ring Sideroblasts due to RNA impaired spicing 4-Myeloid cells → Hypogranlated and hyposegmented 5-Megakaryocyte → small and hypolobulated
	Lymphocytosis	1-**Chronic Myelogenous leukemia** 2-Mature myelocytes in the blood 3-Left shift can also be seen → precursor cells in the blood

	Nucleated RBC Tear Drop RBC	1-**Primary Myelofibrosis** 2-These two with shift to left is called leucoerythroblastic anemia