SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai

DEPARTMENT OF CARDIOPULMONARY PERFUSION CARE TECHNOLOGY

COURSE NAME: Physiology

UNIT I : Blood

TOPIC: White blood cells and its function

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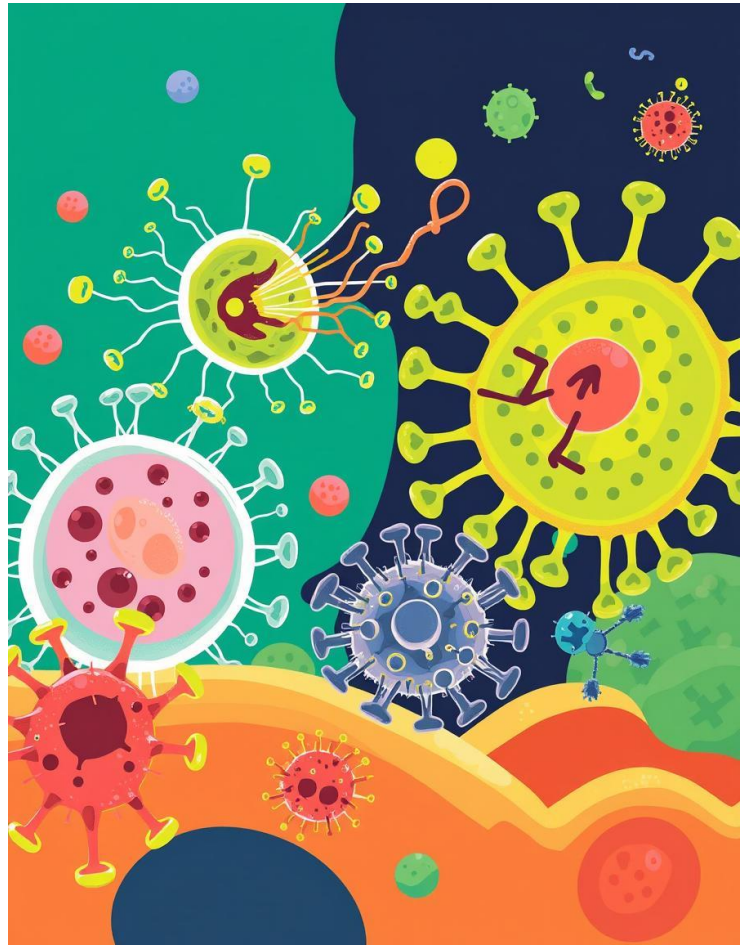
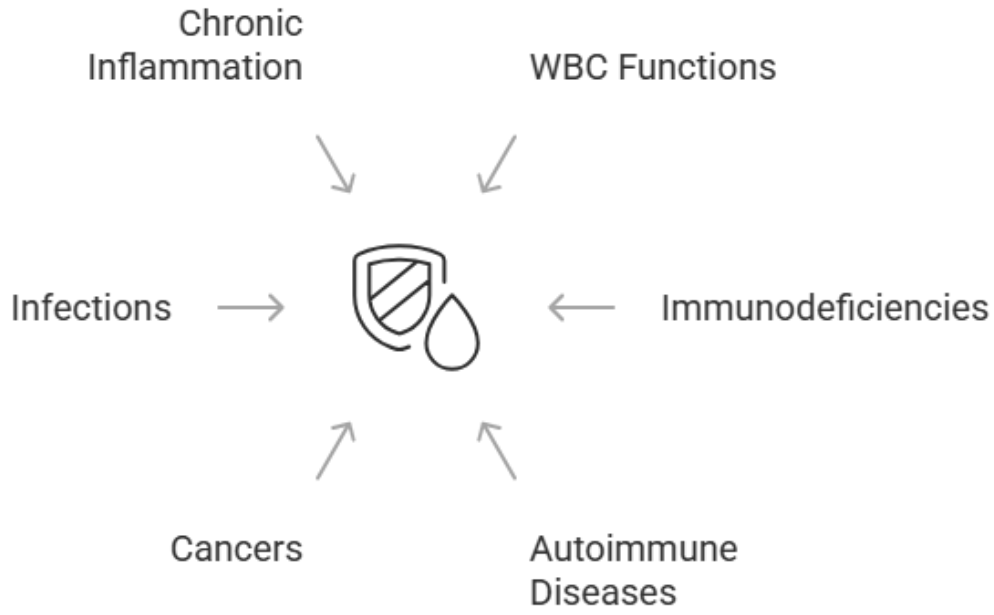
Empathize: Understanding the Need for WBCs

- The human body faces constant threats: bacteria, viruses, fungi, parasites.
- WBCs are critical for defending against these threats and maintaining health.
- **Compromised WBC function = increased risk of infection and disease.** Individuals with HIV/AIDS experience severe immune deficiency due to low WBC counts (specifically CD4+ T cells).

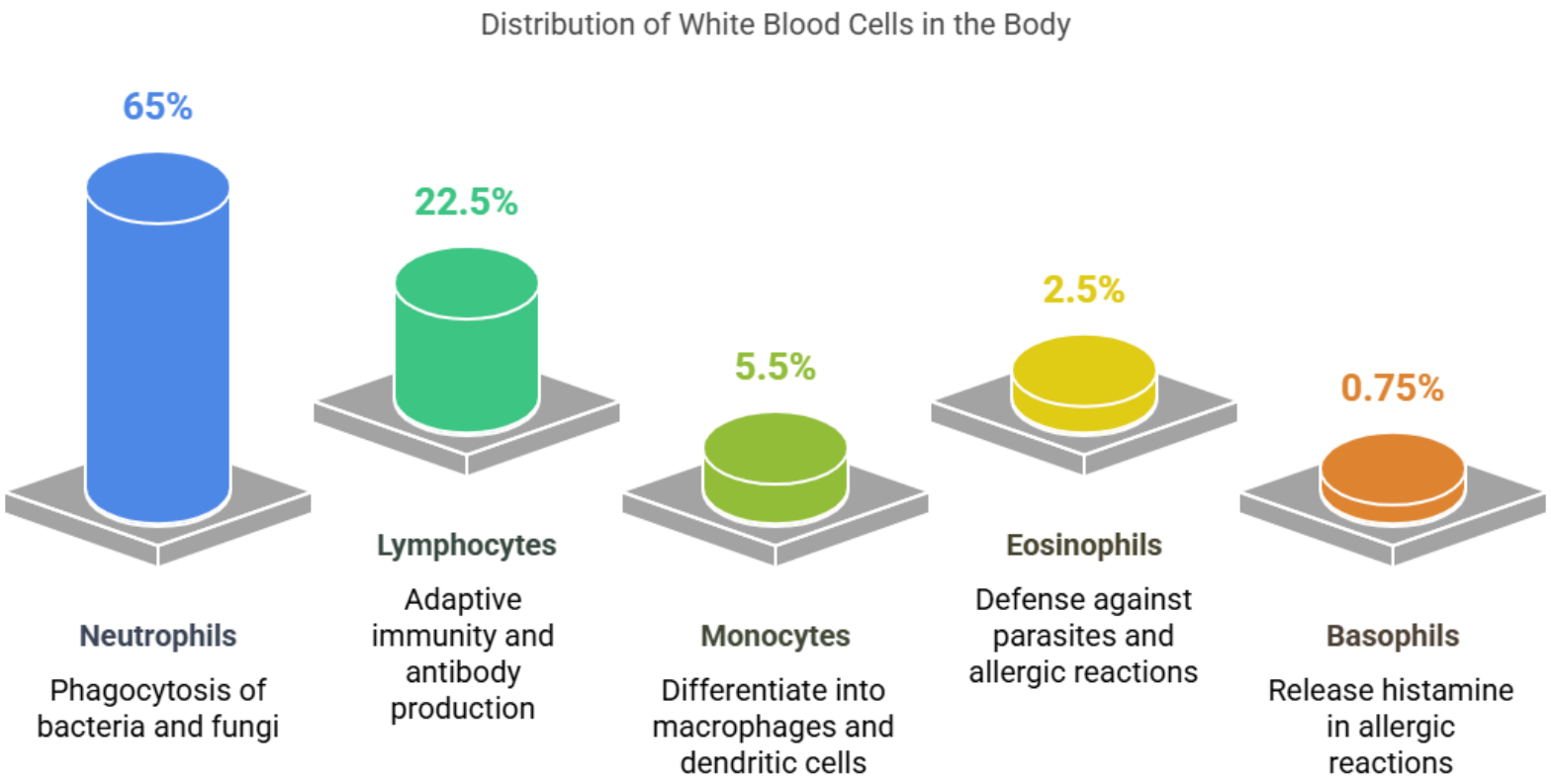


Define: Identifying the Problem - Immune Defense Gaps

- **What specific problems do WBCs solve?** Targeting pathogens, fighting infections, and removing debris.
- **Where do breakdowns occur?** Immunodeficiencies, autoimmune diseases, cancers.
- **How do these problems manifest?** Increased susceptibility to infections, chronic inflammation.



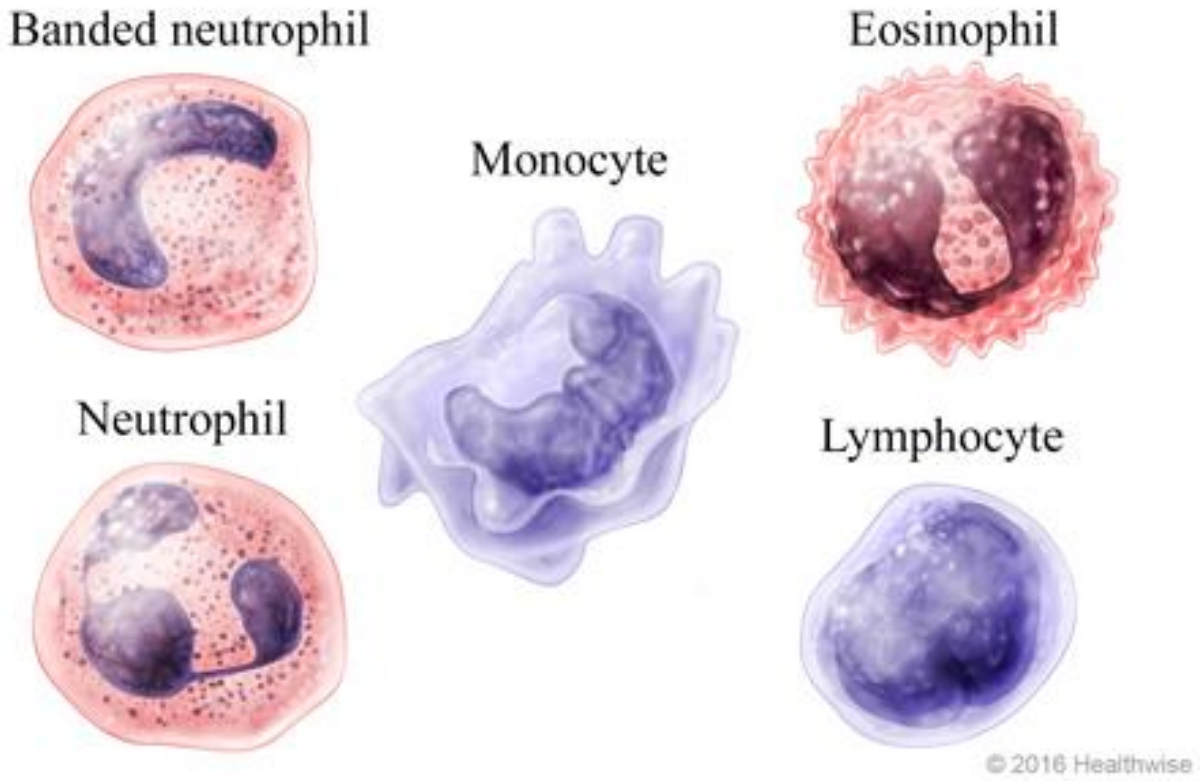
Ideate: Exploring WBC Types & Their Roles



Statistic: According to the World Health Organization (WHO), infectious diseases are responsible for approximately 13 million deaths each year globally.

Prototype: Visualizing WBC Structure

- Show a diagram of a typical WBC (e.g., neutrophil) highlighting key structures:
- Nucleus (segmented in neutrophils)
- Cytoplasm (granules in granulocytes)
- Cell membrane
- Compare and contrast the structures of different WBC types (lymphocyte vs. neutrophil).



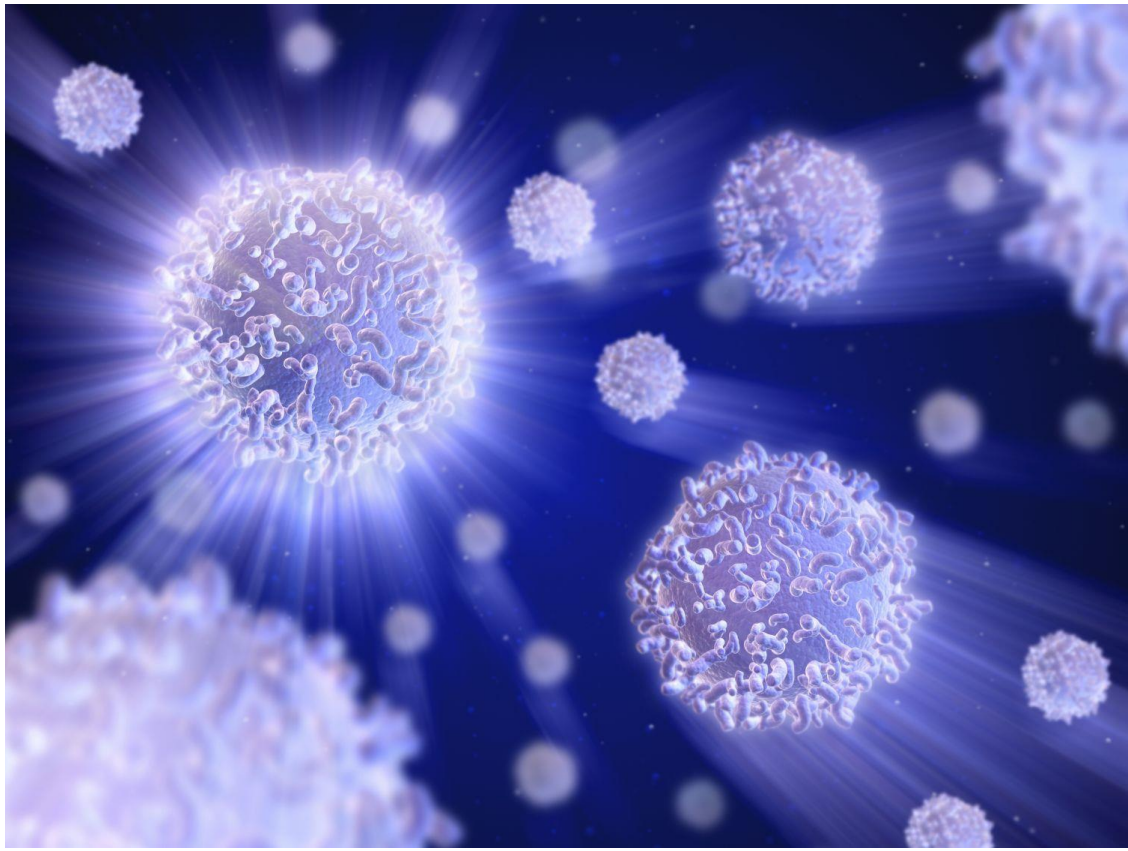
Test: Simulating WBC Function

How do WBCs interact with pathogens?

- Neutrophils engulf bacteria via phagocytosis.
- T cells recognize and kill infected cells.
- B cells produce antibodies to neutralize pathogens.
- Show a simplified animation or diagram of these processes.

Test: Quantifying WBC Effectiveness

- Normal WBC count range: 4,500 to 11,000 cells per microliter of blood.
- **Leucocytosis** (high WBC count): often indicates infection or inflammation.
- **Leukopenia** (low WBC count): increases risk of infection.
- **Example:** Chemotherapy can cause leukopenia, increasing susceptibility to opportunistic infections.



Iterate: Optimizing Immune Response

- **Personalized Immunotherapy**

Tailored treatments targeting specific WBCs.

- **Vaccination**

"Training" the immune system for future threats.

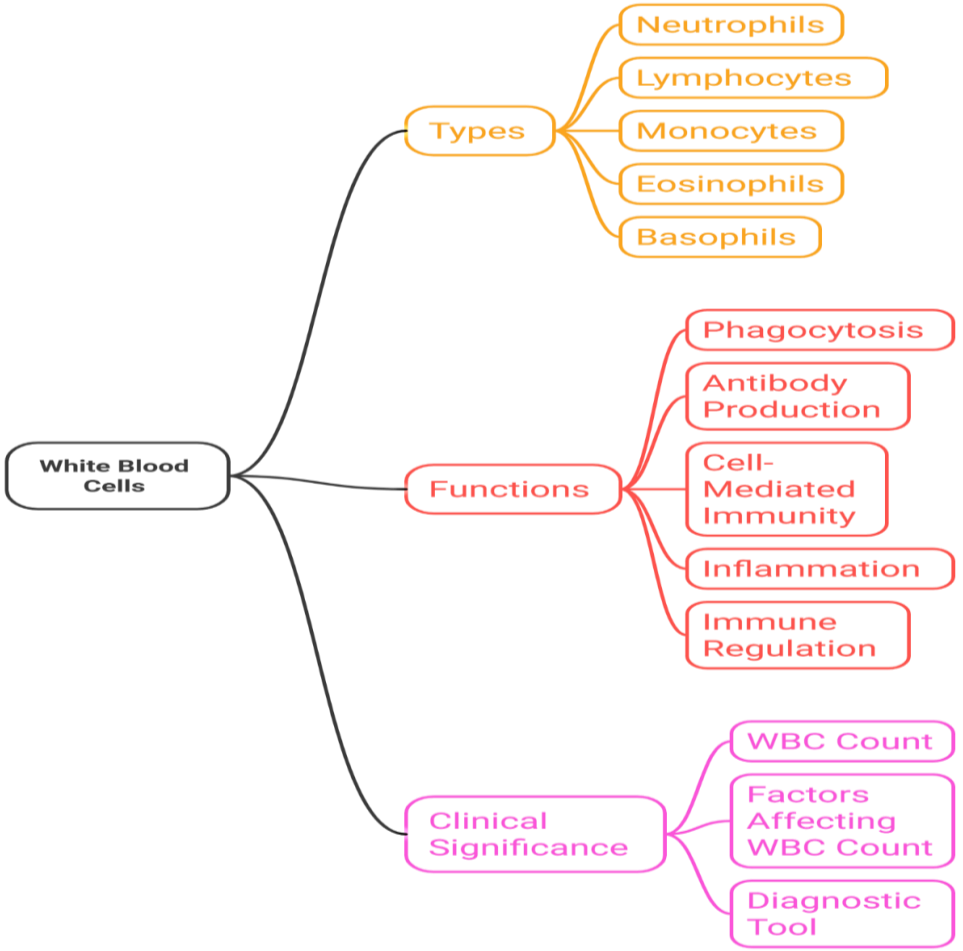
- **Lifestyle Factors**

Diet, exercise, and sleep enhance WBC function.

Next Steps

- Maintaining healthy WBC count by following diet and exercise
- Taking expert advice on any symptoms related to immune system

Summary of WBC



References

- Alberts et al., *Molecular Biology of the Cell*, 6th ed. (Garland Science, 2014).
- National Institutes of Health (NIH): www.nih.gov
- World Health Organization (WHO): www.who.int
- UpToDate: www.uptodate.com (for clinical information)

Thank you