

MODULE 6 L04

Lymphocytes

Dr. Lisa Brinn
lbrinn@fiu.edu



4. Lymphocytes

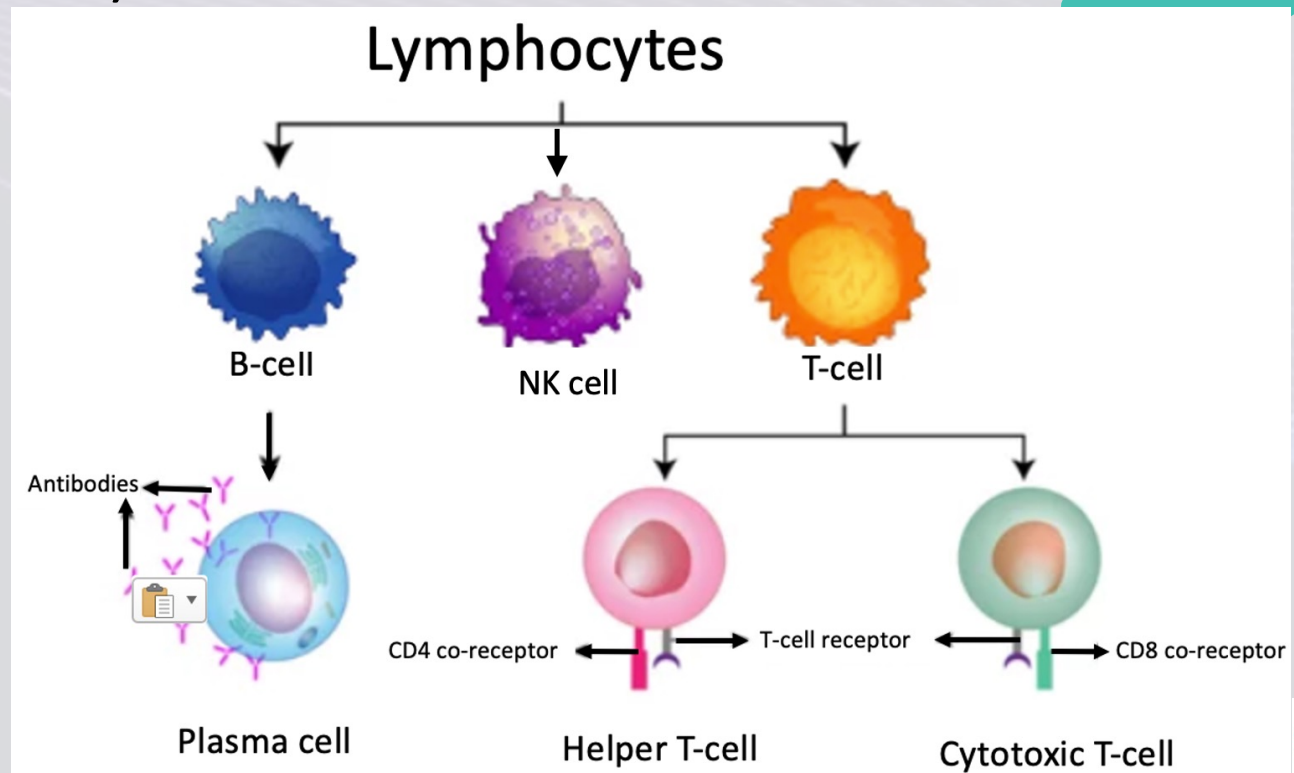
- Primary cells of the lymphatic system
- Mainly responsible for adaptive immunity
- Respond to the presence of:
 - ❖ Invading organisms
 - Bacteria and viruses
 - ❖ Abnormal body cells
 - Virus-infected cells
 - Cancer cells
 - ❖ Foreign proteins
 - Toxins released by some bacteria
- Initiate immune response
 - ❖ Eliminate threats or render them harmless
 - Combination of physical and chemical attacks
 - Circulate in bloodstream → peripheral tissue → bloodstream through lymphatic system
 - Time spent in lymphatic system varies

Encounter invading pathogens

Initiate an immune response

Types of Lymphocytes

1. T cells (Thymus-dependent)
2. B cells (bone marrow-derived)
3. NK cells (natural killer)



T Cells

- Represents 80% of circulating lymphocytes
- Originate in bone marrow
- Migrate to thymus, become activated

❖ Immunocompetent

- Types of T cells

- a) Cytotoxic T cells

- T-killer cells
 - CD8⁺

- b) Helper T cells

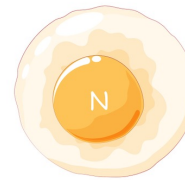
- CD4⁺

- c) Regulatory T cells

- Suppressor T-cells

- d) Memory T cells

- e) Naïve T cells



Naïve T cell

has not encountered antigen



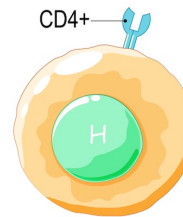
Regulatory T cell

modulate the immune system, prevent autoimmune disease



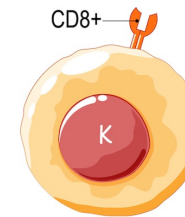
Memory T cell

augmented immune response after reintroduction of pathogen



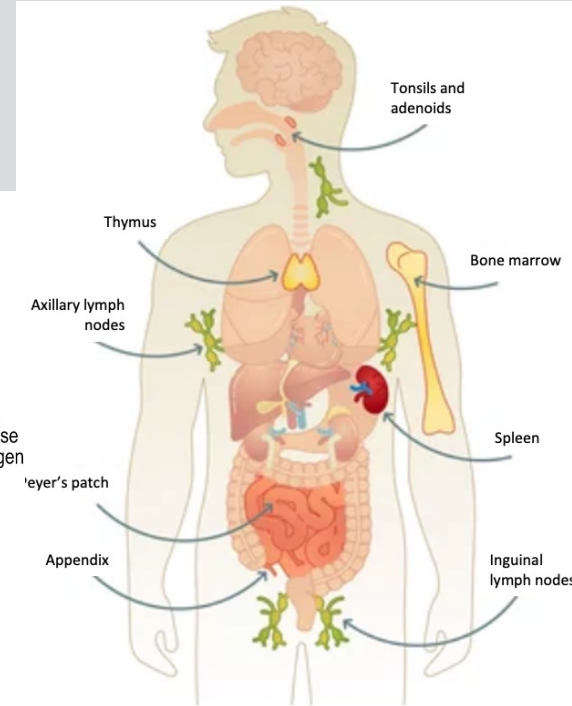
T helper

assist other lymphocytes to mature and activate



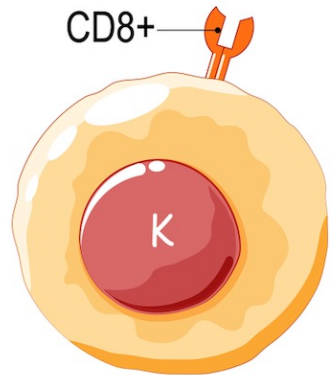
T-killer

destroy virus-infected cells, and tumor cells



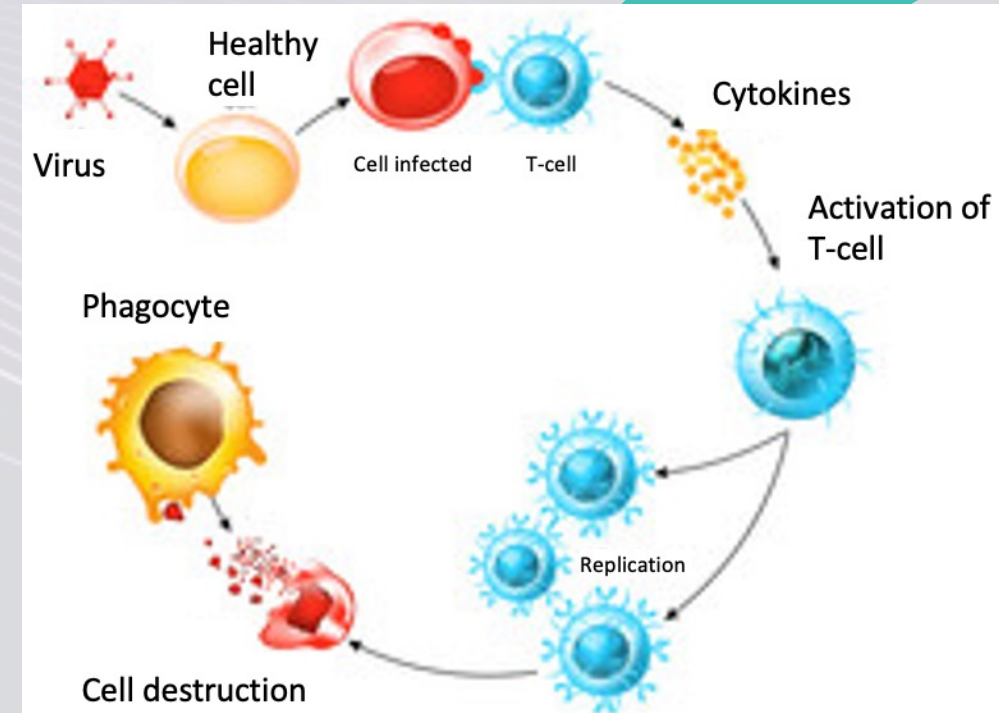
a) Cytotoxic T Cells

- Also known as CD8⁺ T cells
- Attack foreign cells or body cells infected by viruses
 - ❖ Involves direct contact
 - ❖ Induce target cells to undergo apoptosis



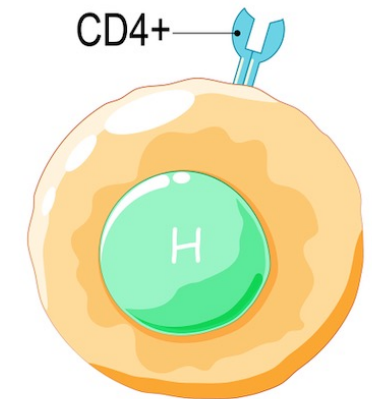
T-killer

destroy virus-infected
cells, and tumor cells



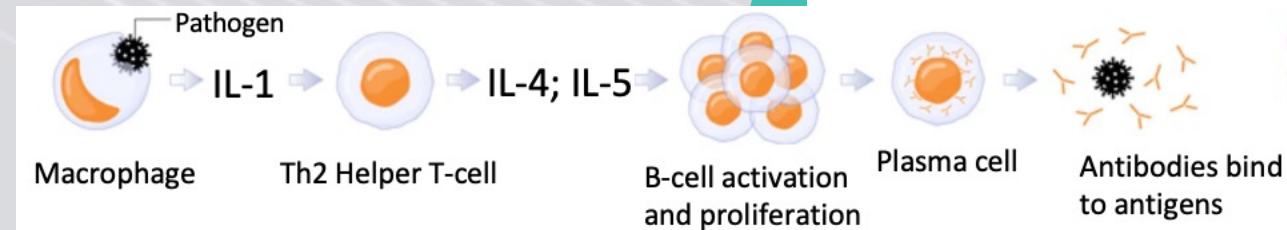
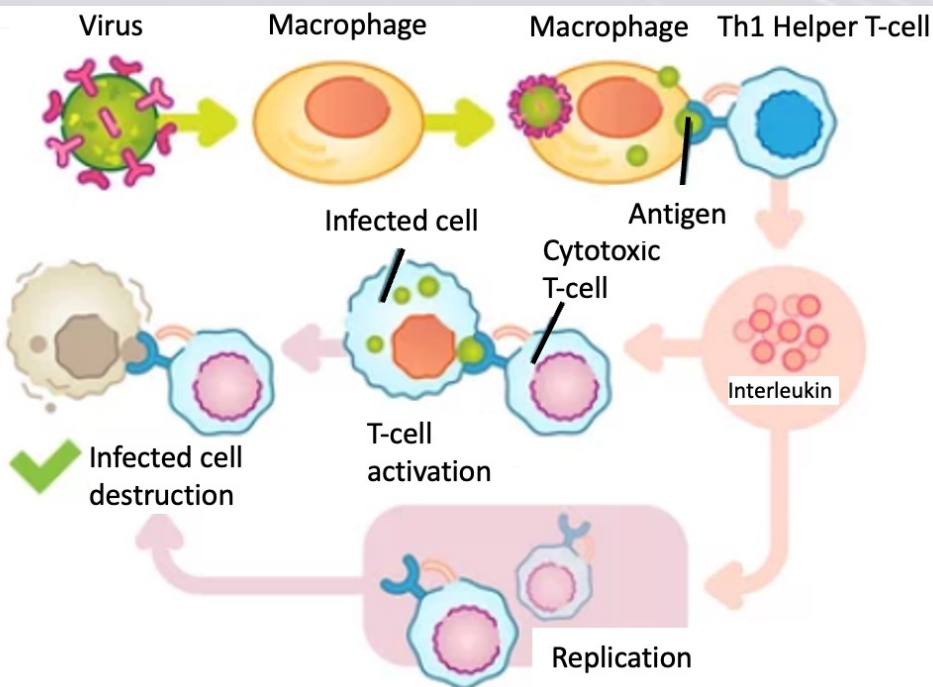
b) Helper T Cells

- Secrete cytokines that act to enhance immune responses
- Types:
 - ❖ Th1 cells
 - Cytokines → macrophages and other types of T cells
 - ❖ Th2 cells
 - Cytokines → B cells → plasma cells → antibodies



T helper

assist other lymphocytes to mature and activate



c) Regulatory T Cells

- Also known as suppressor T-cells
 - Function:
 - ❖ Suppress other T cell immune responses
 - Maintain homeostasis
 - Maintain self-tolerance
 - 1. Inhibit T-cell proliferation
 - 2. Inhibit cytokine production
- Prevent autoimmune diseases
 - Limit chronic inflammatory diseases



Regulatory T cell

modulate the immune system,
prevent autoimmune disease

d) Memory T Cells

- Forms after exposure to a pathogen
- Mounts a rapid immune response
- Live for many years
- Express chemokine and adhesion receptors
 - ❖ enable them to invade non-lymphoid tissues
- Necessary for protective immunity
 - ❖ Against invading pathogens
 - ❖ Immunosuppression
- Threatens transplant survival
 - Challenging for transplatation

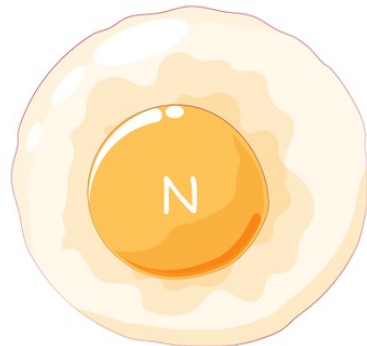


Memory T cell

augmented immune response
after reintroduction of pathogen

e) Naïve T Cells

- Opposite of memory cells
 - Fully functional immunologically
 - ❖ Have not yet encountered an antigen to respond to
 - Have left primary organ and entered a secondary lymphoid organ
 - Lack:
 - ❖ Homing receptors for peripheral tissues
 - ❖ Chemokine receptors for inflammatory cytokines
- } unable to enter non-lymphoid tissues



Naïve T cell

has not encountered
antigen

B Cells

- Represents 1-15% of circulating lymphocytes
- Originate in bone marrow
- Become immunocompetent in bone marrow
- Differentiates into:

- ❖ Plasma cell (plasmocytes)

- Produce
- Secrete
- Die after

Antibodies

↓ React with

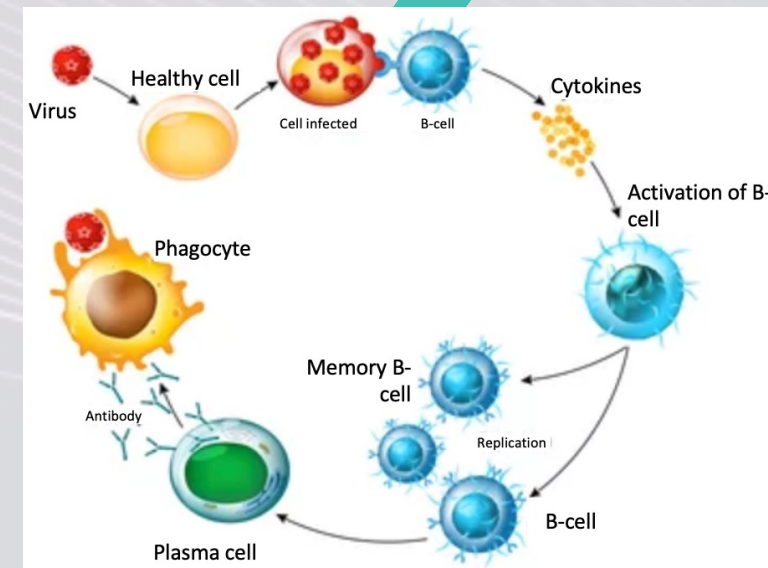
Antigens

Starts chain of events

- Antigens

- ❖ usually associated with:

- Pathogens
- Foreign compounds



NK Cells

- Represents 5-10% of circulating lymphocytes
- Originate in bone marrow
 - ❖ Also in lymph nodes, thymus, liver and uterus
- Functions:
 - ❖ Apoptosis:
 - Killing virally infected cells
 - Detecting and controlling early signs of cancer
 - ❖ Important role in pregnancy

