uBEATS Teacher's Guide:

Medical Terminology Module #4

Anatomical Navigation

This teacher guide is a supplementary text to support the use of the uBEATS Medical Terminology Module #4 – Anatomical Navigation 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 students.

UNMC uBEATS modules are short (15 minutes or less), interactive online health science modules to support curriculum taught in grades 6 – 12. These do not replace curriculum but provide support 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 divisions of the back.
- Identify the planes of the body.
- Describe the body using directional terms.

Introduction

Medical terminology is standardized to clearly communicate the positions of structures within a body. By using precise anatomical terminology, we can eliminate ambiguity and reduce medical errors. Directional terms describe relative locations of different structures, and the use of imaginary two-dimensional planes provide points of view for creating “virtual sections” of living bodies. This module explains the vocabulary used to examine the human body.

Prior Knowledge

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

Disciplinary Core Ideas

LS4.C. Adaptation NGSS

Natural selection leads to adaptation—that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment.

National Academies of Sciences, Engineering, and Medicine. 2012. A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Washington, DC: The National Academies Press. https://doi.org/10.17226/13165.

Science and Engineering Practices NGSS

8. Obtaining, evaluating, and communicating information

Crosscutting Concepts NGSS

1. Patterns

4. Systems and system models

6. Structure and function

Key Terms/Vocabulary

Anatomical terminology, spinal column, vertebra, disk, cervical region, thoracic region, lumbar region, sacral region, coccygeal region, magnetic resonance imaging (MRI), computed tomography (CT) scan, body planes, two-dimensional planes, midsagittal plane, median plane, sagittal plane, lateral plane, coronal plane, frontal plane, transverse plane, horizontal plane, axial plane, standard anatomical position, anterior, ventral, posterior, dorsal, medial, lateral, superior, inferior, proximal, distal, deep, superficial, supine, prone.

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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.

National Consortium for Health Science Education **NCHSE**

- Foundation Standard 1: Academic Foundation
    - 1.1.1. Describe the organization of the human body and directional terms.
        - b. Demonstrate anatomical position.
        - c. Identify body planes.
        - d. Use directional terms.

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 review sessions.

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

- The spinal column has the dual responsibility of providing strength and flexibility. Those two tasks are sometimes at odds with one another.

- The cartilage disks between the vertebrae act as shock absorbers and allow for slight mobility in the spine.
- The five vertebrae of the sacral region fuse together between ages 18-30 years to form a single bone called the sacrum.
- The coccygeal region has 3-5 vertebrae that are fused to form the coccyx or tailbone.
- Body planes can have multiple names.
    - The midsagittal and median planes are the same plane: a vertical plane that passes through the body's midline, dividing it into equal left and right halves.
    - The sagittal and lateral and longitudinal planes are the same plane: a vertical plane that is parallel to the midsagittal plane.
    - The coronal and frontal planes are the same plane: a vertical plane that divides the body into anterior (front) and posterior (back) sections.
    - The transverse and horizontal and axial planes are the same plane: a horizontal plane that divides the body into upper and lower sections.
- The standard anatomical position varies by species. For example, the standard anatomical position for humans has the body standing on two feet, while the standard anatomical position for dogs has the body standing on four legs. This affects the names of body planes and directional terms.
    - In humans, a transverse plane divides the body into superior and inferior sections, but in dogs, a transverse plane divides the body into cranial (head) and caudal (tail) sections.
    - In humans, a coronal (frontal) plane divides the body into anterior and posterior sections, but in dogs, a dorsal plane divides the body into dorsal (back) and ventral (belly) sections. For this reason, in humans the spine is posterior to the heart, while in dogs the spine is dorsal to the heart.

Enrichment

- Search online for "classroom activities for body planes" to explore multiple options for engaging students.

- RegisteredNurseRN.com presents a 7-minute video to introduce the five regions of the spinal column in Vertebral Column Anatomy.

- Many online videos provide tips for learning the basics of anatomy. For example, see the 4-minute The Easiest Way to Remember Directional Terms.