uBEATS Teacher's Guide:

Unicellular and Multicellular

(Grades 6-8)

This teacher guide is a supplementary text to support the use of the uBEATS "Unicellular and Multicellular" module for grades 6-8.

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

- Identify the differences between unicellular and multicellular organisms.
- Distinguish between different specialized cell structures and their corresponding functions.
- Give examples of human illness that are related to cell structure and function.

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Introduction

How do the structures of organisms enable life's functions?

Look down at your hand. What do you see? You see your skin and some of you may even see the veins underneath, but what really makes up your hand?

The answer is cells. Welcome to the introduction of Cell Structures and Functions. In this module, we will dive into the organelles that make up a cell and how they function together. Each slide will be specific for the different organelles in cells. There will also be information on what happens when these organelles fail and what consequences it may bring.

Prior Knowledge

Before beginning this module, the student should understand the Grade Band Endpoints for LS1.A. A Framework for K-12 Science Education.

- ***By the end of grade 2***. All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive, grow, and produce more plants.
- ***By the end of grade 5***. Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Key Terms/Vocabulary

Structure, function, organism, cell, organelle, unicellular, multicellular, prokaryotic, eukaryotic.

Science Standards

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

- Structure and Function: SC.HS.6.1.A, 6.1.B, 6.1.C

Next Generation Science Standards (NGSS) featuring Three-Dimensional Learning

Core Idea LS1.A Structure and Function A Framework for K-12 Science Education

- Systems of specialized cells within organisms help them perform the essential functions of life, which involve chemical reactions that take place between different types of molecules, such as water, proteins, carbohydrates, lipids, and nucleic acids. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Outside that range (e.g., at a too high or too low external temperature, with too little food or water available), the organism cannot survive. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.

Science and Engineering Practices NGSS

- Developing and using models
- Planning and carrying out investigations
- Constructing explanations and designing solutions

Crosscutting Concepts NGSS

- Systems and system models
- Energy and matter
- Structure and function
- Stability and change

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.
- For personal relevance, after using this uBEATS module, use its concepts to make sense of foods you eat by visiting the website Decoding the Nutrition Label.

- The teacher may need to address student misconceptions about these important concepts:
    - In our overfed society, people are often urged to limit their intake of carbohydrates. However, students should understand that the role of carbohydrates is to provide needed energy. They are essential to our diet.
    - Likewise, fats have a negative reputation in our society, not because they are harmful, but because *too much* fat causes problems. Lipids serve many critical functions within the body.
    - Proteins are much more than static structural building blocks—they also serve as dynamic regulators in body chemistry.
    - Each cell in a person's body contains the exact same set of genetic instructions that serve the entire organism. However, within each cell only certain sections of DNA are actually expressed, resulting in much diversity among cells, tissues, organs, etc. within one organism.

Enrichment

- For information about Healthcare Career Opportunities, see UNMC's Careers in Healthcare.
- To make connections in your community, contact local hospitals, healthcare clinics, zoo, nurses, doctors, veterinarians.
- For examples of classroom lessons, see NGSS Biology Food Label Lunch Lab.