uBEATS Teacher's Guide:

Stages of Cancer

This teacher guide is a supplementary text to support the use of the uBEATS "Stages of Cancer" module.

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 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

- List the stages of cancer.
- Name common cancers among men and women in the U.S.
- Describe the risk factors, symptoms, and protective factors of several types of cancer.

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Introduction

Why would you want to learn about cancer? Cancer is a disease that affects many people—perhaps people in your own family, or even you. By learning about cancer, we can design and choose effective treatments for cancer. When we understand more about cancer, we can care for cancer patients in the best ways possible.

Prior Knowledge

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

Core Idea LS1.A. Structure and Function

- ***By the end of grade 8.*** Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. Animals engage in characteristic behaviors that increase the odds of reproduction. Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features (such as attractively colored flowers) for reproduction. Plant growth can continue throughout the plant's life through production of plant matter in photosynthesis. Genetic factors as well as local conditions affect the size of the adult plant. The growth of an animal is controlled by genetic factors, food intake, and interactions with other organisms, and each species has a typical adult size range. A Framework for K-12 Education.

Science and Engineering Practices NGSS

- Developing and using models

Crosscutting Concepts NGSS

- Systems and system models

Key Terms/Vocabulary

Stages 0, 1, 2, 3, 4, tumor, lymph nodes, primary site, secondary site, metastasis, breast cancer, prostate cancer, bronchus, colon, rectum, pancreas, bladder, kidney, uterus, carcinoma, radon, asbestos, urethra, sexually transmitted diseases, vitamins, selenium, lycopene, phytochemicals, flavonoids, polyphenols, menstruation, menopause, density, polyunsaturated fats.

Science Standards

This module is related to the content of **UNMC High School Alliance: Introduction to Pathology and Microbiology**

Pathology is the study of disease processes. The field lays the foundation for all clinical medicine and medical research. All diseases begin at the cellular level and changes in the structure and function of tissues ultimately lead to symptoms that health care providers see daily. This course will introduce students to medical terminology, normal histology and gross/microscopic pathology, allowing students to correlate the findings they see into basic clinical concepts.

Nebraska's College and Career Ready Standards for Science 2017 Nebraska Science Standards

Engineering in Health Sciences SC.HSP.17.1.C

- Evaluate a solution to a complex real-world human health problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

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.
- To help the students see personal relevance, suggest that they have a **private** conversation with family members regarding someone who has had a tumor, attempting to apply this module's vocabulary terms as appropriate.
- As student misconceptions become apparent, the teacher may need to reinforce these important concepts:
  - Cancer does not develop in every person, but genetic predisposition, as well as environmental influences, can increase the risk in everyone.
  - Doctors describe stages of cancer to make informed decisions about treatment.
  - During "Stage 0", abnormal growth occurs in some mutated cells in the body, but the abnormal growth has not spread into nearby or distant tissue.
  - During "Stage 1", the localized tumor gets larger and prepares to spread further during the next stages.
  - During "Stage 2", the cancerous growth invades nearby tissues.
  - During "Stage 3", the cancer spreads into local lymph nodes and/or muscle tissue.
  - During "Stage 4", metastasis occurs as cancerous cells travel through the circulatory system from the original (primary) tumor to other places in the body where secondary tumors begin to grow.

- Detection of cancer during the early stages allows treatment to try to prevent metastasis.
- The most common cancer among men in the U.S. is prostate cancer.
- The most common cancer among women in the U.S. is breast cancer.
- Although prostate cancer and breast cancer are the most common cancers, lung and bronchus cancers, as well as colon, rectum, and pancreas cancers are more likely to cause death in both genders.
- The deadliest cancers (lung and bronchus) are directly related to the quality of air a person breathes; that's why smoking and vaping are so dangerous.
- Prostate cancer is the most common cancer among men, but this cancer does not metastasize as aggressively as many other cancers.
- A healthy diet and avoidance of sexually transmitted infections are two ways to reduce the risk of prostate cancer.
- Breast cancer during Stage 4 can spread to bones, lungs, liver, brain, and other organs. Early detection before metastasis is critical.
- Healthy diet and exercise can reduce the risks of breast cancer.
- Hormonal levels throughout life may influence development of breast cancer.
- Genetic predisposition to breast cancer can increase the risk.
- Colon and rectum cancer can be influenced by poor diet, obesity, low physical activity, heavy alcohol consumption, and smoking.

Enrichment

- For information about career opportunities, see UNMC's Careers in Healthcare.
- Students should be watchful in current events for recent articles about cancer.
- Teacher can involve an entire class in The Faces of Cancer Lesson (pg.51-61) in Cell Biology and Cancer. The masters for printing materials needed for this lesson are found in the same resource (Cell Biology and Cancer) beginning on pg.109.
- To make connections in your community, contact local hospitals, healthcare clinics, nurses, doctors, medical laboratories.