

What is Cellular Immunity?

Worksheet

Cellular immunity is the antibody-free branch of adaptive immunity in which cytotoxic T cells (CD8+) recognize infected or abnormal cells via MHC class I and kill them directly.

Questions

1. Which cell type is central to cellular immunity?
 - A) B lymphocytes
 - B) T lymphocytes
 - C) Red blood cells
 - D) Platelets
2. Cytotoxic T cells recognize infected cells via which molecule?
 - A) MHC class I
 - B) Antibody Fc region
 - C) Hemoglobin
 - D) Insulin receptor
3. Which immune branch does NOT rely on antibodies?
 - A) Humoral immunity
 - B) Cellular immunity
 - C) Passive immunity
 - D) Vaccination-induced immunity
4. What do cytotoxic T cells release to kill target cells?
 - A) Histamine
 - B) Perforin and granzymes
 - C) Insulin
 - D) Mucus
5. Why can't antibodies alone clear a virus that has already infected a cell?
6. A patient with a genetic defect that blocks T cell development frequently develops severe viral and fungal infections despite normal antibody levels. Explain why.
7. Why does organ transplant rejection primarily involve cellular immunity?
8. Define: What is cellular immunity?
9. Define: What do cytotoxic T cells (CD8+) do?
10. Define: What do helper T cells (CD4+) do?

Answer Key

1. B) T lymphocytes - T lymphocytes (T cells) mediate cell-mediated (cellular) immunity.
2. A) MHC class I - Infected/abnormal cells display foreign peptides on MHC class I, which CD8+ T cells detect.
3. B) Cellular immunity - Cellular immunity works via direct T cell action, not antibodies.
4. B) Perforin and granzymes - Perforin creates pores in the target cell membrane; granzymes trigger apoptosis.
5. Antibodies can only bind targets outside cells (extracellular) Once a virus is inside a host cell, antibodies cannot reach it Cytotoxic T cells recognize viral peptides displayed on MHC class I The infected cell is killed, stopping viral replication
6. Normal antibody levels show B cells (humoral immunity) are working Without T cells, cytotoxic T cells cannot kill infected cells Helper T cells also can't activate macrophages or coordinate the response Cellular immunity fails, so intracellular pathogens (viruses, fungi) are not cleared
7. Transplanted cells carry foreign MHC molecules on their surface Recipient's cytotoxic T cells recognize these as non-self T cells directly attack and destroy the transplanted tissue cells This is why immunosuppressants targeting T cells (e.g. cyclosporine) prevent rejection
8. The branch of adaptive immunity mediated by T lymphocytes that directly destroys infected, cancerous, or foreign cells - no antibodies involved.
9. They recognize infected or abnormal cells via MHC class I and kill them by releasing perforin and granzymes.
10. They release cytokines that activate cytotoxic T cells, B cells, and macrophages, coordinating the immune response.

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