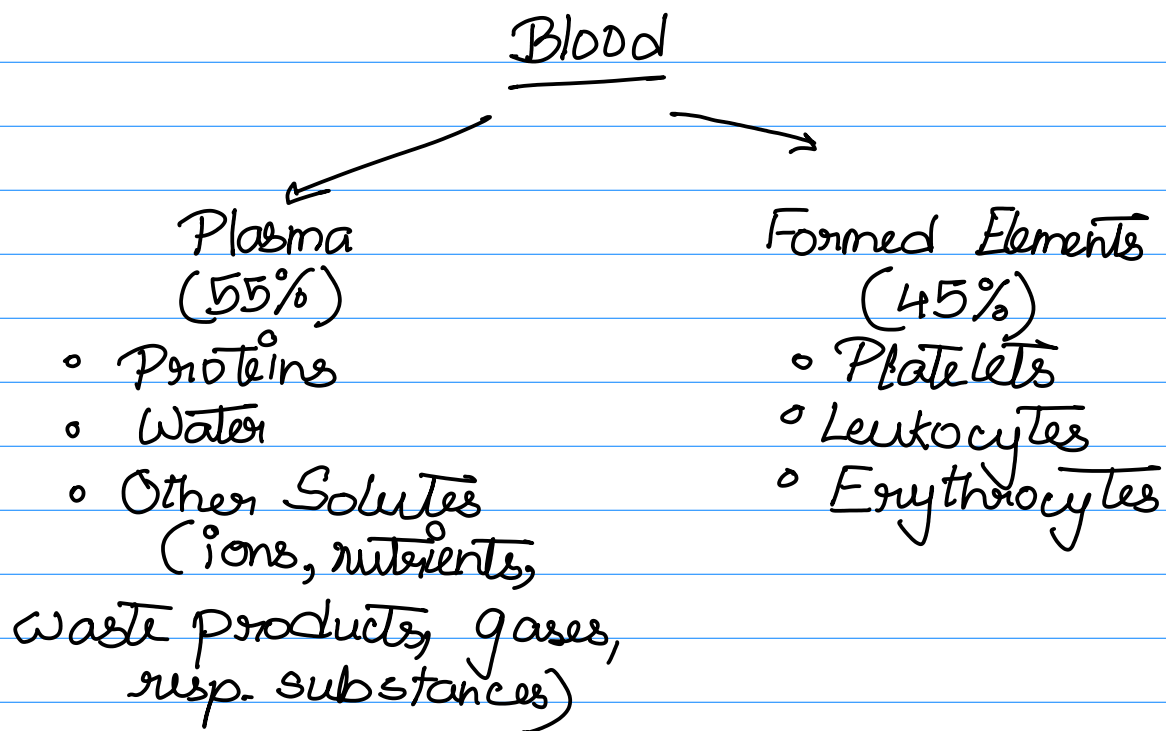


## Day 4 (Immunology)

### Components of Blood



Leukocytes are of different kinds. How do we differentiate between them?

### Cluster of Differentiation (CD) molecules

- important for differentiating between functional capacities of cells. - indicators
- 3 molecules associated with T cells
- CD3
  - coreceptor of TCR
  - composed of 6 polypeptides
  - involved in transmembrane signaling and T cell

activation

Pro-Thymocytes (T cell precursor)

- all T cells are CD3<sup>+</sup> - initially expressed in
- associated with TCR

### Note

- ① B cells, granulocytes, macrophages, are all negative for CD3
- ② NK cells are also CD3<sup>+</sup>, but express E chain of CD3.

### CD4

- glycoprotein capable of recognising non-peptide binding portion of MHC class II molecules.
- expressed on two-thirds of mature T cells
- CD4<sup>+</sup> T cells are called T<sub>H</sub> or helper T cells
- helper cells are supposed to send signals to T<sub>C</sub> cells to destroy infectious pathogen.
- member of the immunoglobulin superfamily

Note:

also presented in monocytes, macrophages & dendritic cells

## CD8

- transmembrane glycoprotein
- two-chain cell surface molecule
- expressed as a homodimer or a heterodimer
- recognises non-peptide binding positions of MHC Class-I molecules.
- affinity keeps the  $T_c$  cell and the target pathogen close together during antigen-specific activation.

## Note

can be found on NK cells & dendritic cells

We know start with cells of the Immune System.

## ① Neutrophils

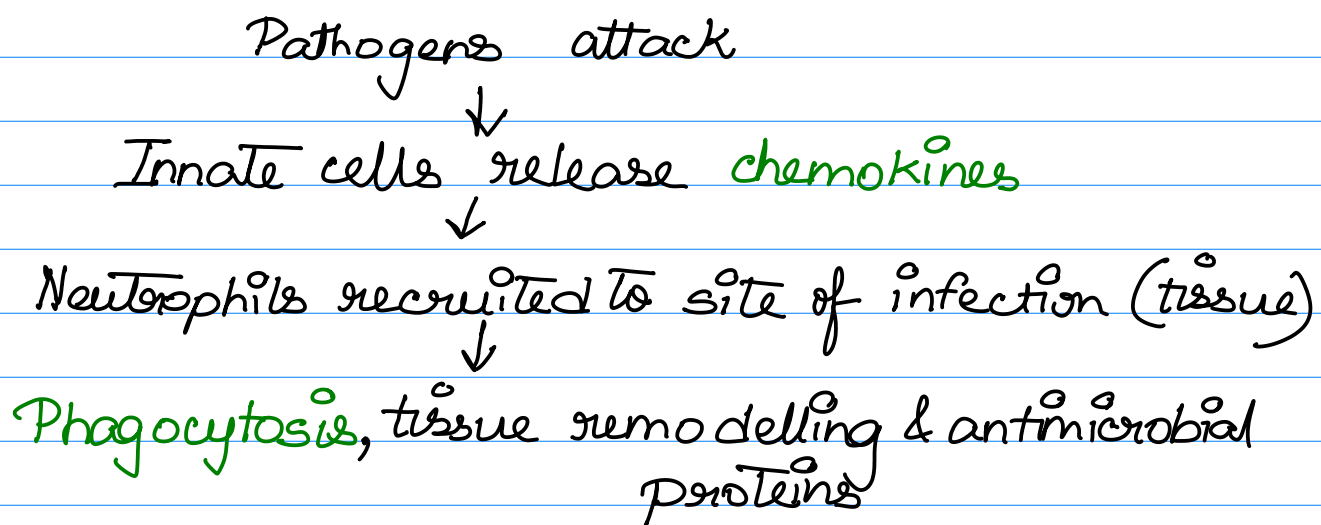
- most abundant WBCs (50-60%)
- professional **phagocytes**
- polymorphonuclear leukocytes
- Granulocyte containing

① **Specific granules** containing enzymes like lysozyme, collagenase, elastase

② **Azurophilic granules** containing myeloperoxidase, antimicrobial substances, like defensins and cathelicins.

- Differentiation in bone marrow → Circulate in blood → Recruited into tissue
- in response to infections, no. of circulating neutrophils ↑ (leukocytosis)

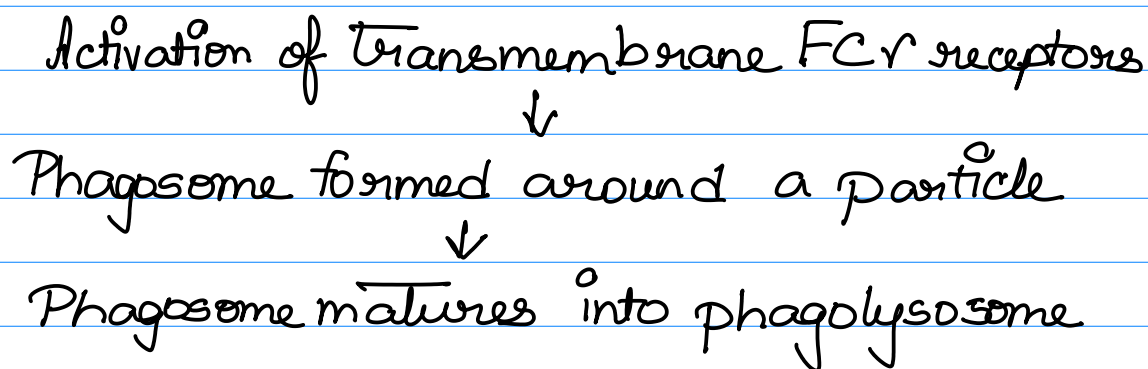
Mode of action:



How do neutrophils kill a pathogen?

- ① Phagocytosis
- ② Neutrophil Extracellular Traps (NETs)

① Phagocytosis



(development of cellular machinery for killing)

↓  
On activation, neutrophil generates ROS (respiratory burst)

& pH starts declining  
↓

Optimal activation of proteases & lysozymes  
↓

Degranulation

## ② Neutrophil Extracellular Traps (NETs)

- killing extracellular pathogens while minimising damage to host cells

### Pathway:

Reactive Oxygen Species (ROS) formation

↓  
Citullination of histone & chromatin decondensation

↓  
Rupture of nuclear pore

↓  
Uncondensed chromatin enters cytoplasm

↓  
Additional cytoplasmic and granule proteins added.

Result: DNA + antimicrobial proteins + proteases

Note : Neutrophils might also regulate the **adaptive** immune response

## ② Monocyte/Macrophage

- ~5% of WBCs
- **Migrate** into tissues → Macrophages & Dendritic cells
- short lifespan of 1-7 days.

