

1. People often talk about “strengthening their immune system,” but there are actually multiple organ systems that have to function properly to defend us against pathogens. Select two organ systems and explain the role they play in defending the body against pathogens.

My answer:

- Cardiovascular System: Some white blood cells travel through the blood to distant locations like the thymus and lymph nodes, while others patrol the blood in search of pathogens.
- Lymphatic System: Some white blood cells monitor pathogens that may have accumulated in the lymph (extracellular fluid). Lymphocytes wait in lymph nodes, prepared to pounce on pathogens.
 - Thymus: where lymphocytes go
 - Spleen: regulating blood cells
 - Lymph nodes: filters lymphocytes
 - Lymphatic vessels: drain extracellular fluid
 - Non-specific defenses: barriers and inflammation (acquired immunity)
 - Specific defenses: cell-mediated and antibody-mediated (innate immunity)

2. In your own words or labeled sketch, describe each step of inflammation from wounded cells to clean-up by the white blood cells.

My answer:

- Cardiovascular System: Some white blood cells travel through the blood to distant locations like the thymus

3. HIV that causes AIDS and the Yersinia bacteria that cause the plague attack two critical cells of the immune response. Explain which cell type each pathogen attacks and why these cells are an important part of our defenses.

My answer: AIDS destroy the Helper T Cells. Helper T Cells are important because they help T & B Cells recognize antigens to know which infected cells to attack. The Yersinia bacteria destroys the Macrophages.

- Macrophages are necessary because they also help B & T cells figure out what to kill.
- Macrophage picks up pathogens and rips them apart
- Takes the antigen of the pathogen and puts them on its plasma membrane
- It releases chemicals to bring over the Helper T Lymphocyte
- Helper T Lymphocyte: helps T & B cells recognize antigens

4. With COVID-19 we hear a lot about antibody testing. If a person has antibodies against SARS-CoV-2, what has happened in the body to produce those antibodies?

My answer:

- Helper T cells tell naive (uneducated) B cells what to make antibodies against. Some B cells can also activate directly when they come in contact with a pathogen.
- Most of the naive B cells that are educated become plasma B cells that pump out large quantities of antibodies.
- Antibodies attach to the antigens on the surface of pathogens. This traps the pathogens in place and they can be consumed and destroyed by the phagocytes, including the macrophages.
- Some of the educated B cells hold back and are called memory B cells. If the pathogen attacks again, the memory B cells become Plasma B cells and start producing antibodies against them quickly.
- Memory T and memory B cells can divide and remain in the body for a long time. If a pathogen with the same antigen re-enters the body, the memory cells can quickly transform into active cytotoxic T cells or plasma B cells, bypassing the time it would take for the body to learn about antigens and what to kill.