A Cut's Hidden Route

Trace how fluid movement connects body systems.

HAP.7.b "Construct an explanation of how the lymphatic system interacts with the immune and circulatory systems."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline where fluid moves between systems, circle immune actions, and number the steps of lymph's route back to the blood.

What Happens Beyond the Cut?

1. After a tiny cut on a finger, nearby blood vessels help start the response. Blood delivers oxygen, nutrients, and white blood cells to the area. At the smallest vessels, called capillaries, some fluid leaves the bloodstream and enters spaces between cells. This tissue fluid supplies cells, but not all of it moves directly back into capillaries. Inflammation can make capillaries leak more fluid than usual, so the finger may swell. Lymphatic capillaries collect much of the extra tissue fluid. Once inside these vessels, the fluid is called lymph, and it begins a one-way trip toward larger vessels.

2. Lymphatic vessels carry lymph away from the cut through a chain of checkpoints called lymph nodes. Microbes and bits of damaged tissue may enter the lymph along with fluid. Inside a node, immune cells such as macrophages can trap and break down microbes. Other immune cells, including lymphocytes, can recognize signs of an invader and help organize a targeted defense. As the response builds, a nearby node may become tender or enlarged because immune cells gather and multiply there. The node does not pump blood; it filters lymph while immune cells inspect what the fluid has carried from the injured area.

3. After passing through nodes, lymph continues through larger lymphatic vessels and eventually empties into veins near the collarbones. This return route helps maintain blood volume by replacing fluid that left capillaries. The heart then circulates that fluid as part of the blood again. Unlike blood, lymph is not pushed around the body by the heart; movement of nearby muscles and one-way valves help it travel. A swollen finger and a tender node are linked clues: fluid has left blood vessels at the cut, and material from that area has reached an immune checkpoint before the fluid returns to circulation.

2 ANSWER WITH EVIDENCE

Use the passage

1. How can fluid leaving blood capillaries make the finger swell, and how do lymphatic capillaries limit that swelling?

2. How can material from the cut reach immune cells in a lymph node, and what can those cells do with it?

3. How does the return of lymph to veins help the circulatory system after fluid leaves blood capillaries?

4. Blood and lymph both move through vessels. How does each move, and how can lymph eventually rejoin the blood?

3 YOUR TURN

Your own words

A student scrapes a shin, and a lymphatic vessel in that leg becomes narrowed, although blood still flows normally. In five or six sentences, predict how the narrowing could affect swelling, the return of fluid to blood, and the arrival of material at lymph nodes; explain one possible immune response if material reaches a node.

ANSWER KEY

A Cut's Hidden Route

PART 1 · READ AND MARK

Underline where fluid moves between systems, circle immune actions, and number the steps of lymph's route back to the blood. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How can fluid leaving blood capillaries make the finger swell, and how do lymphatic capillaries limit that swelling?	**Extra fluid can collect between cells and cause swelling. Lymphatic capillaries collect much of that fluid.**
2	How can material from the cut reach immune cells in a lymph node, and what can those cells do with it?	**Material enters tissue fluid and then lymph, which carries it to a node. Macrophages can trap and break down microbes, while lymphocytes can recognize signs of an invader and help organize a defense.**
3	How does the return of lymph to veins help the circulatory system after fluid leaves blood capillaries?	**Returning lymph replaces fluid that left capillaries, helping maintain blood volume. The heart can then circulate that fluid as blood.**
4	Blood and lymph both move through vessels. How does each move, and how can lymph eventually rejoin the blood?	**The heart pumps blood, while nearby muscle movement and one-way valves help move lymph. Lymph eventually empties into veins near the collarbones.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Blood capillaries near the scrape can still release fluid into the tissue. A narrowed lymphatic vessel may carry that fluid away more slowly, so swelling could increase. Less fluid from the leg may return to the veins through that route. Material from the scrape may also take longer to reach a lymph node. If microbes reach the node, macrophages can trap and break them down while lymphocytes help organize a targeted defense.

Accept explanations that connect fluid leaving blood capillaries, lymphatic collection, immune activity in nodes, and return to veins. For Part 3, students should describe slower transport as a possibility, not claim that narrowing stops all immune activity.