An Introduction to Normal Lymphocytes in Peripheral Blood Smears

LYMPHOCYTES
Lymphocytes (lymphs):

- are involved in the immune response including antigen-antibody reactions.
- have surface receptors that enable them to recognize specific “non-self” antigens (foreign substances)
- receptors are very specialized - each can match only one specific antigen.
- respond to eliminate pathogens or pathogen-infected cells.
Lymphocytes, visually indistinguishable from one another, are classified as:

- B Lymphocytes (B Cells)
- T Lymphocytes (T Cells)
- Natural Killer Cells (NK Cells, K Cells, Killer Cells)
Lymphocytes Data

- **Cell Size**: 7-18µm (larger lymphocytes have more cytoplasm)
- **Nucleus**: round to oval; may be slightly indented; occasional nucleoli
- **Chromatin**: condensed to deeply condensed
- **Cytoplasm**: scant to moderate; sky blue; vacuoles may be present
- **Granules**: +/- few azurophilic
- **Vacuoles**: absent to numerous
- **% Range**: 20%-40% of WBC’s
- **# Range**: $1.3-1.5 \times 10^9$/L
  (0.8-4.8 billion per liter of blood)
Lymphocyte Slide #1
Lymphocyte Slide #4
B Cells (bursa-derived cells):

- are major cellular components of the immune response.
- secrete antibodies which attach to specific antigens in order to destroy them.
- help to eliminate or prevent pathogenic growth.
- mature into plasma cells which produce antibodies
T cells (thymus cells):

- are major cellular components of the immune response.
- are involved in immune responses that do not involve antibodies.
- are involved in stimulating phagocytosis and the release of various chemicals in response to an antigen.
Antigen Presentation

dendritic cell

1. A phagocyte "eats" a bacteria.

2. Parts of the bacteria (antigen) go to the surface of the phagocyte

3. The phagocyte presents the antigen to a helper T cell

activated helper T cell

4. The helper T cell is activated.

helper T cell
Natural Killer Cells (NKC) play a major role in the host-rejection of both tumors and virally infected cells.

NK cells are cytotoxic; small granules in their cytoplasm contain special proteins involved in destroying cells.
Production of Memory Cells Part 1

1. The B-cell finds an antigen which matches its receptors.
2. It waits until it is activated by a T-helper cell.
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2. It waits until it is activated by a T-helper cell.

3. Then the B-cell divides to produce plasma and memory cells.

4. Plasma cells produce antibodies that attach to the current type of invader.
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5. “Eater cells,” prefer intruders marked with antibodies and "eats" loads of them.

6. If the same intruder invades again, memory cells help to activate the immune system to activate much faster.