



uBEATS Teacher's Guide:

Your Body's Defense: The Immune System

This teacher guide is a supplementary text to support the use of the uBEATS “Your Body’s Defense: The Immune System” module for grades 6–12.

To help students develop the knowledge necessary for an incredible future in health care, we created UNMC Building Excellence in Academics Through STEM (uBEATS), an online health science resource for Nebraska students.

UNMC uBEATS modules are short (15 minutes or less), interactive online health science modules to supplement curriculum taught in grades 6–12. These do not replace curriculum, but they are a supplement for teachers and students incorporating evidence-based information and UNMC expert-guided material. Each module is chunked into sections with formative and summative assessments with immediate feedback provided.

Tips on how to utilize uBEATS modules:

- Internet access is required to view uBEATS modules.
- For those who have access to one-to-one technology, modules can be used in or outside of the classroom as a topic introduction, extension, or review.
- For classrooms without individual student devices, modules can be used in whole group instruction. Formative assessment questions can use the teacher’s preferred call-and-response method and summative assessment questions can be displayed on the board and answered individually by students or printed and distributed to students after viewing the module.

Objectives

- Identify the key components of the immune system.
 - Explain how vaccines stimulate the immune system to provide protection against specific pathogens.
- Describe how vaccines reduce the spread of infectious diseases in a population.

Introduction

Your immune system is your body’s defense team. In this module, students learn how the immune system prevents pathogens from entering the body, responds when pathogens get through defenses, and how vaccines “train” immune cells to recognize specific pathogens faster. The module uses an engaging analogy that compares the body to a country with borders, customs agents, highways, and emergency responders to help students visualize immune system functions.

Prior Knowledge

Before beginning this module, it is helpful for students to have basic understanding of cells and body systems, and for the teacher to be familiar with the Next Generation Science Standards (NGSS) approach to Three-Dimensional Learning.

Dimension 3: Disciplinary Core Ideas—Life Sciences (NGSS Alignment)

LS1.A: Structure and Function — Students connect structures (skin, mucous membranes, immune cells) to their functions in protection and response.

LS1.B: Growth and Development of Organisms — Students consider how immune responses change over time and how memory responses

LS1.D: Information Processing — Students use the “intel/wanted poster” analogy to understand how immune systems recognize and respond to threats.

Science and Engineering Practices (NGSS)

- Obtaining, evaluating, and communicating information.

Crosscutting Concepts (NGSS)

- Cause and effect.
- Structure and function.
- Stability and change.

Key Terms/Vocabulary

Immune system, pathogen, skin, mucous membranes, lymphatic vessels, blood vessels, white blood cells, neutrophils, macrophages, T cells, B cells, antibodies, immune response, vaccine, immunity, immunocompromised, outbreak, herd immunity (community protection), infectious disease, inflammation.

Science Standards

Nebraska's College and Career Ready Standards for Science 2024 [Nebraska Science Standards](#)

- SC.HS.6.1 Structure and function
 - Gather, analyze, and communicate evidence of the relationship between structure and function in living things.
- SC.HSP.6.6 Structure and Function and Information Processing

Nebraska Health Science Standards

- HS.HS.11.4 Interpret medical terms related to the anatomy and physiology of body systems
 - a. Describe the basic structural and functional organization of the human body and the systems of the body, including the integumentary, cardiovascular, musculoskeletal, immune, respiratory, digestive, urinary, reproductive, nervous, and endocrine systems.
 - b. Describe the inter-relationship between body systems.
 - c. Describe common diseases and disorders of each body system.
- HS.HS.3.2 Administer appropriate emergency medical care based on assessment findings of a patient's condition.
- HS.HS.6.3.d. Explain the role of medical terminology in effective communication in health care.

National Health Science Standards (NCHSE)

- 9.1.1 Promote self-care behaviors of health and wellness.
- 9.1.2 Examine various aspects of behavioral health.

Extensions of the lesson

- Create a classroom "Word Wall" using the Key Terms/Vocabulary list and encourage students to use terms during discussion and written reflections.
- Have students draw a concept map of the analogy (country □ body) labeling: border (skin/mucosa), highways (blood/lymph), customs agents (immune surveillance), first responders (neutrophils/macrophages), and intel (vaccines).
- Facilitate a short debate or discussion: "How do vaccines protect people who cannot be vaccinated?" using examples from the module's "Power in Numbers" section.
- Connect to current events: Ask students to locate a reputable public health update about vaccination or outbreaks and summarize key takeaways (one paragraph or 3–5 bullets).

Common student misconceptions to address

- “If you have a strong immune system, you’ll never get sick.” Even healthy immune systems can miss pathogens that are disguised or can be overwhelmed.
- “Vaccines directly kill pathogens.” Vaccines train the immune system to recognize and respond faster; they do not directly destroy pathogens.
- “All white blood cells do the same thing.” Different immune cells have specialized roles (e.g., neutrophils and macrophages as early responders; T and B cells involved in targeted responses and memory).
- “Vaccines only protect the person who gets the shot.” High vaccination levels can reduce spread and help protect those who are immunocompromised.

Enrichment

- Simulation activity: Use a simple classroom model (colored stickers or cards) to represent vaccinated vs. unvaccinated individuals and simulate disease spread across a “network.”
- Writing prompt: “Explain the immune system as a country in 6–8 sentences,” requiring at least five vocabulary terms.
- Role-play: Assign students immune system roles (skin, mucous membranes, neutrophils, macrophages, T cells, B cells, vaccine) and act out the response to a pathogen entering through different routes (nose, lungs, cut skin).

Assessment Support

The module includes a 10-question summative assessment. Consider using the quiz as: (1) an individual post-check, (2) a paired discussion where students justify answers before submitting, or (3) an exit ticket by selecting 3–5 questions for a quick check for understanding.

Implementation Notes

- Estimated time: ~15 minutes (plus optional discussion/extension activities).
- Delivery options: Individual devices, pairs, or whole-group with projector.
 - Accessibility: Encourage students to use the module’s built-in navigation and help features; provide printed vocabulary for students who benefit from pre-teaching.