LEUKOCYTE DISORDER

- Leukocyte disorders may reflect underproduction or overproduction of a cell line
- The most common cause of leukopenia (WBC count <4,000/uL) is **neutropenia.**
- **Neutrophilia** is the most commonly seen reactive cause of leukocytosis (WBC count>11,000/ul).

- Leukocyte disorders may be reactive or malignant.
- The non-malignant leukocyte disorders are most often **reactive** responses **there is a stimulus**, e.g. infection or inflammation. The reaction disappears when the stimulus that provoked it is gone.
- The malignant leukocyte disorders have **no known stimulus** for the abnormalities….cell proliferations are *uncontrolled* by normal regulatory mechanisms.

Symptoms Associated with Reactive and Malignant WBC Disorders

Physical Signs and Symptoms	Associated With
Lymph node enlargement	Viral infection, chronic leukemia, lymphoma
Hepatosplenomegaly	Chronic leukemia, lymphoma, viral infection
Pallor, fatigue	Anemia secondary to leukemia, lymphoma, or infection
Petechiae, bruising, bleeding	Thrombocytopenia secondary to acute leukemia, DIC
Fever	Infection, less often malignancy
Rashes, itching	Viral infection, malignancy
Swollen gums	Acute leukemia
Bone or joint pain	Leukemia, multiple myeloma
Headaches	CNS involvement
Weight loss, night sweats	Malignancy
Abdominal pain	Tumor or hepatosplenomegaly

Classification of Leukocyte Disorders

I. Non-Malignant Leukocyte Disorders (Reactive leukocyte disorders)

1. Neutrophilia (shift and pathologic including neutrophilic leukemoid reaction)
2. Neutropenia
3. Eosinophilia
4. Basophilia
5. Monocytosis
6. Lymphocytosis (including infectious mononucleosis)
7. Lymphopenia

II. Malignant leukocyte Disorders

Neutrophilia - increase in the absolute # of neutrophils **TWO types** of neutrophilia:

1. **Shift/Physiologic/Pseudo** neutrophilia - redistribution of the blood pools causes a

short term increase in the total WBC/cmm and the # of neutrophils in the circulating pool.

a. Physical and emotional stimuli such as exercise, stress, fear, pain, pregnancy, epinephrine, anesthesia or heat cause a release of the marginating pool (MGP) into the circulating pool (CGP); WBC count can double but returns to normal in several hours.

b. NOT a response to tissue damage. There is no change in the total # of neutrophils in the blood pools. The marrow has not released immature neutrophils so there is no "left shift" as seen in a pathologic neutrophilia.

2. **Pathologic neutrophilia** - neutrophils leave the blood and enter the tissues in response to tissue damage this causes a release of mature and immature neutrophils from the bone marrow into the blood.

Occurs in response to:

a. Acute and chronic infections - bacterial, fungal, certain viral, parasitic.

b. Metabolic disorders - diabetes, uremia in renal disease.

c. Tissue destruction – myocardial infarction (MI), burn patient, tumors.

d. Drugs or toxins – myeloid growth factors (G-CSF), ACTH, lead.

e. Chronic inflammatory disorders - rheumatoid arthritis (RA).

f. After hemorrhage/hemolysis – neutrophils are released along with red cells.

Neutropenia - decrease in the absolute # of neutrophils.

1. Due to defects in bone marrow production, bone marrow injury (aplastic anemia),

bone marrow invasion (acute leukemia or metastatic cancer), or bone marrow suppression by chemicals or drugs. Most chemotherapy regimens cause marked marrow suppression and significant blood cytopenias.

2. Decreased neutrophils occurs in overwhelming infections in which the bone marrow's production capacity is exceeded by use (neutropenia follows a degenerative left shift); *very poor prognosis.*

3. Many viral infections are associated with a neutropenia.

4. Removal from circulation by neutrophil antibodies or an overactive spleen (hypersplenism).

Eosinophilia - increase in the absolute # of eosinophils

1. Parasitic infections - hookworm, tapeworm, trichinosis.
2. Allergic/inflammatory states - hayfever, asthma, drugs; eosinophils modify hypersensitivity reactions caused by degranulation of basophils.
3. Skin disorders - dermatitis, eczema; pulmonary syndromes.

Basophilia - increase in the absolute # of basophils

1. Chronic allergies and immediate type I hypersensitivity reactions (foods, drugs, etc.); basopenia follows anaphylactic shock.

A more usual cause for basophilia is a malignant myeloproliferative disorder — chronic myelocytic leukemia (CML), polycythemia vera, myelofibrosis.