**Normal Peripheral Blood-Low Power**

Description: Low power view of peripheral blood showing evenly spaced red cells with normal central pallor. A neutrophil and platelets are seen as well.

**Normal Blood-Hi Power**

Description: High power view of previous field.

**Polychromasia (Shift Cell)**

Description: The purple colored cell in the center exhibits the property of polychromasia which signifies a young red cell. Polychromasia is seen in hemolytic diseases, bone marrow recovery from chemotherapy or transplantation and following bleeding episodes. The other cells are spherocytes.

**Normal Reticulocyte**
Description: Peripheral blood stained with New Methylene Blue which precipitates ribosomes in newly emerged red cells.

Description: Normal and stress reticulocytes.

Description: PMN and eosinophil.

**Normal Eosinophil and Band Cell**

Description: The cell on the left is an eosinophil with its characteristic red granules. The cell on the right is a band cell which is an immature granulocyte.

**Normal Basophil**

Description: This is a normal basophil with its dark granules overlying the nucleus. These cells are involved in hypersensitivity reactions. An increase in basophils may also be seen in chronic myelogenous leukemia.

**Normal Small Lymphocyte**
Normal small lymphocyte. Note the normocytic red cells which are the same size as the lymphocyte nucleus.

Monocyte and small lymphocyte.

**Neutrophilia (Reactive)**

The field shows many mature neutrophils and no immature cells. This is more indicative of a reactive leukocytosis rather than CML which would have many granulocytes at various stages of maturation. Reactive Neutrophilia is often called a leukamoid reaction.

**LAP Stain in reactive neutrophilia**

This field shows the special histochemical stain leukocyte alkaline phosphatase (LAP). The enzyme LAP is increased in reactive neutrophilia and stains intensely black when reacted with an appropriate substrate. In CML, the enzyme levels are reduced or absent due to the clonally aberrant cells. The test can sometimes be useful in distinguishing between CML and leukamoid reactions.

**Dohle Bodies and Toxic Granulations in Sepsis**

Class of 2014
Description: The neutrophils have bluish inclusions in the cytoplasm called Dohle bodies. These can be seen in severe infections and are collections of lysosomes. Often the granulation of the cytoplasm is course and is called toxic granulations because of the association with sepsis. The granules represent a preponderance of primary granules that have not matured due to rapid turnover of granulocytes.

**Reactive Monocyte**

Description: This ugly looking cell is not malignant. It is a reactive monocyte typified by vacuoles, an irregular nucleus and irregularly shaped cytoplasm.

**Atypical or Reactive Lymphocytes in infectious Mononucleosis**

Description: The cells shown are atypical or reactive lymphocytes. They can be distinguished from blasts by their irregular cytoplasm that seems to be indented by red cells. Blasts tend to be rounder and plumper. Theses cells are activated T cells reacting against B cells infected with Epstein-Barr virus.

**Pelger-Huet Anomaly**
Description: The bi-lobed nuclei seen in the granulocytes are termed Pelger-Huet Anomaly. This may be congenital, having no clinical consequences or acquired and seen with malignancy or some infections.

**Undifferentiated Blasts in Acute Leukemia**

Description: The blasts seen in this field have nucleoli but no granules in the cytoplasm. They are seen in M0 acute nonlymphocytic leukemias.

**Acute Non-lymphocytic Leukemia-M1**

Description: These typical blasts showing a nucleus, scant cytoplasm, round regular shape and multiple nucleoli are typical of M1 acute nonlymphocytic leukemia. The lack of granules categorize this as M1 rather than M2.

**Acute Myelogenous Leukemia with Auer Rods-ANNL M2**

Description: The blasts in this field are more defined and contain granules. The cell in the lower right contains a sharp spiny inclusion called an Auer rod which is pathognomonic for ANNL. This blood is from a patient with an M2 leukemia, otherwise known as acute myelogenous leukemia (AML).

**Acute promyelocytic Leukemia with Auer rod-ANNL M3**
Description: These two fields are from patients with M3 ANLL known as acute promyelocytic leukemia. The bottom field demonstrates the number of primary granules typical of promyelocytes. The top field shows an Auer rod which can be seen in M2 or M3 leukemias.

**Acute myelomonocytic Leukemia-ANLL M4**

Description: The blasts seen in this field have irregular shaped nuclei, nucleoli and some cytoplasmic granules. They thus have features of both monocyte and myeloid blasts; hence the combined name.

**Chronic Myelogenous Leukemia**

Description: The field shows mature polys, bands, metamyelocytes, and myelocytes. This heterogeneity of WBC maturation is typical of CML rather than a leukamoid reaction. In addition, there are numerous basophils present, also suggestive of CML.
Chronic myelocytic leukemia (CML).

ALL L1 Acute lymphocytic leukemia.

**Acute Lymphocytic Leukemia-ALL L2**

Description: Multiple undistinguished lymphoblasts with nucleoli. It is difficult to classify them as lymphoblasts because of a lack of distinguishing features. They look like M0 ANLL blasts. Surface marker studies are needed for definitive identification.

**Acute Lymphocytic Leukemia-ALL L3**

Description: These blasts are more typical of ALL and contain significant numbers of vacuoles, scant cytoplasm and multiple nucleoli.

**Chronic Lymphocytic Leukemia**
Description: The monotonous field of mature looking lymphocytes is typical of CLL. Note that only one granulocyte is present.

Rouleaux

Description: Rouleaux formation of red cells as seen in inflammatory or malignant conditions. They are described as appearing like stacked coins.

Hairy Cell Leukemia

Description: Hairy Cell Leukemia.

Multiple Myeloma

Description: This field is taken from a bone marrow aspirate. The abnormal clone of plasma cells shown are usually not seen in peripheral blood. They are typified by eccentric nuclei, perinuclear clear zone and dark blue velvety cytoplasm.

Reed-Sternberg Cell in Hodgkin's Disease
Description: The bi-nucleated cell nested within a sea of lymphocytes in this paraffin sectioned bone marrow biopsy is a classic Reed-Sternberg cell.

**Iron Deficiency Anemia**

Description: Marked hypochromia, anisocytosis and poikilocytosis is seen.

**Pernicious Anemia**

Description: Two hypersegmented polys are seen along with some macrocytic red cells.

**Megaloblastic Anemia**

Description: An eight lobed poly is seen along with macroovalocytes.

Description: Macroovalocytes in megaloblastic anemia.
Description: Tear-drop shaped red blood cells.

<table>
<thead>
<tr>
<th>Tear drop cells in agnogenic myeloid metaplasia (AMM)</th>
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<tbody>
<tr>
<td>Description: 2-3 tear drop shaped red cells are seen. These are commonly observed in myelofibrosis, a variation of AMM.</td>
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<tr>
<th>Basophilic Stippling in Lead Poisoning</th>
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<tbody>
<tr>
<td>Description: Two cells with course basophilic stippling are seen. In addition to lead poisoning, this feature can be seen in any hemolytic process, especially thalassemia.</td>
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<tr>
<th>Howell-Jolly Body in Post Splenectomy State</th>
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<tr>
<td>Description: Two nucleated red cells are seen along with some basophilic stippling of the red cells. In the lower right quadrant a Howell-Jolly body is seen in a red cell. This represents residual nuclear fragments that have not been pitted out because of the absence of a spleen.</td>
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<tr>
<th>Hereditary Spherocytosis</th>
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</table>
Many microspherocytes are seen along with larger polychromatophilic cells. The finding of spherocytes on smear is not specifically diagnostic of HS as they can be seen in other hemolytic disorders.

**Hereditary Elliptocytosis**

Many cigar shaped cells are seen.

**Stomatocytosis**

Stomatocytes are seen in hereditary stomatocytosis and in acute alcoholism.

**Spurr Cells and Burr Cells**

The cells with a several sharp projections are spurr cells which are seen in liver disease. The cells with the flatter projections are burr cells seen in uremia. This slide is from a patient with hepato-renal syndrome.

**Echinocytes in uremia**
Description: The knobby red cells are called burr cells or echinocytes and are frequently seen in uremia.

Acanthocytes in abetalipoproteinemia

Description: In addition to burr and spur cells; this slide contains acanthocytes which have several sharp spiny, long projections. Morphologically, spur cells and acanthocytes are indistinguishable.

Cold Agglutinin Disease

Description: Red cell clumping in an IgM autoimmune disorder. In IgG autoimmune hemolytic anemia spontaneous clumping is rarely seen.

Beta Thalassemia (Homozygous)

Description: Marked hypochromia, target cells and microcytosis are seen.
**Sickle-Thalassemia**

Description: Both sickled red cells and target cells are seen in this combined case of sickle and thalassemia. In homozygous SS disease just sickled cells would be seen.

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**Warm-antibody Autoimmune Hemolytic Anemia**

Description: In acquired warm antibody autoimmune hemolytic anemia there is some combination of microspherocytes and shift retics among the normal RBCs. If hemolysis is severe, there may even be nucleated RBCs present. Note the shift reticulocytes, nucleated RBCs, and microspherocytes on this smear. It is difficult to distinguish this smear from hereditary spherocytosis and more information about the patient is needed. It is also important to distinguish it from microangiopathic hemolytic anemia in which the most characteristic cell is the schistocyte.

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**Thrombotic Thrombocytopenic Purpura**

Description: This field from a patient with TTP shows several classical features. There are numerous schistocytes or fragmented cells, nucleated red cells are present as is polychromasia and there is an absence of platelets.

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**Giant Platelet in ITP**

Description: This field shows a giant platelet.
Description: There is no characteristic morphology diagnostic of idiopathic thrombocytopenic purpura (ITP). This field shows a giant platelet plus two regular sized platelets. Because the peripheral platelet destruction in ITP causes rapid platelet turnover, there is usually a plethora of or giant platelets. This finding, though non-specific and can be seen in other platelet destructive disorders as well as in myeloproliferative diseases.