Where Defenses Meet

Trace how immune cells and organs work together.

HAP.11.4 "Correlate the functions of the spleen, thymus, lymph nodes, and lymphocytes to the development of immunity."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline what each named organ does, and circle what B cells and T cells do. Use your marks to connect each organ's role to the development of immunity.

From a Scraped Heel to an Immune Response

1. A scraped heel gives bacteria a route past the skin, but immune defense does not begin in just one place. Fluid from the injured tissue enters tiny lymph vessels and travels as lymph toward a nearby lymph node. The node filters the lymph, trapping material from the wound. Immune cells in the node can meet pieces of the bacteria, called antigens. Some lymphocytes that recognize those antigens become active and multiply. As these cells gather, the node may swell. A swollen node, then, can signal that immune cells are responding to trouble in tissues nearby.

2. The response depends on cells prepared long before the scrape. T lymphocytes, or T cells, mature in the thymus, an organ most active in childhood. There they are tested so that many cells that react strongly to the body's own tissues are removed. Later, helper T cells can coordinate other immune cells, while cytotoxic T cells destroy infected body cells. B lymphocytes, or B cells, can become plasma cells that release antibodies. Each antibody binds a particular antigen and can help mark a bacterium for removal. Some activated B and T cells persist as memory cells, supporting a quicker response if the same antigen returns.

3. Suppose some bacteria from the wound enter the bloodstream. The spleen filters blood rather than lymph, and its immune cells can detect antigens carried in that blood. B and T lymphocytes in the spleen can respond, adding protection when a threat moves beyond the original injury. The spleen also removes aging red blood cells, but that housekeeping job is different from detecting a bloodborne infection. The node and spleen are meeting places for immune cells, not the site where T cells mature. Together, thymus-trained T cells, other lymphocytes, and these filtering organs link local defenses to protection throughout the body.

2 ANSWER WITH EVIDENCE

Use the passage

1. How does the nearby lymph node help lymphocytes respond to the scraped heel?

2. How does the thymus's role differ from the lymph node's role in this response?

3. If bacteria enter the blood, how do the spleen and lymphocytes work together?

4. How can B cells and T cells help during this infection and if the same antigen returns?

3 YOUR TURN

Your own words

Imagine a virus enters the airways and later reaches the blood. In four or five sentences, explain how the thymus, lymph nodes, spleen, and lymphocytes each contribute to immunity, including how a second encounter could differ.

Where Defenses Meet

PART 1 · READ AND MARK

Underline what each named organ does, and circle what B cells and T cells do. Use your marks to connect each organ's role to the development of immunity. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How does the nearby lymph node help lymphocytes respond to the scraped heel?	**It filters lymph from the injured tissue, bringing bacterial antigens into contact with lymphocytes that can become active and multiply.**
2	How does the thymus's role differ from the lymph node's role in this response?	**T cells mature and are tested in the thymus before the injury. The lymph node filters lymph and provides a place where lymphocytes encounter antigens from the injury.**
3	If bacteria enter the blood, how do the spleen and lymphocytes work together?	**The spleen filters blood and detects antigens carried there. B and T lymphocytes in the spleen can then respond.**
4	How can B cells and T cells help during this infection and if the same antigen returns?	**B cells can release antibodies, while helper T cells coordinate defenses and cytotoxic T cells destroy infected cells. Some B and T cells remain as memory cells, allowing a quicker response when the antigen returns.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Before the virus arrived, T cells matured in the thymus, where many cells that reacted strongly to the body's own tissues were removed. Lymph nodes draining the airways filter lymph and bring lymphocytes into contact with viral antigens. If the virus reaches the blood, the spleen filters that blood and provides another place for lymphocytes to respond. B cells can make antibodies, while helper T cells coordinate defenses and cytotoxic T cells kill infected cells. Memory B and T cells can respond faster if the same virus returns.

Accept responses that distinguish lymph filtered by nodes from blood filtered by the spleen and place T-cell maturation in the thymus before infection. Students may describe either antibody production or T-cell actions when explaining the role of lymphocytes.