Body Story: The Flu: Teacher’s Guide

Grade Level: 9-12  Curriculum Focus: Human Body  Lesson Duration: Three class periods

Program Description
An army of cells with a mission to keep the body healthy, the immune system attacks unfriendly invaders, but not without taking a toll on the infected human. Travel inside the body of Holly Jones, a 25-year-old motorcycle courier who becomes a victim in the cellular war between her immune system and the influenza virus.

Onscreen Questions
Before watching the video

- Discuss what you already know about viruses. Are they cells? How are they transmitted? How does the body try to defend against viruses?
- As you watch the program, note how a virus affects the human body and how the body’s immune system prepares for battle.

After watching the video

- In the past century, the widespread use of vaccines has saved many lives. Describe how vaccines work.
- If everyone were immunized for the flu would the virus still exist? Why or why not?

Lesson Plan

Student Objectives

- Identify the types of cells that are important in the immune system.
- Investigate the mechanisms the white blood cells use to protect the body from foreign invaders.
- Explain what is happening on a cellular level as the body is invaded.

Materials

- Body Story: The Flu video and VCR
- Pencils
Body Story: The Flu: Teacher’s Guide

- Markers
- String
- Construction paper
- Large sheets of paper
- Index cards for case studies
- Library or Internet reference materials about viruses, bacteria, antibodies, white blood cells, the immune system

Procedures

1. Create a chart with definitions for terms of the immune system (below). As a class or in small groups, review the terms.
   - macrophage
   - bacteria
   - lysosomes
   - interleukin
   - viruses
   - specific immunity
   - helper T cells
   - antigen
   - nonspecific immunity
   - suppressor T cells
   - inflammation
   - natural killer cells
   - killer T cells
   - leukocytes
   - vaccine
   - memory T and B cells
   - B cell growth factor
   - lyphokines
   - antibody

2. Let students know that they will receive one of six case studies about which they will write a script and perform a skit. They will use the chart above as a reference.
3. Divide the students into groups of four or five. Present each group with a case study (below) written on an index card.

- Case 1: You receive a flu shot before flu season begins. A month later you get the flu. What could have happened?
- Case 2: A jellyfish stings you in the ocean. Soon your foot feels painful. What is happening?
- Case 3: You are a doctor; you have a patient who has just received a kidney transplant. Explain to the patient the necessity of taking immunosuppressant drugs.
- Case 4: You once received antivenin (horse serum with antibodies) to treat snakebite. Explain why you must never repeat this procedure.
- Case 5: Five students get measles at your school, so the nurse rechecks immunization records. Give a possible explanation for this outbreak. (Hint: Three possibilities exist.)
- Case 6: You pull a splinter from your finger, which soon shows redness and swelling. A few days later your hand is swollen and painful, and you have a fever. Why?

4. Students should analyze the case and create a diagram, concept map, or storyboard on a large sheet of paper to illustrate the interaction between an invading antigen and the immune system. (Note: The diagrams may be similar, but variations exist for the type of antigen causing the reaction, mode of entry, transmission, and so on. Each script will have a unique story line.)

5. Before students write their scripts, hold informal discussions with each group to determine if they have outlined the correct sequence of events. Students should write a script that dramatizes the interaction between the antigen and the immune response in their case study, specifically identifying the antigen and its transmission, entrance into the body, and the immune response to it.

6. Have students choose a narrator and a cast of characters from the group to perform the scenario. Encourage students to use simple staging and nametags to identify the characters. Students should conclude each skit with a summary of the immune response, as well as specifics to their case such as inflammatory response or allergic reaction.

7. After all skits have been performed, review the immune system by comparing the body’s response in each case.

**Assessment**

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

- **3 points:** Students outlined the appropriate immune response for their case, using accurate graphics and vocabulary; the skit reflected an accurate presentation of the material, creativity, and thoroughness; the summary included case-study specifics.

- **2 points:** Students outlined the appropriate immune response for their case, using mostly accurate graphics and vocabulary; the skit reflected a mostly accurate presentation of the material, and some creativity and thoroughness; the summary included some case-study specifics.
Body Story: The Flu: Teacher’s Guide

- 1 point: Students had difficulty outlining the appropriate immune response, using some inaccurate graphics and vocabulary; the skit reflected a somewhat inaccurate presentation of the material, and little creativity and thoroughness; the summary did not include case-study specifics.

Vocabulary

**antibody**
 Definition: A glycoprotein produced in response to an antigen, such as bacteria or a virus  
**Context:** Antibodies defend the body by destroying or weakening invading antigens.

**antigen**
 Definition: Short for antibody generator, a substance that when introduced into the body stimulates the production of an antibody  
**Context:** Antigens include toxins, bacteria, foreign blood cells, and the cells of transplanted organs.

**immune response**
 Definition: A bodily response to an antigen that leads to the formation of antibodies and sensitized lymphocytes  
**Context:** The immune response takes place when antigens cause the production of antibodies.

**inflammation**
 Definition: A localized protective reaction of tissue to irritation, injury, or infection, characterized by pain, redness, swelling, and sometimes loss of function  
**Context:** After an injury to the body, inflammation occurs to protect the are.

**influenza**
 Definition: An acute contagious viral infection characterized by inflammation of the respiratory tract and by fever, chills, muscular pain, and prostration; often called the flu  
**Context:** An influenza epidemic in 1918 caused thousands of deaths in the United States.

Academic Standards

**National Academy of Sciences**
 The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit [http://books.nap.edu](http://books.nap.edu).

This lesson plan addresses the following science standards:

- Life Science: The cell; Behavior of organisms
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

This lesson plan addresses the following national standards:

- Science—Life Sciences: Understands the structure and function of cells and organisms
- Language Arts—Writing: Uses the general skills and strategies of the writing process
- Arts—Theatre: Demonstrates competence in writing scripts

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