

جامعة الانبار

كلية : الصيدلة

قسم : فرع الادوية والسموم

اسم المادة باللغة العربية: فسلجة عملي

اسم المدة باللغة الإنكليزية: **physiology lab.**

المرحلة: الثانية

التدريسي: م.م. مروة شكيب ذنون

عنوان المحاضرة باللغة العربية: العد التفاضلي لكريات الدم البيضاء

عنوان المحاضرة باللغة الإنكليزية: **Differential Count of White Blood Cells**

محتوى المحاضرة Differential Count of White Blood Cells

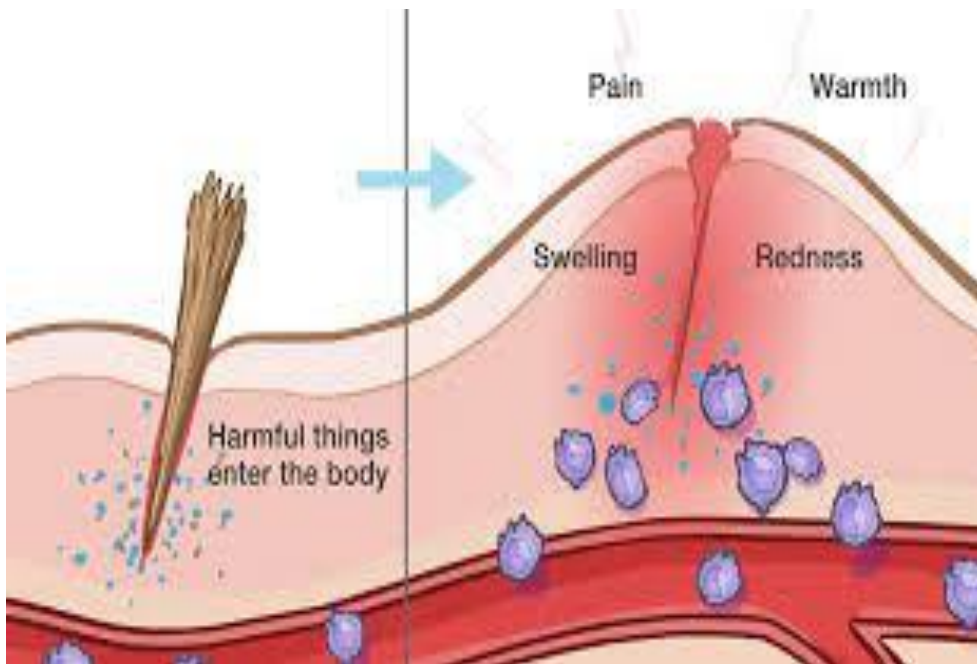
1. Smear preparation-cell identification

2. Differential Count -CI Variation

Acute Inflammation

Inflammation

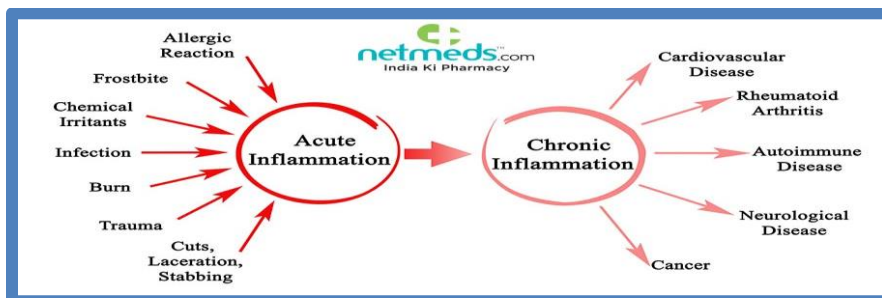
- is the process for eliminating:
 - **Pathogens OR Damaged tissue**
 - **Part of innate immunity**
 - **Three hallmark features**
 - Increased blood flow (**vessel dilation**)
 - Increased vascular **permeability**
 - **Emigration of neutrophils** into tissues



Innate Immune System

- Phagocytes (debris clearing)
 - Macrophages
 - Neutrophils
- Complement
- Natural Killer Cells
- Eosinophils
- Mast cells and Basophils

Inflammation



Acute inflammation

- Rapid onset (minutes to hours)
- Quick resolution (usually days)

Chronic inflammation

- May last weeks, months, or years

Lines of defense against infection

- **First** : Tissue Macrophages.(monocyte)
- **Second** : Neutrophils
- **Third** : Second macrophage invasion .(Blood monocyte)
- **Fourth** : Increased granulocytes and monocytes (BM)

Summary Of Line of Defense against infection

Time (depend on presence of stimulus)	Cell involved	Effect
0-1 hr.	Tissue macrophages (mobile + fixed)	Phagocytosis, Release cytokines (IL-1 & TNF α)
	Sensitized T cell	Release cytokines (IL-1 & TNF α)
1 hr. - few days	Neutrophils	Tissue infiltration (Chemotaxis, margination, diapedesis & phagocytosis)
		Neutrophilia
Several days - several weeks	Monocyte	Buildup tissue macrophage
Months - years	Granulocytes	Neutrophilia and mononucleosis (20-30 times increase in bone marrow production)
	Monocytes	

Persistence of infection, antigen, or foreign body

Persistent, unsuccessful acute inflammation

- Activation of lymphocytes
- Activation of fibroblasts
- Neutrophilic degranulation and death

Results in ONE OF THREE ;

1. Lymphocyte, monocyte, and macrophage infiltration (**pus**)
2. Epithelial or giant cell proliferation (**Granuloma**)
3. Tissue repair (**scar**)

Acute Inflammation

• Three potential clinical outcomes

1. Resolution of inflammation

- Removal of microbes/debris
- Tissue returns to normal

1. Healing/scar

- Tissue damage too extensive for regeneration
- Connective tissue growth

1. Chronic inflammation-----to be continued

Inflammation

- May cause damage to host IF ;
 1. Excessive inflammation
 - (sepsis)
 - (Cytokine storm in Covid 19)
 2. Prolonged (infection fails to resolve)
 3. Inappropriate recurrence (autoimmune disease)
- In those 3 scenario Treatment is mandatory.

Covid 19 as an example of sever Systemic

Inflammation

- Fever , Headache, Congested throat , Cough , SOB ,Anosmia LO taste
- Complete Blood Count

Shows different WBC Changes ;

- Neutrophilia (2 day)
 - Monocytosis (3-5days
 - Lymphopenia (Dxtic)
 - 2ndry Leucocytosis TLC (Bacterial pneumonia)
- Acute phase reactants increased
(CRP titre -ESR-S. Ferritin)
 - Chest CT Scan
 - PCR 65% accuracy

Acute Phase Reactants

- **Serum proteins** Mostly produced by **liver**

To increase the efficacy of fighting cells ,clot to entrap the invader for kill.

- **Levels rise with inflammation (acute or chronic)**
- Synthesis increased by cytokines often **IL-6** ;
 - **C-reactive protein (opsonin)** to mark the invader for cells.
 - Serum amyloid A
 - **Ferritin**
 - **Hepcidin**
 - **Fibrinogen-----Clotting** & affect RBC negative charge –
roulou formation, sedimentation **ESR elevation**

White Blood Cells

- **Very important Fighter In inflammation**
- **Very important marker of inflammation, Allergy**
- **Pathological variations in each types of WBCs DLC**
- **Differential blood count is essential skill for pharmacist .**

Finally we usually have one of the following scenario ;

- 1. Normal physiology**
- 2. physiological variation**
- 3. pathological variation** divided to 4 types ;

- A. **Self limited (No treatment)**
 - B. **Excessive inflammation (sepsis) (Cytokine storm in Covid 19)**
 - C. **Prolonged (infection fails to resolve)**
 - D. **Inappropriate recurrence (autoimmune disease)**
- The last three need to be treated (drug targeting)**

Differential Leucocyte Count

VS

Total Leucocyte Count

- Expressed in **cell/Cubic Mm or cell/L**
- **Provide more information than TLC**
- **DLC data combined with other clinical test results allow the health professional to make well informed diagnosis and treatment**

Normal values of differential WBCs

WBC	Percentage	Absolute value per cu mm
Neutrophils	50 to 70	3,000 to 6,000
Eosinophils	2 to 4	150 to 450
Basophils	0 to 1	0 to 100
Monocytes	2 to 6	200 to 600
Lymphocytes	20 to 30	1,500 to 2,700

Absolute values are more significant than relative values

