



BPS Science Department Anatomy and Physiology

Anatomy and Physiology – Unit 3 - The Integumentary System (Chapter 5)

Overview: The integumentary system consists of the skin and accessory structures, including hair, nails, sweat and sebaceous glands, and specialized nerve receptors such as touch, cold, heat, pain, and pressure. Its functions include protection of internal structures, prevention of entry of disease causing microorganisms, thermoregulation, excretion through perspiration, pigmentary protection against ultraviolet sun rays, and production of Vitamin D. In order to do these things, the integumentary system works with all the other systems in the human body to maintain and support the conditions that your cells, tissues, and organs need to maintain homeostasis. A disruption of homeostasis may lead to a diseased state of the human integumentary system.

Essential Questions:

- How does the human integument's anatomy determine its physiology?
- Why does the human integument consist of many layers?
- How do the parts of the human integument work together to maintain homeostasis?
- Why is thermoregulation essential to the proper function of the human integument?
- Why is pigmentation crucial to the human integument?
- How does a failure of homeostatic mechanisms in the human integument lead to disease?

NYSSLS Standards:

- **HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.**
 - (DCI) **LS1.A: Structure and Function:** Systems of specialized cells within organisms help them perform the essential functions of life
 - (CCC) **Structure and Function:** Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.
 - (SEP) **Constructing Explanations and Designing Solutions:** Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.
- **HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.**
 - (DCI) **LS1.A: Structure and Function:** 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.
 - (CCC) **Systems and System Models:** Models (e.g. physical, mathematical, computer models) can be used to simulate systems and interactions -- including energy, matter, and informational flows -- within and between systems at different scales.
 - (SEP) **Developing and Using Models:** Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Use a model based on evidence to illustrate the relationships between systems or between components of a system.
- **HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis**
 - (DCI) **LS1.A: Structure and Function:** 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.
 - (CCC) **Stability and Change:** Feedback (negative or positive) can stabilize or destabilize a system.
 - (SEP) **Planning and Carrying Out Investigations:** 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



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3D Learning Overview: KNOW → <u>Disciplinary Core Ideas</u> (DCI): what students need to know UNDERSTAND → <u>Crosscutting Concepts</u> (CCC): what students look for/ applies across all science domains and <u>Science & Engineering Practices</u> (SEP): how students explore and apply		Crosscutting Concepts (CCC): <ul style="list-style-type: none"> ● Patterns ● Cause and Effect ● Scale, Proportion, and Quantity ● Systems and System Models ● Energy and Matter ● Structure and Function ● Stability and Change 		Science and Engineering Practices (SEP): <ul style="list-style-type: none"> ● Asking questions (for science) and defining problems (for engineering) ● Developing and using models ● Planning and carrying out investigations ● Analyzing and interpreting data ● Using mathematics and computational thinking ● Constructing explanations (for science) and designing solutions (for engineering) ● Engaging in argument from evidence ● Obtaining, evaluating, and communicating information 	
Time Frame	Skills, Practices or Expectations	Textbook Resources	Online Resources	Vocabulary	Higher Order Questions
10.10.22 - 10.28.22 NOTE: 10.10.22 – Indigenous Peoples’/ Italian-Heritage Day	Anatomy and Physiology: The students will be able to: <ul style="list-style-type: none"> ● Describe the anatomy and physiology of the human integument. ● Identify the layers of the human integument. ● Describe the accessory structures of the human integument. ● Explain the role of the human integument in thermoregulation. ● Explain the importance of pigmentation. ● Classify burns based on appearance, sensation, and damage to the human integument. ● Explain the functional relationships between the human integument and other human body systems. Diseases/Disorders: The students will be able to: <ul style="list-style-type: none"> ● Describe a disease or disorder of the human integument or its accessory structures including symptoms, 	Chapter 5 Introduction & Functions (p.122-123) 5-1 Epidermis Layers (p.123-125) <ul style="list-style-type: none"> ● Figure 5-2 Epidermis (p.123) 5-2 Pigmentation (p.125-126) <ul style="list-style-type: none"> ● Figure 5-3 Melanocytes (p.125) 5-3 Sunlight & Skin (p.126-127) 5-4 Dermis (p.127) 5-5 Hypodermis (p.127-128) 5-6 Hair (p.128-130) <ul style="list-style-type: none"> ● Figure 5-5 Hair Follicles & Hair (p.129) 5-7 Exocrine Glands (p.130-131) <ul style="list-style-type: none"> ● Figure 5-7 Sweat Glands (p.131) 5-8 Nails (p.131-132) <ul style="list-style-type: none"> ● Figure 5-8 Nail Structure (p.132) 	Michigan State Histology Slides: Epithelia ; Integumentary System HASPI: <ul style="list-style-type: none"> ● Sunscreen & Skin Cancer - learn about skin cancer then use UV sensitive paper to test effectiveness of sunscreen ● Investigating Skin - station activities about sweat glands, evaporative cooling, nerve distribution and 2-point touch Sticky Fingers Activity (CSI Activity PDF about fingerprints with student and teacher sheets) HHMI How we Get Skin Color* <ul style="list-style-type: none"> ● Video: Explains how melanin is formed and explains how types amounts of melanin vary from person to person. This helps understand why there are differences in skin color between people. 	cutaneous membrane integument thick skin/ thin skin epidermal ridges keratin/ keratinized cornified <u>Layers of Skin:</u> epidermis, dermis, hypodermis (subcutaneous layer) <u>Layers of Epidermis:</u> stratum basale, stratum corneum, stratum spinosum, stratum granulosum, stratum lucidum <u>Layers of Dermis:</u> papillary, reticular <u>Pigment:</u> carotene, melanin, melanocytes <u>Hair:</u> hair follicles, hair papilla, hair root, hair shaft, arrector pili <u>Nails:</u> nail body, nail root, nail bed, cuticle <u>Glands:</u> sebaceous, exocrine, sweat (apocrine, eccrine/ merocrine)	<ul style="list-style-type: none"> ● How do two or more systems work together to maintain homeostasis in Acne? ● Why does the aging process change the human integument? ● Why does hair turn gray or white with age? ● How might our knowledge and care of the integumentary system help to prolong a youthful appearance? ● How might an albino’s lifestyle change as a result of their condition? ● Some criminals file their fingertips or use acid to avoid leaving recognizable fingerprints. Explain if these practices would permanently remove fingerprints?



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	<p>diagnosis, medications, prevention, and treatment.</p> <ul style="list-style-type: none"> Diagnose a human integument disease/disorder given a data set of symptoms. Explain homeostasis in the human integument through negative and positive feedback mechanisms. Predict prevention and treatment of a human integument disorder based on a given data set. 	<p>5-9 Injury Repair (p.132-133)</p> <ul style="list-style-type: none"> Figure 5-9 Skin Repair (p.133) Table 5-1 Burns (p.134) <p>5-10 Aging (p.134-135)</p> <p>Chapter 5 Review Questions p.137-139</p> <p>Integumentary System and Other Body Systems (p.140)</p>	<p>HHMI Biology Of Skin Color (video with embedded quiz questions)</p>	<p>homeostasis/ homeostatic regulation disease/ disorder symptoms negative feedback loop positive feedback loop</p>	<ul style="list-style-type: none"> What is the skin's role in maintaining homeostasis? What are the effects of the environment on the integumentary system?
Resources	<p>https://ngss.nsta.org/Classroom-Resources.aspx - Searchable NYSSLS/NGSS aligned resources curated by NSTA</p> <p>Dissection Videos (these videos -- dissection of heart, liver, uterus and eye -- were created in collaboration with the Jacobs School of Medicine and Biomedical Sciences. All dissection videos have two separate segments - an introduction segment and a dissection segment. All segments have an accompanied student activity resource Access via Schoology BPS Science K-12 Group Resources 9-12 Resources Anatomy & Physiology Dissection Videos</p> <p>Virtual Frog Dissection (step by step virtual dissection) PBS Learning Media Dissection Videos and Resources (Sheep Heart, Cow Eye, Frog) Virtual Fetal Pig Dissection (from Whitman College) Cow Eye Dissection (video, step-by-step virtual dissection, PDF of student lab guide) NYSED Bilingual Glossaries – NYS Statewide Language Regional Bilingual Education Resource for NYSED approved bilingual glossaries.</p>				
<p>English Language Learners (ELL) Enhancements</p> <p>To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p>Listening</p> <ul style="list-style-type: none"> Cross- Linguistic Practices: Gives students opportunities to make connections between what they hear and their home language (ex: allow students to listen to a passage and identify cognates.) Build background knowledge Activating Prior Knowledge Activating Prior Knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content Visuals - GIFs, pictures- assist students in understanding. Use visual thinking strategies to set learning lens 	<p>Speaking</p> <ul style="list-style-type: none"> Sentence Frames - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i> Academic Conversation Starters: Have a visual of a list of academic sentence starters that students can refer to in a discussion (helps students have a more science focused dialogue). Examples include- I expect ___ to happen. My data shows that... Choral Reading - To build fluency, self-confidence and motivation with reading/speaking 	<p>Reading</p> <ul style="list-style-type: none"> Supplementary Text to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension. Visual Aids - Pictures or models to support vocabulary words and concepts Video to review or introduce a topic - use closed captioning to help students read along while they listen to the content 4 Square / Frayer models to help students gain a deeper understanding of vocabulary. Highlighting important text to assist students in answering questions after the reading. Chunking-Break reading of text into chunks or paragraphs 	<p>Writing</p> <ul style="list-style-type: none"> Sentence Frames - to begin a sentence- such as <i>Biodiversity is...</i> or <i>An example of competition is....</i> Cloze passages with word banks Word banks Graphic Organizers to help break down the writing process and organize thoughts 	<p>Instructional Accommodations (depending on the student's needs)</p> <ul style="list-style-type: none"> Extended time for tests in class, projects and assignments Directions read. Broken down as necessary Model how to complete the activity in the lesson Oral simplification of directions or questions Translated version of test when available. Student may have both version English and native language version



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	<ul style="list-style-type: none"> • Video to review/ introduce topics– use closed captioning to help students see the words and pronunciations while they listen • Word stretching / Vowel stretching when instructing allows student to listen closely to the pronunciation of the word • Performance Level Descriptors - description of expected output from students based on earned NYSESLAT levels in the modality of listening (Scroll for grades 9-12) 	<ul style="list-style-type: none"> • Create movement to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning • Performance Level Descriptors - description of expected output from students based on earned NYSESLAT levels in the modality of speaking(Scroll for grades 9-12) 	<ul style="list-style-type: none"> • Performance Level Descriptors - description of expected output from students based on earned NYSESLAT levels in the modality of reading(Scroll for grades 9-12) • Vocabulary Morphology- Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary. 	<ul style="list-style-type: none"> • Standards-based sentence stems • Performance Level Descriptors - description of expected output from students based on earned NYSESLAT levels in the modality of writing(Scroll for grades 9-12) 	<ul style="list-style-type: none"> • Use of approved bilingual glossaries from NYS in each subject
<p>Special Education Modifications</p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p>Instructional</p> <ul style="list-style-type: none"> • Pre-teach vocabulary • Use picture vocabulary • Scaffold Depth of Knowledge questions • Provide copy of notes/notes in “cloze” form • Use of Think, Pair, and Share strategy to help process information • Scaffold written assignments with the use of graphic organizers • Allow for multiple ways to respond (verbal, written, response board) • Provide model of performance task • Modify informational text to fit the needs of the students • Provide a digital or paper interactive notebook • Present complex tasks in multiple ways • Provide mnemonic strategies for Chemistry concepts 	<p>Technology:</p> <ul style="list-style-type: none"> • Audio reading of text • Text to type functions • Videos to clarify/visualize Chemistry concepts • Record class lecture/discussions and make accessible to student • Nearpod- interactive presentations of notes • Playposit - show a video clip about the topic and add your own questions for them to answer as they watch • Allow students to type answers in chat on Teams <p>Other:</p> <ul style="list-style-type: none"> • Arrange seating for maximum engagement and minimum distraction • Accessible lab space (counter level) 	<p>In Class Assessments</p> <ul style="list-style-type: none"> • Provide review packet or review sheet of concepts covered on the test • Practice similar questions prior to the test • Provide multiple options for projects • Give a timeline of when things are due and remind them of the process often. • Use of timer in class • Break all complex tasks into chunks 		



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<p>Step Up to Writing Step Up to Writing materials can be found in BPS Science K-12 Schoology Folder 9-12 Resources Chemistry Resources Curriculum Materials</p>	<p><u>SUTW Strategy</u></p> <ul style="list-style-type: none">● Informal Outline● Color-Coding – Informative/Explanatory Text● Two-column notes● I-V-F Topic Sentence progressing to Four Step Summary Paragraph● CUPS – Capitalization, Usage, Punctuation, Spelling● Transitions
<p>Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom</p>	<p>Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications</p> <ul style="list-style-type: none">● Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population● All students are given an opportunity to engage in science discourse● Teacher demonstrates high expectations for all students <p>CLRT resources which align to Science content are denoted with a *</p>