# Tracking an Infection

How immune cells, lymph, and organs work together

**HAP.11.1** "Analyze the functions of leukocytes, lymph, and lymphatic organs in the immune system."

NAME _____ DATE _____

## 1 READ AND MARK

Read it twice

**YOUR JOB** Underline the actions of neutrophils, dendritic cells, T cells, and B cells, then circle one function each of lymph, lymph nodes, bone marrow, the thymus, and the spleen.

### A Cut on the Palm

1. A tiny cut on Maya's palm lets bacteria cross the skin barrier. Nearby blood vessels widen, bringing leukocytes, or white blood cells, toward the wound. Neutrophils arrive quickly and engulf bacteria. Monocytes leave the blood and become macrophages in the tissue, where they engulf microbes and damaged cells. These cells help contain the infection, but some bacterial pieces and cells can move beyond the cut. Fluid that leaks from blood capillaries surrounds body cells; much of it returns to the blood, while some enters lymphatic vessels as lymph. Lymph carries material from tissues toward lymph nodes.

2. From Maya's palm, lymph travels through lymphatic vessels toward nodes near her elbow and armpit. Lymph nodes filter this fluid, trapping foreign material and giving immune cells a place to meet. Dendritic cells that picked up bacterial pieces in the tissue can travel to a node and present those pieces to T lymphocytes. Some activated T cells help B lymphocytes respond. B cells can develop into plasma cells that release antibodies that bind specific bacterial targets. Antibodies can help mark bacteria for destruction. Thus lymph transports evidence of infection, while the node concentrates the cells that coordinate a targeted response.

3. The lymphatic system also includes organs with different jobs. Bone marrow produces leukocytes and is where B lymphocytes mature. T lymphocytes mature in the thymus before they can take part in later immune responses. The spleen filters blood rather than lymph; its immune cells can respond to microbes traveling in blood. If bacteria from Maya's cut enter her bloodstream, the spleen can help detect them there, while nearby lymph nodes continue to monitor lymph draining from her hand. Lymph eventually returns to the bloodstream. Together, these pathways place different leukocytes where they can find threats and respond.

## 2 ANSWER WITH EVIDENCE

Use the passage

1. How do neutrophils and B cells contribute differently to the response to Maya's cut?

2. Why is a lymph node near Maya's arm a useful place for dendritic cells to present bacterial pieces to T cells?

3. If bacteria spread from the cut into Maya's blood, how would the spleen's role differ from that of nearby lymph nodes?

4. How do bone marrow and the thymus prepare different lymphocytes for the response described in the passage?

## 3 YOUR TURN

Your own words

Imagine a small infected cut on your ankle. In four to six sentences, trace how at least two kinds of leukocytes, lymph, and a lymphatic organ could work together to respond. Explain what could change if microbes entered your blood.

ANSWER KEY

# Tracking an Infection

HIGH SCHOOL · HAP.11.1

## PART 1 · READ AND MARK

Underline the actions of neutrophils, dendritic cells, T cells, and B cells, then circle one function each of lymph, lymph nodes, bone marrow, the thymus, and the spleen. Accept any marking that follows this job and points at the right text.

## PART 2 · ANSWERS

| # | QUESTION | ANSWER |
|---|---|---|
| 1 | How do neutrophils and B cells contribute differently to the response to Maya's cut? | **Neutrophils quickly engulf bacteria at the wound. B cells can become plasma cells that release antibodies against specific bacterial targets.** |
| 2 | Why is a lymph node near Maya's arm a useful place for dendritic cells to present bacterial pieces to T cells? | **Lymph carries material from the cut toward nearby nodes. The nodes filter lymph and bring immune cells together, allowing dendritic cells to present bacterial pieces to T cells.** |
| 3 | If bacteria spread from the cut into Maya's blood, how would the spleen's role differ from that of nearby lymph nodes? | **The spleen filters blood and can respond to microbes in it. Nearby lymph nodes filter lymph draining from Maya's hand.** |
| 4 | How do bone marrow and the thymus prepare different lymphocytes for the response described in the passage? | **B lymphocytes mature in bone marrow and can later produce antibody-releasing plasma cells. T lymphocytes mature in the thymus and can later help B cells respond.** |

## PART 3 · YOUR TURN (SAMPLE ANSWER)

Neutrophils could reach the cut and engulf bacteria. Lymph could carry material from the ankle toward nearby lymph nodes. Dendritic cells could bring bacterial pieces to a node and present them to T cells. Some T cells could help B cells respond, and B cells could develop into plasma cells that release antibodies. If microbes entered the blood, the spleen could help detect them because it filters blood.

Accept other accurate leukocyte combinations if the response explains their functions and connects lymph to a lymphatic organ. The blood-spread explanation should distinguish the spleen's blood-filtering role from a lymph node's lymph-filtering role.