uBEATS

uBEATS Teacher's Guide:

Understanding Pediatric Cancer

(Grades 6-12)

This teacher guide is a supplementary text to support the use of the uBEATS *Understanding Pediatric Cancer* 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 (20 minutes or less), interactive online health science modules to supplement curriculum taught in grades 6–12. These do not replace curriculum, but 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

- Summarize the most prevalent pediatric cancer types, symptoms and causes.
- Describe the treatments and survival rates of these childhood cancers.
- Explain how pediatric cancer can interfere with the ability of children to function normally on a day-to-day basis.

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Introduction

Trianne's Story: Trianne remembers the exact day she started feeling sick. One morning she woke up with a bloody nose. It wasn't her first, but this one was different. It would not stop bleeding. Her mom decided to take her to the emergency room.

After multiple tests, doctors diagnosed Trianne with B-cell acute lymphoblastic leukemia. Trianne was only ten years old, making her cancer diagnosis fall into the category of childhood cancer, or what is commonly referred to as pediatric cancer.

Prior Knowledge

Before beginning this module, the teacher should understand the Next Generation Science Standards (NGSS) featuring Three-Dimensional Learning.

Core Idea LS1.B: Growth and Development of Organisms

Understanding how a single cell can give rise to a complex, multicellular organism builds on the concepts of cell division and gene expression. In multi-cellular organisms, cell division is an essential component of growth, development, and repair. Cell division occurs via a process called mitosis: when a cell divides in two, it passes identical genetic material to two daughter cells. Successive divisions produce many cells. Although the genetic material in each of the cells is identical, small differences in the immediate environments activate or inactivate different genes, which can cause the cells to develop slightly differently. This process of differentiation allows the body to form specialized cells that perform diverse functions, even though they are all descended from a single cell, the fertilized egg. Cell growth and differentiation are the mechanisms by which a fertilized egg develops into a complex organism. A Framework for K-12 Science Education.

Science and Engineering Practices NGSS

- Developing and using models

Crosscutting Concepts NGSS

- Cause and Effect

Key Terms/Vocabulary

Pediatric, cancer, oncologist, diagnosis, leukemia, acute, lymphoblastic, white blood cells, anemia, red blood cells, immune system, infection, lymph nodes, trachea, brain cancer, nervous system, tumor, primary tumor, metastatic tumor, malignant, benign, progenitor, bone marrow, myeloid, granulocytes, monocytes, platelets, lymphoid, lymphocytes, B cells, T cells, plasma cells, natural killer cells, acute development, chronic development, chemotherapy, induction, remission, intensification, maintenance, stem cell transplant, survival rate, relapse, psychosocial, anxiety, depression, physical, cognitive, emotional, familial.

Science Standards

Nebraska Science Standards

High School Life Sciences

SC.HS.6.1 Gather, analyze, and communicate evidence of the relationship between structure and function in living things.

Anatomy and Physiology

SC.HSP.6.6 Gather, analyze, and communicate evidence of the relationship between the structures and physiological processes of the cardiovascular/respiratory systems.

SC.HSP.6.6.D Construct and present arguments using evidence to support claims about the causes of dysfunction in the cardiovascular/respiratory systems.

Extensions of the lesson

To help students become more familiar with the Key Terms of this module, the teacher can use the vocabulary list for a classroom Word Wall or integrate the vocabulary into classroom word games during review sessions.

Encourage students to check current events for the latest news involving pediatric cancer.

As student misconceptions become apparent, the teacher may need to reinforce these important concepts:

- Pediatric cancer is not contagious. During cancer treatment, children often wear masks and are isolated from other children, but this is not an indication that the other children are in danger of “catching” the cancer. Masks and isolation are important because the cancer patient’s own immune system may be compromised.
- Although cancer is the leading cause of death from illness among children in the U.S., childhood cancers are rare.
- Different kinds of cancer can occur in children, with leukemia (a blood cancer), being the most prevalent.
- Leukemia involves the over-production of unhealthy white blood cells which crowd out the healthy white blood cells. This weakens the immune system and makes the child more susceptible to infections. At the same time, it causes a shortage of red blood cells and the result is anemia.
- Cancer does not cause hair to fall out. Hair loss is a side-effect of cancer treatment.

Enrichment

For information about Healthcare Career Opportunities, see UNMC's Careers in Healthcare.

The UNMC Office of Interactive e-Learning offers additional modules about cancer among their Online Science Education Resources. See uBEATS for details.

To study the correlation between the Nebraska Science Standards and the Next Generation Science Standards (NGSS) see the Crosswalk.

More information is available at Leukemia and Lymphoma Society.

For classroom activities about pediatric cancer, see Alex's Lemonade Stand Foundation for Childhood Cancer at ALSF.

To view statistics involving childhood cancer in the United States, see The National Center for Health Statistics.

Learn more about childhood leukemias at American Childhood Cancer Organization.

To read about Myths and Misconceptions about Childhood Cancer Survivors, see Childhood Cancer International.

The Pediatric Cancer Library presents a brief video about Cancer in Children.