

WBCs / Leukocytes

Learning Objectives

- Introduction to WBCs
- Myelopoiesis & its steps
- Neutrophil characteristics
- Inflammation and signs of inflammation
- Role of Neutrophil in inflammation/infection
- Causes of Neutrophil number variation

Introduction – WBCs / Leukocytes

Human body is exposed to a number of, diseases causing microbes all the time and but body is equipped with the **White blood cells** to safeguards from these microbes.

We can say that WBCs are mobile units of body’s protective mechanisms (IMMUNITY).

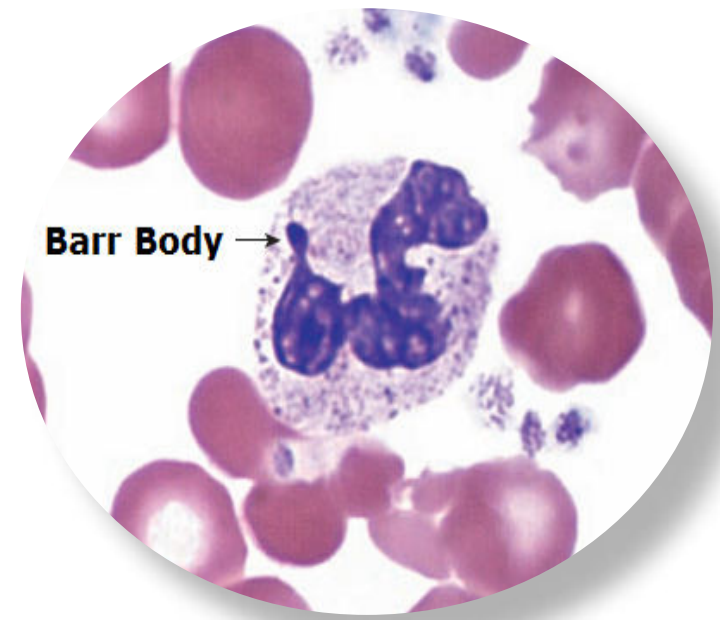
Peripheral blood - WBC count= 4000-11000/mm³, Life span 4-8 hours in bloodstream
Tissue life span estimated at 4-5 days.

Normal range of WBCs / Leukocytes

| | | | |
|--|-----------------------|--|-----------------------------|
| ▪ Total Leukocytes Count (TLC) | | | 4000–11,000/mm ³ |
| ▪ Differential Leukocytes Count (DLC) | | | |
| | <u>Absolute value</u> | | <u>% value</u> |
| Neutrophils | 3000–6000 | | 50–70 |
| Eosinophils | 150–300 | | 1–4 |
| Basophils | 01–100 | | 0.4 |
| Lymphocytes | 1500–4000 | | 20–40 |
| Monocytes | 300–600 | | 2–8 |

Neutrophil

- Most Numerous of all leukocytes : 50 – 70%
- Diameter : 10 – 14 μ
- The Cytoplasm contains closely packed, fine and violet-pink granules
- The Nucleus can have 1 – 6
- Function- Neutrophil can cause effective '**Phagocytosis**' –to **kill** foreign particles and microbes.



Form first line of defense.

Neutrophil

Granules contents (biologically active substances) –

Neutrophil - Role in Inflammation / Phagocytosis

Neutrophil blood cells are very important in combating **acute inflammation** in body by the process of

'leukocytes adhesion cascade' reaction i.e.:

Margination,

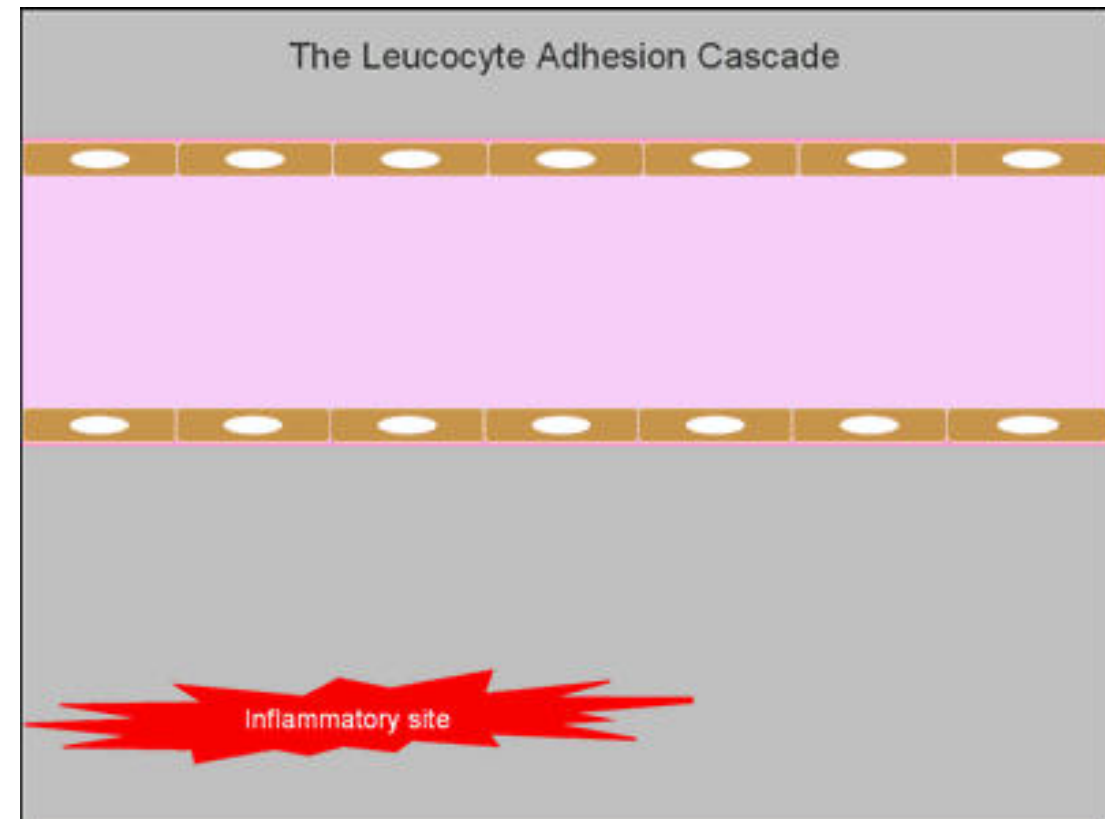
Rolling,

Adhesion,

Diapedesis

Chemotaxis and

Phagocytosis



Inflammation and Signs of inflammation

The five **cardinal signs of inflammation**—

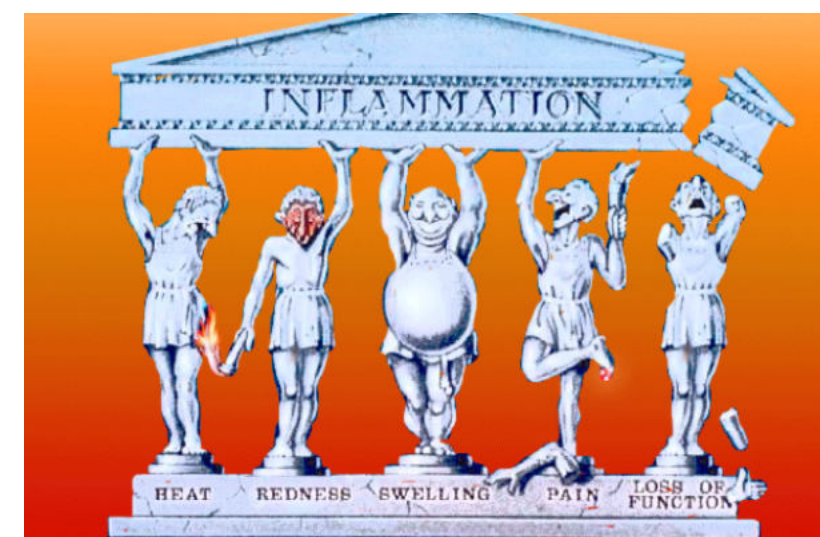
Redness (**rubor**)

Heat (**calor**)

Swelling (**tumor**)

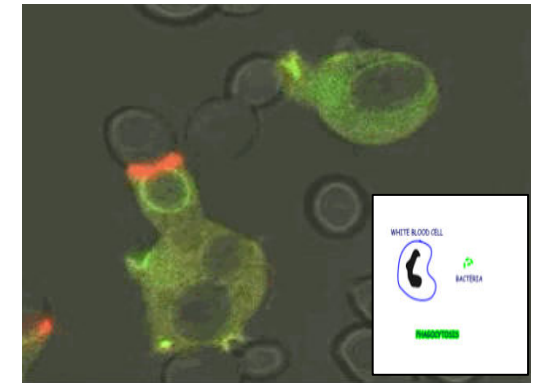
Pain (**dolor**)—were described by **Cornelius Celsus**.

A fifth consequence of inflammation is the **loss of function** of the inflamed area, **Rudolf Virchow**

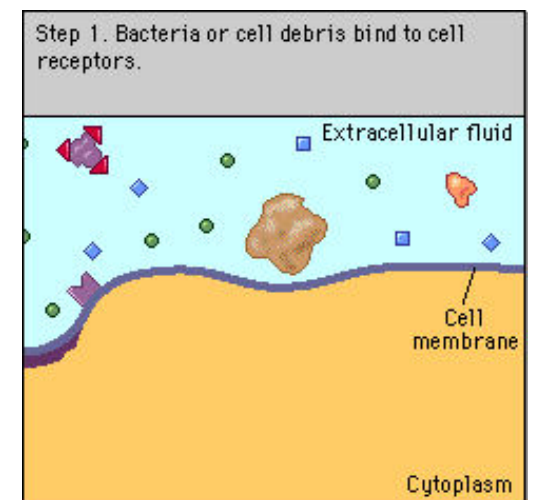
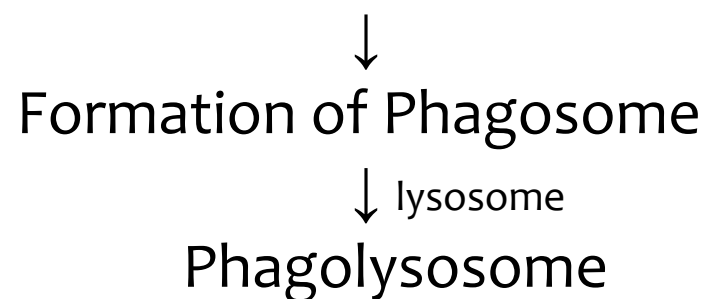


Neutrophil- Role in Inflammation / Phagocytosis

Phagocytosis- Phagocytosis: to eat, Cytos: cells
'Process of ingestion and destroying of foreign microbes/antigens'



Endocytosis-Taking in Microbes and cell debris



Neutrophil- Causes of variation in Number

Neutrophilia :Increase in neutrophil= $>12000/\text{mm}^3$

Causes-

Neutropenia :Decrease in neutrophils= $<2000/\text{mm}^3$

Causes-

Neutrophil- Leukemia

Leukaemia, is a malignant neoplasm that involve HSC in the bone marrow and results in formation of high numbers of abnormal nonfunctional white blood cells ($>1 \text{ Lac/mm}^3$). These white blood cells are not fully developed and are called blasts or **leukemia** cells.

Self Assessment

Normal WBC count is ----- / mm^3

Steps of Myelopoiesis:→ CFU-GM →→ Promyelocyte→..... → Metamyelocyte →Mature form.

30% neutrophil cell nuclei of female contains a small, densely staining structure, consisting of a condensed, inactive known as

Name 3 important granules contents of neutrophil (biologically active substances)–.....

'leukocytes adhesion cascade' reactions include

The inflammatory response involves three major stages: first,to increase blood flow; second,from the bloodstream; and third,at the site of injury.

The five cardinal signs of inflammation are of the inflamed area.

Name 6 important Released chemokines from injured tissues to mediate inflammation –

Thank you

www.FirstRanker.com