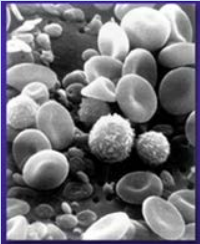


## Cells of the Immune System—Student Worksheet



### About This Worksheet

This worksheet complements the Click and Learn “Cells of the Immune System” developed in conjunction with the 2007 Holiday Lectures on Science, “AIDS: Evolution of an Epidemic.”

**Author:** Ann Brokaw, Rocky River High School, Rocky River, OH

Answer the following questions as you proceed through the activity slides.

1. Name one type of cell involved in each of the following processes:
  - a. Innate immunity: \_\_\_\_\_
  - b. Adaptive immunity: \_\_\_\_\_
  - c. Both adaptive and innate immunity: \_\_\_\_\_
2. Define *innate immune system*.

---

3. Where are the cells of the adaptive immune system found in humans? \_\_\_\_\_

4. Watch the video on slide 3 and answer the following.
  - a. How do B cells react to antigens?

---

b. Which cells conduct the immune system? \_\_\_\_\_

- c. Which immune cells kill infected cells? \_\_\_\_\_
5. What is the purpose of humoral immunity?

---

\_\_\_\_\_

6. How does antibody specificity arise?

---

\_\_\_\_\_

7. Outline the specific steps involved in antibody production in response to infection with human immunodeficiency virus (HIV).

---

---

---

8. Define *antigen*.

---

9. A macrophage is also referred to as an antigen-presenting cell. Explain why that is an appropriate term.

---

10. Why is antigen-presentation important in fighting infection?

---

11. A T cell is a type of white blood cell that has surface receptors that recognize antigens. Does an individual T cell have the ability to recognize more than one type of antigen? Explain your answer.

---

12. Explain the relationship between the antigen-presenting cells and helper T cells.

---

13. Watch the video on slide 8 and answer the following questions.

a. What specifically results from the release of cytokines by helper T cells?

---

b. What is the problem with helper T cells carrying out this function in HIV infection?

---

14. What role do cytotoxic T cells play in fighting infection?

---

15. What two molecules on the surface of a cytotoxic T cell help the cell recognize infected cells?

---

16. What is the role of ubiquitin in host cells? Be specific.

---

---

17. What is the role of an MHC class 1 protein? Be specific.

---

---

18. What is the relationship between an MHC class 1 protein and a cytotoxic T cell?

---

---

19. What is a potential problem with respect to the timing for when a cytotoxic T cell recognizes a virally infected cell?

---

---

20. Summarize the main difference between the action of MHC class 1 and MHC class 2.

---

---

---

---

#### About the Holiday Lectures on Science and BioInteractive.org

As part of its mission to strengthen science education, HHMI presents the Holiday Lectures on Science, an annual series that brings the latest developments in a rapidly moving field of research into the classroom. The lectures are given by HHMI investigators and other leading scientists. The series began in 1993.

To complement the Holiday Lectures and enhance their usefulness in the classroom, HHMI produces a variety of free science education materials. Lecture summaries, biographies of the lecturers, and other resources are available at [www.holidaylectures.org](http://www.holidaylectures.org). DVDs and CD-ROMs can be ordered through HHMI's Catalog at <http://catalog.hhmi.org>.

The BioInteractive website ([www.BioInteractive.org](http://www.BioInteractive.org)) features virtual labs, animations, and other engaging instructional materials. They can be used to supplement the lecture topics or to learn important concepts in the biomedical sciences.

**HHMI**  
HOWARD HUGHES MEDICAL INSTITUTE

Department of Science Education

4000 Jones Bridge Road, Chevy Chase, MD 20815  
(301) 215-8500 • [biointeractive@hhmi.org](mailto:biointeractive@hhmi.org)

#### About the Howard Hughes Medical Institute

The Howard Hughes Medical Institute is a nonprofit medical research organization that employs hundreds of leading biomedical scientists working at the forefront of their fields. In addition, through its grants program and other activities, HHMI is helping enhance science education at all levels and maintain the vigor of biomedical science worldwide. Headquartered in Chevy Chase, Maryland, HHMI is one of the world's largest philanthropies, with laboratories across the United States and grants programs throughout the world.

The views and opinions expressed in this publication are not necessarily those of the Trustees or management of the Howard Hughes Medical Institute.