What is the Immune System?

Worksheet

The immune system is a coordinated network of barriers, cells (like white blood cells) and organs (like the thymus, spleen and lymph nodes) that detects and eliminates pathogens while distinguishing the body's own cells from foreign invaders.

Questions

1. Which branch of the immune system responds first to an infection?

A) Adaptive immunity
B) Innate immunity
C) Passive immunity
D) Herd immunity

2. Which cells produce antibodies?

A) T cells
B) Red blood cells
C) B cells
D) Platelets

3. What gives the adaptive immune system 'memory'?

A) Neutrophils
B) Memory B and T cells
C) Skin barrier
D) Stomach acid

4. Which of these is a physical barrier, not a cell-based defense?

A) Macrophage
B) Antibody
C) Skin
D) T cell

5. A splinter breaks the skin and bacteria enter the wound. Which immune response reacts first, and how?

6. A child receives the measles vaccine. Explain how the immune system builds long-term protection.

7. In an autoimmune disease like type 1 diabetes, what goes wrong with the immune system?

8. Define: What are the two main branches of the immune system?

9. Define: What is the role of lymph nodes?

10. Define: What do B cells produce?

Answer Key

1. B) Innate immunity - Innate immunity reacts within minutes to hours, before a specific adaptive response can form.

2. C) B cells - B cells differentiate into plasma cells that secrete antibodies.

3. B) Memory B and T cells - Memory cells persist after infection and enable a faster response on re-exposure.

4. C) Skin - Skin is a physical barrier that is part of innate immunity, unlike the other cell/protein-based options.

5. Step 1: The skin barrier is broken, so bacteria can enter. Step 2: Innate immune cells (neutrophils, macrophages) rush to the site within minutes. Step 3: They engulf bacteria by phagocytosis and release inflammatory signals, causing redness and swelling. Step 4: If bacteria persist, dendritic cells carry antigens to lymph nodes to activate the adaptive response.

6. Step 1: The vaccine introduces a harmless piece (or weakened form) of the measles virus antigen. Step 2: B cells recognize the antigen and, with T-cell help, produce specific antibodies. Step 3: Some activated B and T cells become memory cells that persist for years. Step 4: On real exposure to measles, memory cells trigger a much faster, stronger antibody response, preventing illness.

7. Step 1: The adaptive immune system normally learns to ignore the body's own cells (self-tolerance). Step 2: In autoimmunity, T cells mistakenly identify a self-antigen (insulin-producing beta cells) as foreign. Step 3: Adaptive immune cells attack and destroy these healthy beta cells. Step 4: The loss of insulin-producing cells leads to type 1 diabetes.

8. Innate immunity (fast, non-specific) and adaptive immunity (slow, highly specific, with memory).

9. They filter lymph fluid and are sites where immune cells encounter antigens and activate adaptive responses.

10. Antibodies - proteins that bind specific antigens to neutralize or mark pathogens for destruction.