Body Story: Allergies: Teacher’s Guide

Program Description
It hurts to get stung by a wasp, but it’s dangerous if you happen to be allergic to them. Learn why a sting may be just a pain to one person but cause an extreme histaminic response—and even death—in another.

Onscreen Questions
Before watching the video
- Do you know someone who has an allergy? What do you think causes an allergic reaction?
- As you watch the program, think about the immune system and its ability to defend against harmful invaders. Note how the immune system overreacts to certain invaders, causing an allergy.

After watching the video
- Allergies can develop at any age. Discuss why overprotecting an immune system from germs may not be helpful, especially in a child.
- How would exposure to some bacteria and allergens help bolster the immune system?

Lesson Plan

Student Objectives
- Understand how a virus and an allergen infect the body and how the body responds to each.
- Create flowcharts to show the body’s reaction to the common cold (a viral infection) or hay fever (an allergic reaction).
- Examine the differences in how colds and allergies are diagnosed and treated.

Materials
- Internet access
- Poster board
Colored markers (for each student)

Print resources about allergies and viral infections (including the common cold)

Procedures

1. Find out what students know about allergies by asking the following questions:
   - What causes allergies?
   - What happens to the body during an allergic reaction?
   - How are allergies treated?

2. Find out what students know about viral infections by focusing on these questions:
   - What causes an infection?
   - How does the body react?
   - How is a viral infection treated?

3. Explain to students that the body uses its immune system to fight infections and illnesses. When an antigen, or foreign substance, is introduced into the body, the immune system responds. Antigens may take the form of a virus, bacteria, or a substance that causes an allergic reaction, like pollen. The latter type of antigen is called an allergen.

4. Tell students that they will compare the immune system’s reaction to pollen, a common allergen, and the common cold, a viral infection. First review with the class the following descriptions:

   **Allergic reaction:** When pollen or another allergen invades the body, it may set in motion an allergic reaction. The allergen binds to the antibodies attached to mast cells in the nose, skin, stomach, or sinus membranes. Becoming activated, the mast cells release histamine. This substance produces many of the symptoms normally associated with allergic reactions: sneezing, nasal congestion, itching, rashes, and wheezing. The reactions help the body fight off the invading allergens.

   **Viral infection:** When a virus enters the body, it lands on a host cell. The virus starts reproducing immediately, which marks the beginning of an infection. The infected cell produces new viruses that are released from the host cell. Occasionally, the new viruses build up enough to rupture the host cell, releasing more new viruses that infect other cells and keep the process going.

When a virus infects a cell, the body responds by activating parts of the immune system. Reactions may include the following:

   - Lymphocytes, or white blood cells, produce antibodies that cover a virus’s protein coat and prevent the virus from attaching itself to another cell.
   - Other lymphocytes destroy infected cells, killing the virus before it can reproduce.
   - The body produces a high fever, which limits the virus’s ability to reproduce.
• The body forms large amounts of mucus in the nose and throat to trap the virus and expels both mucus and virus from the body by sneezing, coughing, or blowing the nose.

• The body makes interferons, or protein substances, that provide some protection against many types of viruses.

5. Review the vocabulary terms in this lesson before students proceed with their research.

6. Explain that students will continue their studies of an allergic reaction to pollen (more commonly known as hay fever) or a viral cold. Have students work in small groups using the Web sites suggested below. Have them take notes and answer the following questions:

• What are the causes?

• What are the symptoms?

• How long do symptoms typically last?

• How is it treated?

• How can they be prevented?

• How is it diagnosed?

**ALLERGIC REACTIONS**

**Hay Fever**

• [http://my.webmd.com/content/article/1625.50516](http://my.webmd.com/content/article/1625.50516)

• [http://my.webmd.com/content/article/1680.50309](http://my.webmd.com/content/article/1680.50309)

**What Are Allergies?**

• [http://my.webmd.com/content/article/1625.50536](http://my.webmd.com/content/article/1625.50536)

**Kids’ Health: Allergies**


**Allergy Glossary**

• [http://my.webmd.com/content/article/1625.50534](http://my.webmd.com/content/article/1625.50534)

**Cold, Flu, Allergies**


**COMMON COLD**

**Common Cold**


• [http://my.webmd.com/content/article/1680.50949](http://my.webmd.com/content/article/1680.50949)

**Cold, Flu, Allergies**

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7. Have each group create a flowchart showing the body’s reaction to an allergen or virus. The chart can use both text and symbols and should include the antigen entering the body, the immune system’s various reactions, the body’s physical symptoms, and how the body heals. Tell students to use the vocabulary terms.

8. Have the groups present their flowcharts to the class.

9. Finally, compare the two reactions as a class. How are they alike? Which symptoms are similar? How can you tell the difference between a virus and an allergen? (A virus follows a course of beginning, middle, and end. White blood cells increase if the body is fighting an infectious disease. In an allergic reaction, allergies will likely persist as long as irritants are in the environment. Allergies tend to last more than two weeks.)

Assessment

Use the following three-point rubric to evaluate students’ work during this lesson.

- **3 points:** Students actively participated in class discussion; showed strong research skills; created a clear, thorough flowchart using more than three new vocabulary words.
- **2 points:** Students participated in class discussion; showed on-grade research skills; created a complete flowchart using two or three new vocabulary words.
- **1 point:** Students had little participation in class discussion; showed weak research skills; created an incomplete flowchart using few or no new vocabulary words.

Vocabulary

**allergen**

*Definition:* A substance such as pollen or mold that causes an allergy because the body’s immune system interprets it as an invader

*Context:* Pollen is a common allergen that causes hay fever.

**antibodies**

*Definition:* Proteins produced in blood and tissue to help neutralize and destroy foreign bodies, or antigens

*Context:* Antibodies are essential to the human immune system.
antigen

**Definition:** A chemical substance (usually a protein) that the body perceives as foreign. Antigens cause the body to form antibodies to fight them.

**Context:** In the case of allergies, the antigen is pollen, dust, or other allergens.

histamine

**Definition:** A naturally occurring substance released by the immune system

**Context:** Histamine produces many symptoms associated with allergic reactions, such as sneezing, nasal congestion, itching, rashes, and wheezing.

immune system

**Definition:** The body’s defense system that fights infections and foreign substances

**Context:** The immune system provides protection against potentially damaging substances that invade the body.

**Academic Standards**

**National Academy of Sciences**

The National Academy of Sciences provides guidelines for teaching science in grades K–12 to promote scientific literacy. To view the standards, visit this Web site:


This lesson plan addresses the following science standards:

- Life Science: Structure and function in living systems

**Mid-continent Research for Education and Learning (McREL)**

McREL’s Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit link:

[http://www.mcrel.org/compendium/browse.asp](http://www.mcrel.org/compendium/browse.asp)

This lesson plan addresses the following national standards:

- Science — Life Sciences: Understands the structure and function of cells and organisms
- Language Arts — Reading: Uses reading skills and strategies to understand and interpret a variety of informational texts

**Support Materials**

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the DiscoverySchool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- [http://school.discovery.com/teachingtools/teachingtools.html](http://school.discovery.com/teachingtools/teachingtools.html)