Unit 3: Systems that Control by Communication

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **3-4 weeks**
Status: **Published**

Summary

The exploration of the human body is continued with the two systems that control body activities via communication, the nervous and endocrine systems. The nervous system serves to provide control and coordination via rapid nerve impulses. In turn, the endocrine system controls cell activities by the release of chemicals that must circulate through the bloodstream. Both of these systems play an essential role in responding to changes in the environment, a characteristic of life known as excitability.

Revised: July 2024

Essential Questions/Enduring Understandings

Essential Questions

- How does each system contribute to maintaining homeostasis in the complete organism?
- What is the physiology of a nerve impulse?
- How are the nervous and endocrine systems able to work together to allow the body to respond?
- How are target cells affected by hormones?

Enduring Understandings

- The nervous and endocrine systems work in conjunction to communicate and facilitate control of body functions and impulses.
- The physiology and features of different components of each system allow the body to respond to stimulus and function.

Objectives

Students will be skilled at identifying hormones and which gland is responsible for secreting.

Students will be skilled at determining if a response is somatic or autonomic.

Students will know the three different neurons based on structure.

Students will know the differences between afferent and efferent.

Students will know how an impulse travels from one neuron to another and the impact of myelin on speed.

Students will know how to classify the types of hormones and how they enter a cell.

Students will know how endocrine and the nervous system allow for physiological changes in the body.

Learning Plan

- Preview the essential questions and connect them to the learning throughout the unit.
- Introduction to key concepts and topics via direct instruction and discussions.
- Discuss how the nervous system can receive, send, and interpret messages.
- Produce a chart describing the different types of neurons based on structure and function.
- Explain the process and route of how a nerve impulse travels.
- Identify the organs and functions of the peripheral nervous system.
- Discuss different neurological disorders and how they affect the body systems.
- Distinguish between exocrine and endocrine glands.
- Describe different types of hormones and their roles.
- Distinguish between positive and negative feedback and the circumstances these reactions create.
- Describe the location and structure of the primary endocrine glands.
- Identify the hormones produced by each gland and describe their effects.

Assessment

Formative

- Do Now questions
- Small group discussion participation
- Large group discussion participation
- Individual student questions and responses
- Independent tasks
- Create a flow chart indicating the physiology behind a nerve impulse
- Label the parts of a multipolar neuron
- Practice identifying the parts of the brain
- Research a neurological disorder and present

Summative

- Quizzes
    - Identifying and labeling the parts of the brain
    - Key hormones produced by each gland and their effects
- Response lab to demonstrate how the body reacts to a stimulus

- Unit test

Benchmark

- Final exam

Alternative

- Open note exam
- Research project on the system that communicates with the outside world

Materials

- Hole's Essentials of Human Anatomy and Physiology, High School 2nd Edition by Charles J. Welsh
- Google slides
- Lab materials & models
    - Skeleton model
    - Skull model
    - Brain model
    - Model of the upper body
    - Model of the digestive system
    - Anatomical poster of body systems
- core book list

Standards

ELA.L.SS.11–12.1	Demonstrate command of the system and structure of the English language when writing or speaking.
ELA.L.KL.11–12.2	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
SCI.HS.LS1.A	Structure and Function
SCI.HS.LS1.A	Structure and Function
SCI.HS.LS1.A	Structure and Function
SCI.HS.LS1.C	Organization for Matter and Energy Flow in Organisms
SCI.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
SCI.HS-LS1-6	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
WRK.9.2.12.CAP	Career Awareness and Planning
WRK.9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training

	schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
WRK.9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
	Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.
	Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.
	Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.
	Systems of specialized cells within organisms help them perform the essential functions of life.
	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.
	The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.
	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. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.
	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.

Integrated Accommodations and Modifications

https://docs.google.com/spreadsheets/d/11cEQxerWEHQEjIbnMkdf8AsemQLmsrMS6VdGmBFYliU/edit?usp=sharing