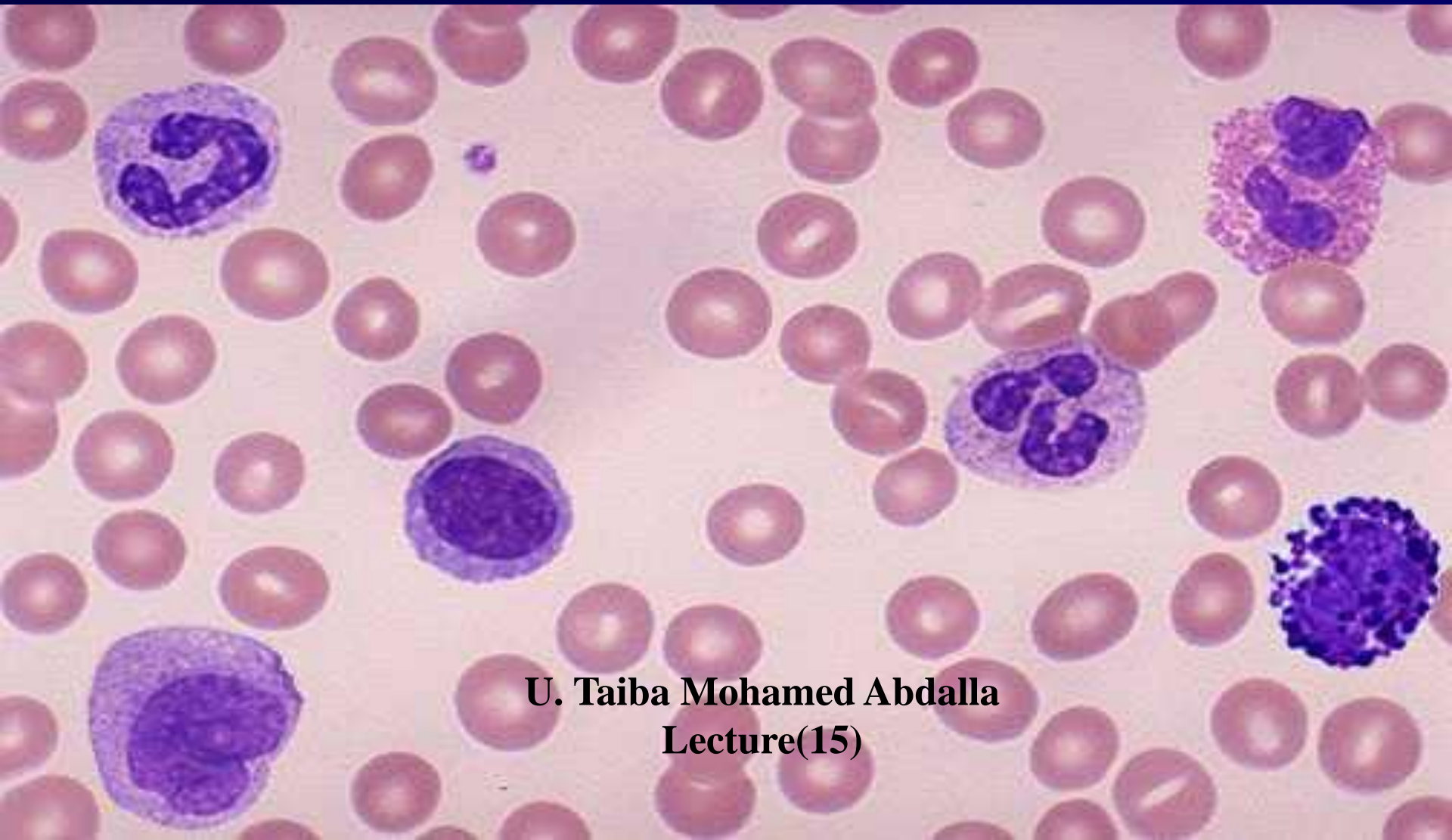


Non Malignant WBC - Disorders



U. Taiba Mohamed Abdalla
Lecture(15)

WBC disorders:

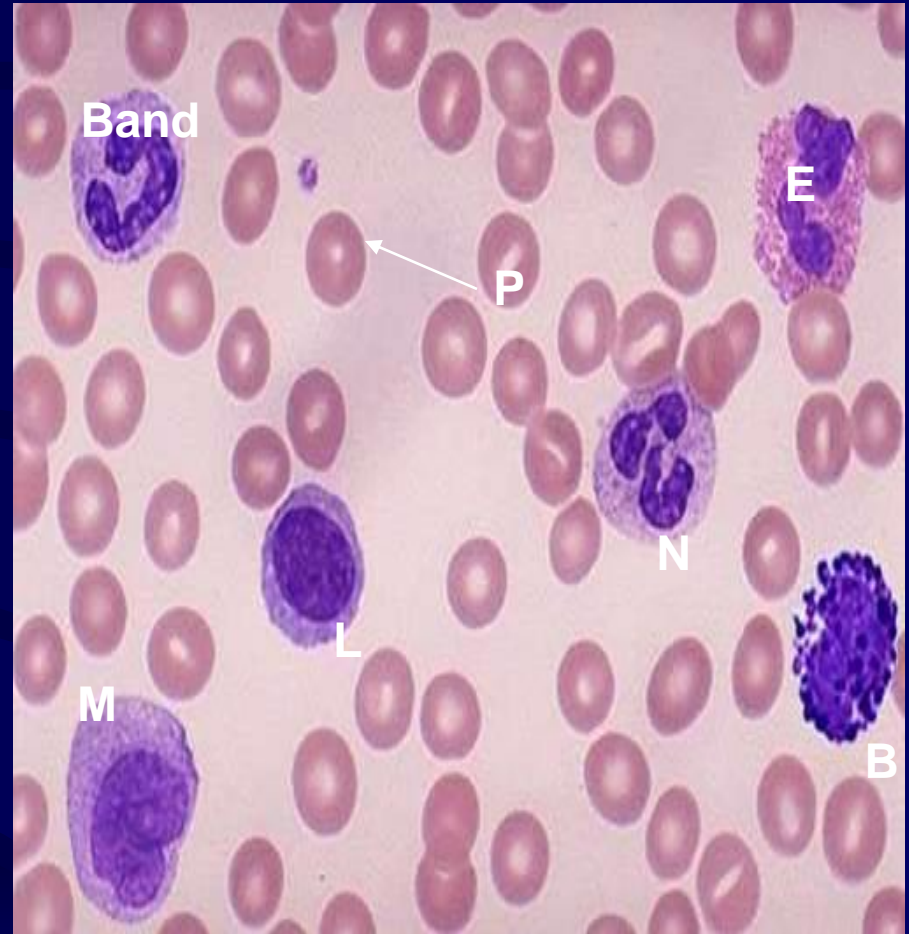
- **Quantitative disorders: “Penias” & “Philias” & Malignancies.**
- **Qualitative disorders - function disorders or morphological**
 - **Congenital**
 - Lazy leucocyte syndrome.
 - Chronic granulomatous disease
 - Pelger Huet, May Hegglin, Alder-Reilly
 - Chediak-Higashi (penias with giant granules).
 - **Acquired**
 - Steroids, aspirin, alcohol.
 - diabetes, hypogammaglobulinemia

Leucocytes benign disorders either...

- Quantitative
 - Change in number
 - Terminology
 - Cytosis / philia
 - » Increase in number
 - Cytopenia
 - » Decrease in number
- Qualitative
 - Morphologic changes
 - Functional changes

Leucocytes

- Lymphocytes
- Monocytes / Macrophages
- Granulocytes
 - Neutrophils
 - Eosinophils
 - Basophils



Normal differential WBCs count

Neutrophils 50–70 %

Lymphocytes 20–40 %

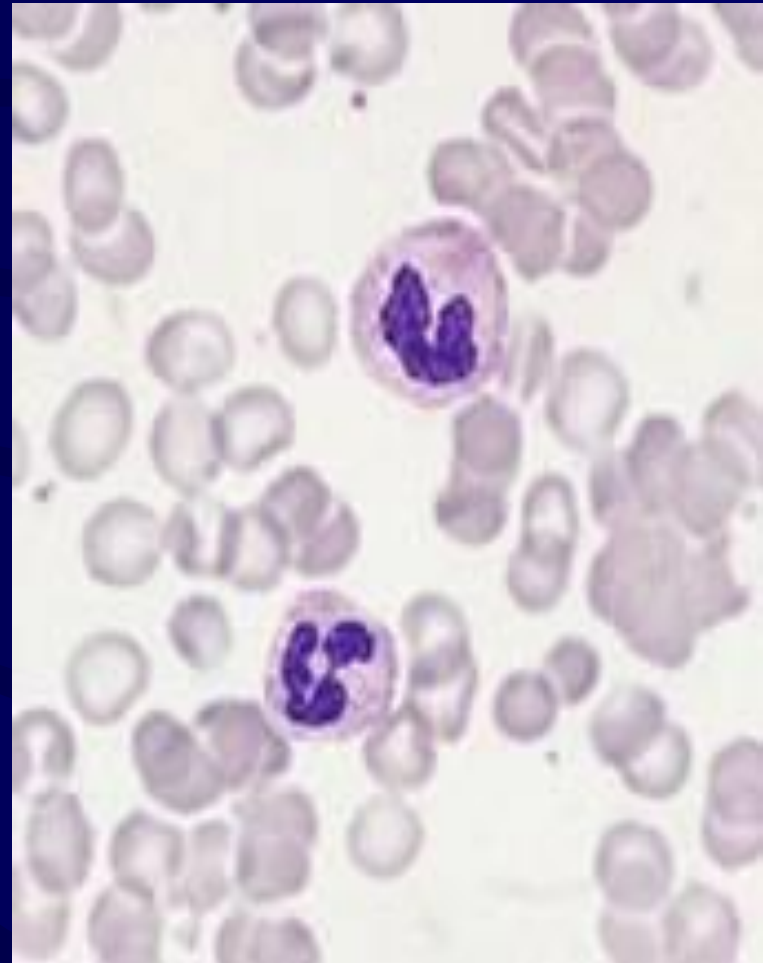
Monocytes 2–9 %

Eosinophils 2–4 %

Basophils 0-1 %

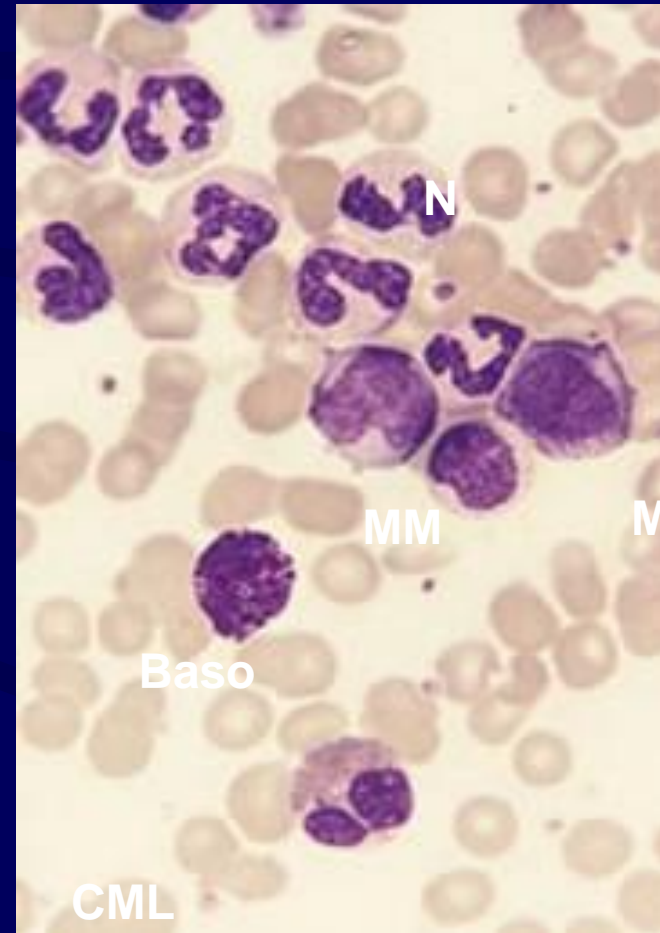
Neutrophils

- Count $2.5 - 7.5 \times 10^9/l$
- Granular cytoplasm
- Transient stay in blood
- Major phagocytic role
- Bacterial killing
- 3-5 lobes of nucleus

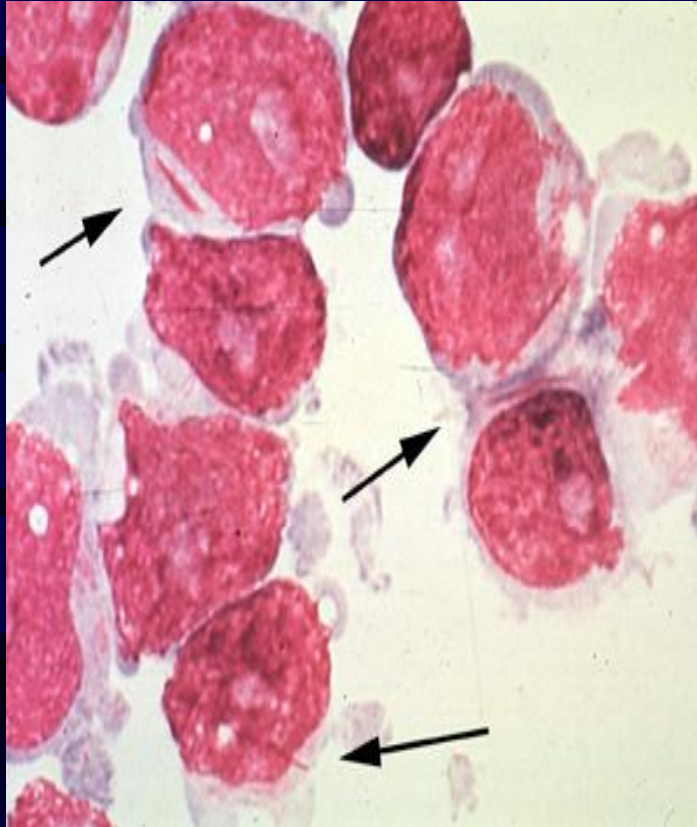


Disorders of Neutrophil

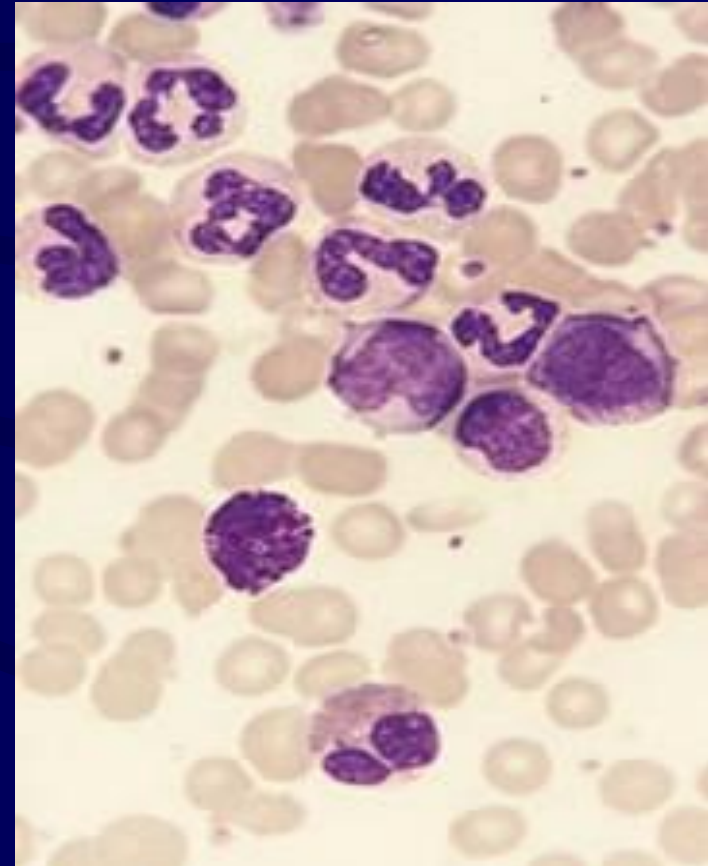
- Neutrophilia
 - Infection (Bacterial)
 - Inflammatory conditions
 - Neoplasia
 - Metabolic conditions
 - Uraemia
 - Haemorrhage / haemolysis
 - Corticosteroids
 - Marrow infiltration
- Haematological malignancies
 - Chronic Myeloid Leukaemia
 - Myeloproliferative disorder



Myeloid malignancies



Acute Myeloid Leukaemia
(AML M-3)



Chronic Myeloid Leukaemia

Disorders of Neutrophil

- Neutropenia Count <
 - $1.5 \times 10^9/l$
 - Drugs
 - Chemotherapy
 - Viral infection
 - Inherited disorders
- Morphological abnormalities
 - Pelger-Huet anomaly
 - May-Hegglin anomaly
 - Chediak-Higashi syndrome

Neutrophilia

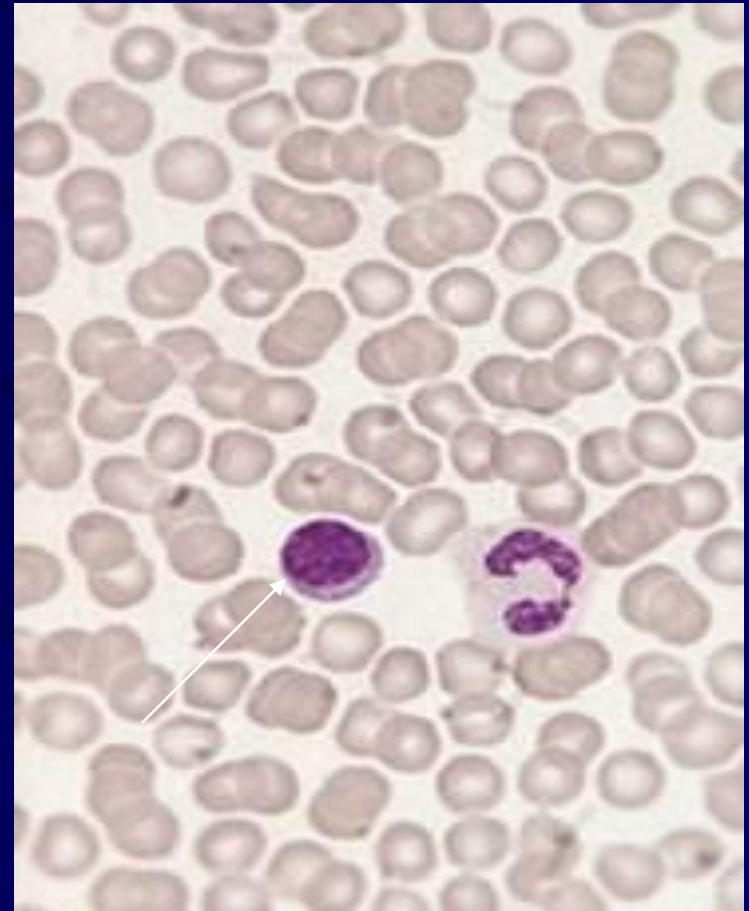
- Transiently with stress and exercise by a shift of neutrophils from the marginating pool to the circulating pool.
 - Infection
 - Toxins: metabolic (uremia), drugs, chemicals
 - Tissue destruction or necrosis: infarction, burns, neoplasia, etc
 - Hemorrhage, especially into a body cavity
 - Rapid hemolysis

Neutropenia

- Aplastic anemia
- Toxins that damage marrow
- Infection Viral (Hep-B), Mycoplasma etc.
- marrow infiltration by infections or carcinomas,
Radiation therapy Chemotherapy
- Hematologic malignancies such as leukemias
- Myeloproliferative disorders
- Congenital disorders
- Increased neutrophil destruction as in
Splénomegaly, Immune destruction

Lymphocytes

- Count varies with age
 $1.5 - 3.5 \times 10^9/l$
- The subset cells are
 - B-cells
 - Antibody mediated immunity
 - T-cells
 - Cell mediated immunity
 - NK cells



Disorders of lymphocytes

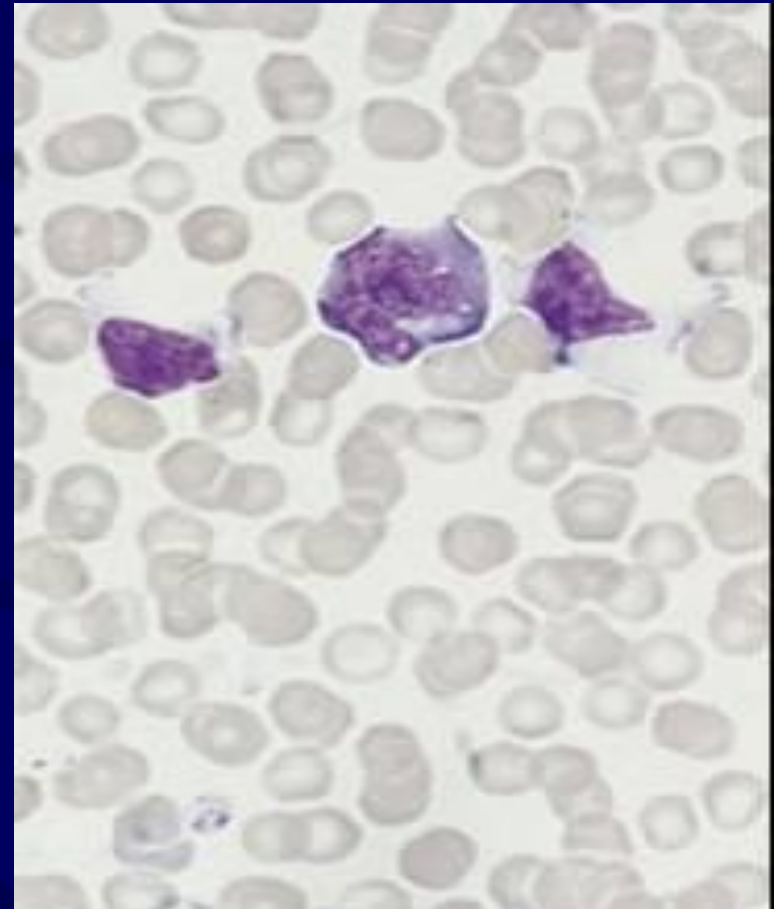
Benign disorders

- Lymphocytosis
 - Viral infections
 - Bacterial infections
 - Protozoal infections
- Lymphopenia
 - Marrow failure (drugs, irradiation)
 - Infections (viral infections)
- Immune-deficiency syndromes
 - Antibody deficiency
 - Cell mediated immune deficiency
 - Combined cell and antibody immune deficiency

Disorders of lymphocytes

Benign disorders

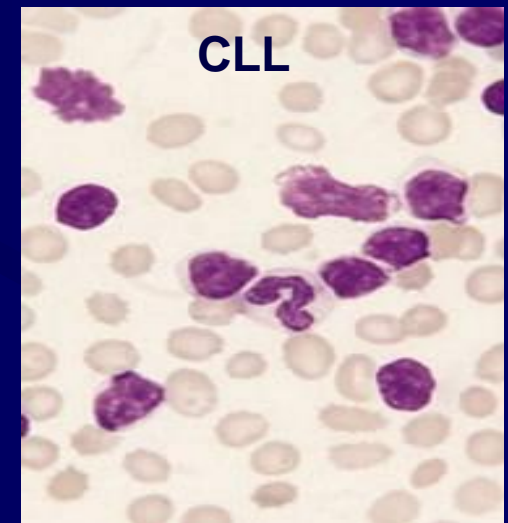
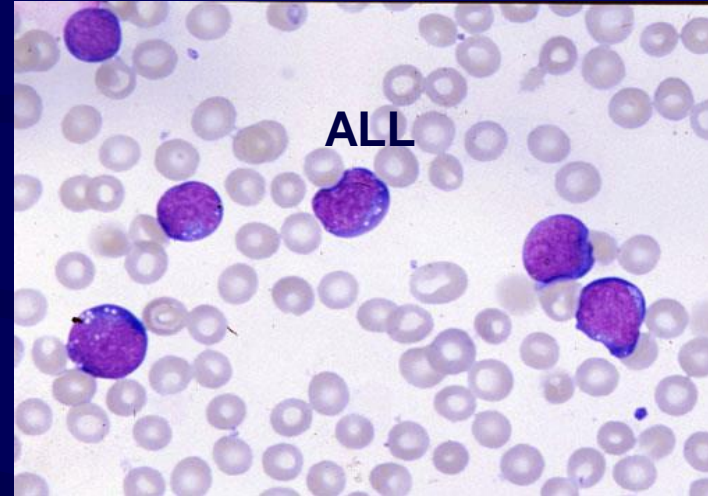
- Infectious mononucleosis
 - Epstein-Barr virus infection
- Autoimmune lymphoproliferative syndrome



Disorders of Lymphocytes

Malignant disorders

- Acute lymphoblastic (ALL) leukemia
- Chronic lymphocytic leukemia (CLL)
- Lymphomas
 - Non Hodgkin's lymphoma
 - Hodgkin's disease



Lymphocytosis

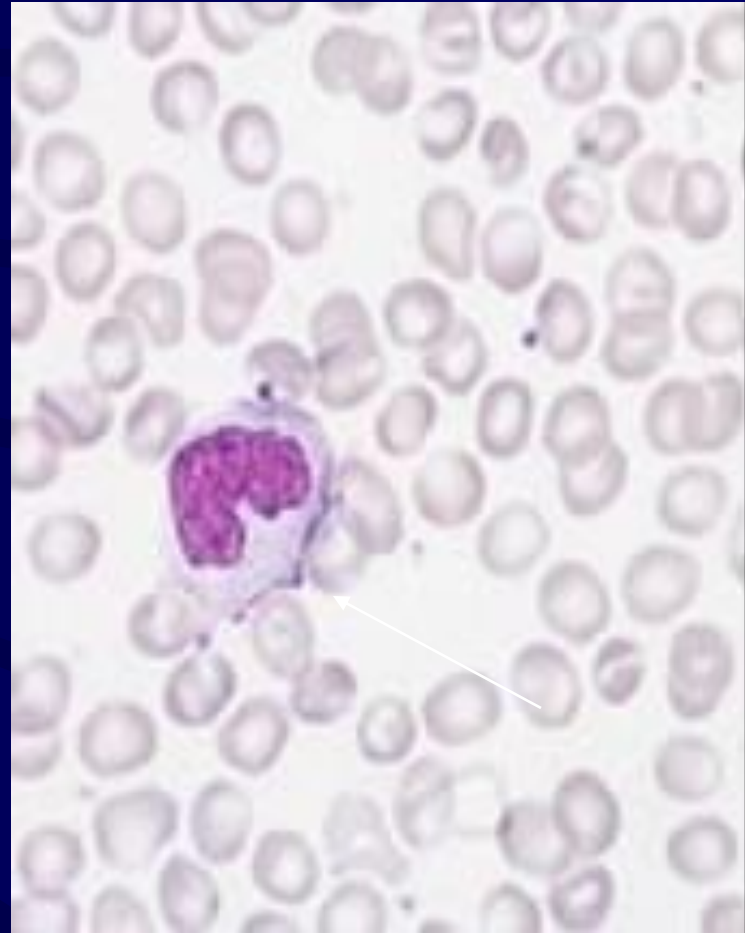
- Normally be observed in infants and young children.
- Acute infections, including pertussis, typhoid, and paratyphoid
- Infectious mononucleosis, with "atypical" lymphocytosis
- Viral infections, including measles, mumps, adenovirus, enterovirus, and Coxsackie virus
- Toxoplasmosis
- HTLV I

Lymphopenia

- Immunodeficiency syndromes, including congenital (DiGeorge syndrome, etc) and acquired (AIDS) conditions
- Corticosteroid therapy
- Neoplasia, including Hodgkin's disease, non-Hodgkin's lymphomas, and advanced carcinomas
- Radiation therapy
- Chemotherapy

Monocytes

- Count is 0.2-0.8 x $10^9/l$
- Functions
 - Antigen presentation
 - Cytokine production
 - Phagocytosis



Disorders of Monocytes

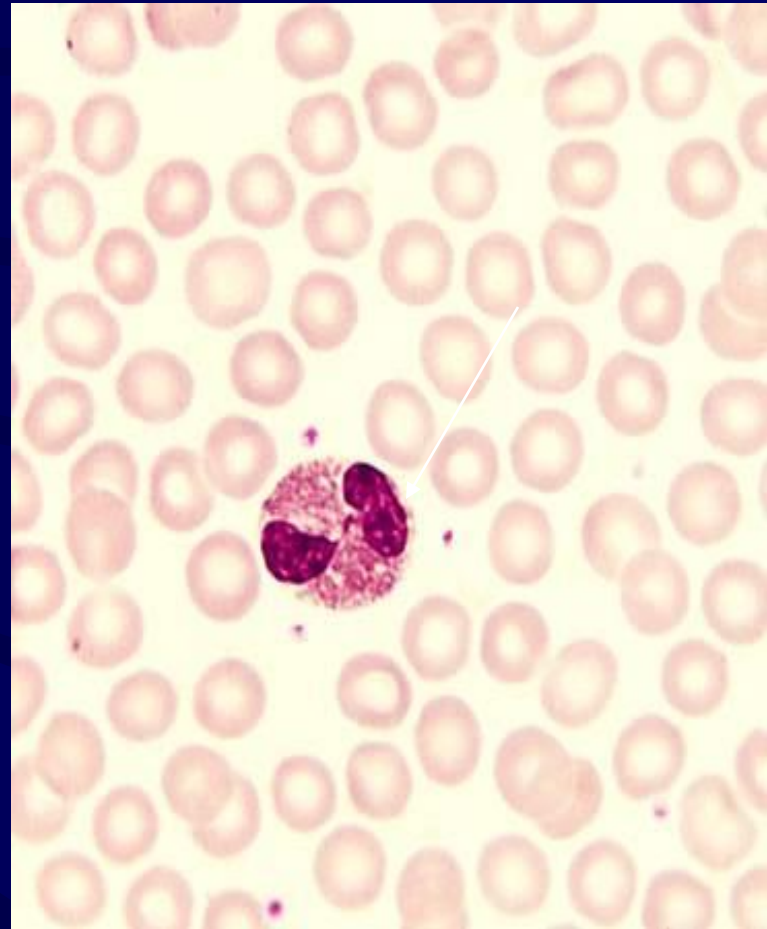
- Monocytosis
 - Benign
 - Chronic bacterial infection
 - Malignant
 - Chronic Myelomonocytic Leukaemia CMML

Monocytosis

- Infections: such as brucellosis, tuberculosis and rickettsia
- Myeloproliferative disorders
- Hodgkin's disease
- Gastrointestinal disorders, including inflammatory bowel diseases and sprue

Eosinophils

- Count $0.2 - 0.8 \times 10^9/l$
- Bilobed nucleus
- Phagocytic activity is low
- Modulation of hypersensitivity and allergic reactions



Disorders of Eosinophil

- Eosinophilia

$>0.8 \times 10^9/l$

- Allergic reactions
- Parasitic infections
- Malignancy
 - HD, NHL
- Inflammatory conditions
- Myeloproliferative disorders
- Hypereosinophilic syndrome

Eosinophilia

- Allergic drug reactions
- Parasitic infestations - with tissue invasion
- Extrinsic asthma
- Hay fever
- Extrinsic allergic alveolitis ("farmer's lung")
- Chronic infections
- Hematologic malignancies: CML, Hodgkin's disease

Eosinopenia, Monocytopenia & Basopenia

- Acute stress reactions with increased glucocorticoid and epinephrine secretion
- Cushing's syndrome with corticosteroid therapy
- Steroid therapy
- Acute inflammation

Basophils

- Count $0.1 - 0.2 \times 10^9/l$
- Bilobed nucleus
- Nucleus is hidden behind the granules
- Inflammatory response
- Basophilia is seen in Myeloproliferative disorders (CML)

