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Week 4: Health, Protection, and Early Detection

Module 2: Human Immune System

Lesson: Why Did the Infection Get Worse? Fixing the Body's Defense System

Lesson Overview	
Students learn how the immune system follows a sequence of responses to fight infection. They use evidence to explain why the order and timing of these steps determine whether the body recovers or becomes more sick.	
Learning Targets	Vocabulary
Describe the sequence of immune system responses. Explain why the order of immune responses matters. Use evidence to explain what happens when the immune response is disrupted.	Pathogen something that causes disease Innate immune response a fast, general defense Adaptive immune response a slower, targeted defense Antigen a signal from a pathogen that triggers a response
Materials	Instructional Notes
Module Infection scenario Marcus case file Chart paper or whiteboard Student notebooks	This lesson helps students understand that the immune system works as a coordinated sequence of responses rather than a single reaction. Students learned that the immune system must distinguish between threats and things that should be protected. In this lesson, they investigate what happens after that decision is made and how the body responds to infection over time. Students learn that infection outcomes depend on immune responses occurring in the correct order and at the appropriate time. Different parts of the immune system have different roles that work together as a coordinated system.



Learning Experience

8 min	Opening	Present the scenario: "Two students get the same small cut. One heals quickly. The other develops swelling, pain, and infection." Display the three possible explanations: A. The immune system didn't work B. The immune system steps didn't happen correctly C. The body reacted too slowly Ask students to choose the explanation they think best fits the situation and be prepared to defend their thinking. Students choose one explanation independently, write a reason to support their thinking, discuss their ideas with a partner, and share responses with the class. Sentence Frame: "I think the infection got worse because _____, which means _____."
15 min	Module	Focus: How does the immune system respond step by step after a pathogen enters the body? Guiding Questions: • What happens first when a pathogen enters? • What response happens next? • What is the final step that helps stop infection? Quick Checks: • Thumbs up/down: "The immune system responds all at once." • Turn-and-talk: "Which step happens first?"
15 min	Application	Introduce the challenge: "Today you are part of a hospital infection investigation team." "Doctors are trying to understand why a small cut turned into a serious infection. Your job is to examine the evidence and determine what may have happened inside the patient's immune system." Distribute the case file and evidence cards. Students: Step 1: Review the Case Read the patient file. Case File: Marcus Marcus is a 13-year-old student who spent a Saturday helping his grandfather repair an old fence. While carrying boards, Marcus scraped his arm on a rusty nail. At first, the injury seemed minor. Marcus rinsed the cut quickly and continued working. The next day, the area around the cut became red and swollen. Two days later, the swelling increased and the skin felt warm to the touch. By the fourth day, Marcus developed a fever and felt tired enough to stay home from school. A doctor examined the wound and confirmed that bacteria had entered through the cut and were multiplying inside the tissue. The doctor explained that the infection became established before Marcus's body was able to fully stop it. Step 2: Analyze the Evidence Review the evidence cards. Identify which pieces of evidence help explain what happened. Discuss what the immune system may have been doing at different points in the case.



Step 3: Build an Explanation

Use the evidence to explain what happened after the bacteria entered the body. Explain which immune responses were involved. Explain how the infection became established. Explain why Marcus became sick.

Step 4: Present Your Diagnosis

Create a claim supported by evidence.

Sentence Frames:

"The infection worsened because ____."

"Evidence suggests ____ happened before ____."

"The most important part of the immune response in this case was ____ because ____."

Students then share their explanation with another group, compare evidence and reasoning, and revise their explanation if needed.

Evidence Cards

Card 1

Marcus's skin was damaged when the nail scraped his arm.

The break in the skin created an opening where bacteria could enter the body.

Card 2

The skin normally acts as a barrier that helps keep pathogens out of the body.

When the barrier is broken, pathogens can enter tissues more easily.

Card 3

The innate immune response activates quickly when pathogens enter the body.

This response helps slow the spread of pathogens before more specific defenses are activated.

Card 4

Redness, warmth, and swelling are common signs that the innate immune response is active.

These signs often appear near the site of an infection.

Card 5

As bacteria multiply, they can spread deeper into tissues and become harder for the body to control.

Large numbers of pathogens increase the challenge for the immune system.

Card 6

Pathogens contain antigens that help the immune system recognize what is causing the infection.

These signals help the immune system identify threats.

Card 7

The adaptive immune response targets specific pathogens.

This response develops after the immune system recognizes the threat.

Card 8

A successful immune response depends on different defenses working together.

Problems with timing or coordination can allow infections to worsen.

Card 9

A delay in one part of the immune response can affect everything that follows.

The earlier an infection is controlled, the less opportunity pathogens have to spread.

Card 10

Doctors look for evidence of where an infection may have progressed faster than the immune system's ability to control it.

Understanding the sequence of events helps explain why patients experience different outcomes.



2 min	Reflection	Why is it important for the immune system to respond in the correct order? Sentence Frame: "If the immune system responds _____, then _____ can happen because _____."
2 min	Career Connections	Doctors and immunologists investigate infection cases by examining symptoms, identifying evidence, and determining what may have happened inside the immune system. They use information about immune responses, timing, and disease progression to explain why some infections heal quickly while others become serious. Understanding how the immune system responds helps healthcare professionals diagnose illness, select treatments, prevent complications, and develop new approaches to fighting disease. The same type of evidence-based reasoning students used today is used by medical teams every day when solving patient cases.