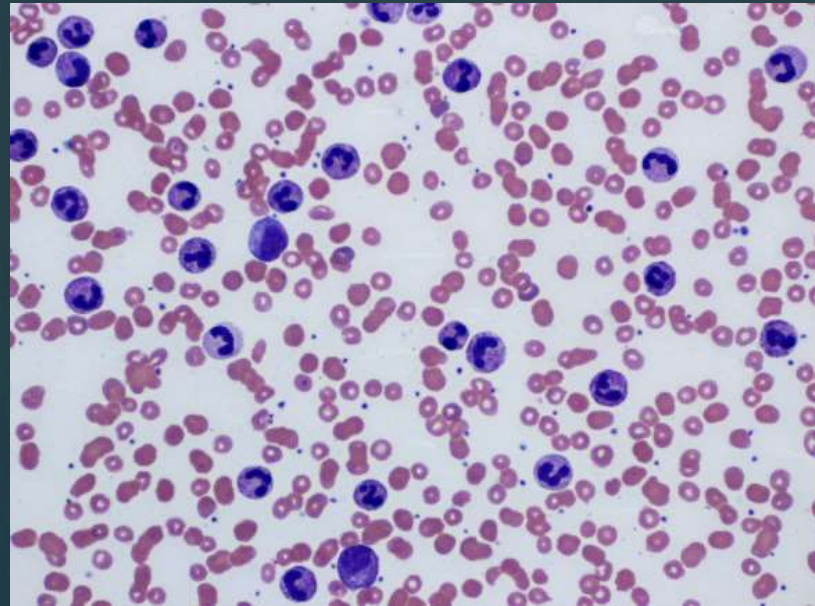
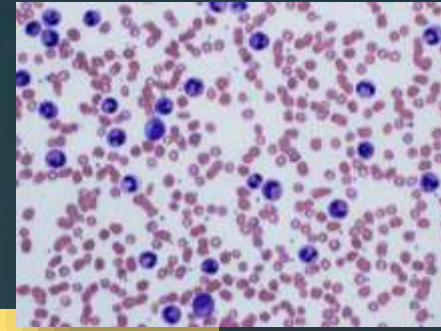


# Neutrophilia & Leukocytosis

## Causes & Evaluation



# Neutrophilia & Leukocytosis



## Neutrophilia

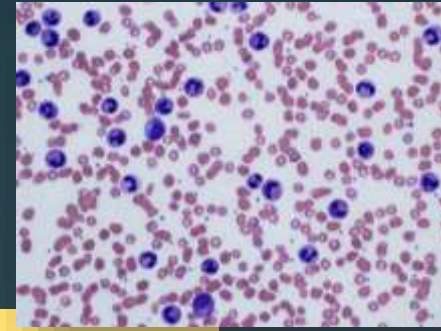
- An increase of peripheral blood neutrophils, at least two standard deviations above the mean
- For adults, this corresponds to neutrophils  $>7,700/\mu\text{L}$

## Leukocytosis

- White Blood Cells (WBC)  $>11,000/\mu\text{L}$

Normal values for WBC in children vary based on age

# Neutrophilia & Leukocytosis



## 1. Increased Production

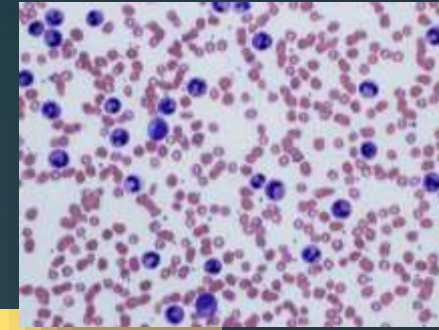
- i. Autonomous – *e.g., Hematological malignancy*
- ii. Reactive – *e.g., Infection, Inflammation*

## 2. Increased Demargination

Leukocytes, normally attached to vessel walls, separates from it due to *e.g., Glucocorticoids*

## Causes

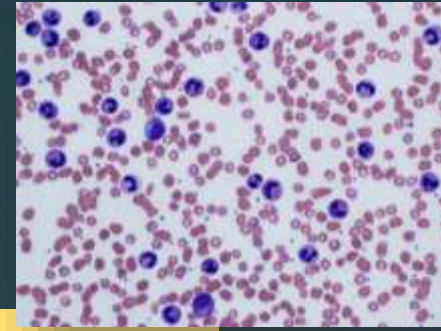
# Neutrophilia & Leukocytosis



- Normal variant
- Infection
- Inflammation – Acute or Chronic
- Medications
  - Glucocorticoids
  - G-CSF, GM-CSF
  - Catecholamines
- Asplenia *or* Hyposplenia
- Myeloproliferative disorders
- Cigarette smoking, Exercise, Physical *or* Emotional stress
- Laboratory artifacts / Spurious
  - Platelet clumping *or*, Cryoglobulinemia

## Causes

# Neutrophilia & Leukocytosis

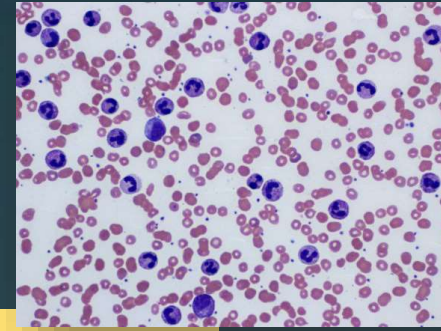


## Leukemoid reaction or Hyperleukocytosis

- Leukocytosis > 50,000 cells / $\mu$ L due to causes other than leukemia
- May be associated with infections, medications, asplenia, and other conditions

## Evaluation

# Neutrophilia & Leukocytosis



- Hx & Examination
- Complete Blood Count (CBC) with Differential counts
- Peripheral Blood Smear examination
  - Nature of the increased neutrophils, abnormalities in other lineages, & exclude spurious leukocytosis
- C-Reactive Protein (CRP), ESR
- Serum Chemistries
- Coagulation studies

### - Specialized Tests

- Bone marrow examination
- Flow cytometry
- Cytogenetics, &
- Molecular studies



## DETAILED CAUSES OF LEUCOCYTOSIS

### Spurious

Platelet clumping  
Mixed cryoglobulinemia

**Nonhematologic malignancy**

**Heatstroke**

**Generalized bone marrow stimulation (as in hemolysis)**

**Asplenia and hyposplenism**

### Primary (no other evident associated disease)

Myeloproliferative disorders (eg, CML, PV, ET)  
Hereditary neutrophilia  
Chronic idiopathic neutrophilia  
Familial myeloproliferative disease  
Congenital anomalies and leukemoid reaction  
Down syndrome  
Leukocyte adhesion factor deficiency  
Familial cold urticaria and leukocytosis

### Secondary

Infection  
Stress (physical or emotional stress, vigorous exercise)  
Cigarette smoking  
Drugs  
    Glucocorticoids  
    Recombinant G-CSF or GM-CSF  
    Catecholamines (epinephrine)  
    Lithium  
    All-trans retinoic acid  
    Isolated case reports for occasional other drugs

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