



Anatomy and Physiology – Unit 8 - The Cardiovascular System: Blood (Chapter 11)

Overview: The Cardiovascular System provides a mechanism for the rapid transport of nutrients, waste products, respiratory gases, and cells within the body. Blood is a specialized fluid connective tissue. Its functions include 1) transporting dissolved gases, nutrients, hormones, and metabolic wastes; 2) regulating pH and electrolyte composition of the interstitial fluids; 3) restricting fluid losses through damaged vessels; 4) defending against pathogens and toxins; 5) regulating body temperature by absorbing and redistributing heat. Blood contains plasma, red blood cells, white blood cells, and platelets. The plasma and formed elements constitute whole blood, which can be fractionated for analytical or clinical purposes.

Essential Questions:

- What are the main components, characteristics and major functions of blood?
- What is the composition and functions of plasma?
- Explain the characteristics and functions of red blood cells, white blood cells, and platelets.
- Why is hemoglobin important?
- Why is knowing one's blood type so important?
- How does the human cardiovascular system work together with other human body systems?
- How does a failure of homeostatic mechanisms in the human blood 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 (DCI)</u> : what students need to know UNDERSTAND → <u>Crosscutting Concepts (CCC)</u> : what students look for/ applies across all science domains and <u>Science & Engineering Practices (SEP)</u> : 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
Time Frame 1.30.23 - 2.10.23	Anatomy and Physiology: The students will be able to: <ul style="list-style-type: none"> ● Describe the major components and major functions of blood and list the physical characteristics. ● Describe the composition and functions of plasma, red blood cells, white blood cells, and platelets. ● Describe the function of hemoglobin. ● Discuss the factors that determine a person's blood type and explain why blood types are important. ● Describe the mechanisms that control blood loss after an injury. Diseases/Disorders: The students will be able to: <ul style="list-style-type: none"> ● Describe a disease or disorder of the human Cardiovascular system or its accessory structures including symptoms, diagnosis, medications, prevention, and treatment. ● Diagnose a human blood disease/disorder given a data set of symptoms. 	Chapter 11 11-1 Blood Functions & Characteristics (p.381-382) <ul style="list-style-type: none"> ● Figure 11-1 Composition of Blood (p.383) 11-2 Plasma (p.382-384) 11-3 Red Blood Cells (p.384-390) <ul style="list-style-type: none"> ● Figure 11-2 Anatomy of RBCs (p.385) ● Figure 11-6 Role of EPO in Control of Erythropoiesis (p.390) 11-4 ABO Blood Types (p.391-393) <ul style="list-style-type: none"> ● Figure 11-7 Blood Types and Cross Reactions (p.392) 11-7 Hemostasis <ul style="list-style-type: none"> ● Figure 11-9 Structure of a Blood Clot (p.399) Chapter 11 Review Questions (p.403-404)	Michigan State Histology Slides: Cardiovascular System HASPI: <ul style="list-style-type: none"> ● Cardiovascular System - use charts to learn about blood vessels, the heart, blood pressure, pulse, histology, disease and hematocrits ● CBC Count - examine blood smears and data to diagnose patients with blood disorders Blood Typing Game (Virtual Simulation collecting blood, blood typing & giving transfusions) Z Space Activity (code): Sickle Cell Disease (A277) Explore sickle cell disease, inheritance, effects and symptoms Teacher Resource pdf Student Resource pdf	blood hemostasis coagulation embolus fibrin fibrinolysis fractionated hematocrit hemoglobin hemopoiesis/ hematopoiesis <u>Parts of Blood:</u> plasma, serum, erythrocyte (red blood cell), leukocyte (white blood cell), platelets homeostasis/ homeostatic regulation disease/ disorder symptoms negative feedback loop positive feedback loop	<ul style="list-style-type: none"> ● How do red blood cells differ from typical body cells? ● Which of the formed elements would you expect to increase after you have donated a pint of blood? ● Why do many individuals with advanced kidney disease become anemic? ● In the disease mononucleosis, the spleen enlarges because of increased numbers of phagocytes and other cells. Common signs and symptoms of this disease include pale complexion, a tired feeling, and lack of energy sometimes to the point of not being able to get out of bed. What might cause each of these signs and symptoms?



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	<ul style="list-style-type: none"> • Explain homeostasis in the human blood through negative and positive feedback mechanisms. • Predict prevention and treatment of a human blood disorder based on a given data set. 		<p><u>Charles Drew Article (Gale Database)*</u></p> <ul style="list-style-type: none"> • Article: Charles Drew pioneered further into the field of blood preservation and organized procedures from research to a clinical level, leading to the founding of blood banks just prior to World War II. His love of sports opened the door to his chosen future in medicine and research. 		
	<p>http://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)</p> <p>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)</p> <p>PBS Learning Media Dissection Videos and Resources (Sheep Heart, Cow Eye, Frog)</p> <p>Virtual Fetal Pig Dissection (from Whitman College)</p> <p>Cow Eye Dissection (video, step-by-step virtual dissection, PDF of student lab guide)</p> <p>NYSED Bilingual Glossaries – NYS Statewide Language Regional Bilingual Education Resource for NYSED approved bilingual glossaries.</p>				



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<p>English Language Learners (ELL) Enhancements</p> <p>To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p><u>Listening</u></p> <ul style="list-style-type: none"> ● <u>Cross- Linguistic Practices:</u> 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.) ● <u>Build background knowledge</u> ● <u>Activating Prior Knowledge</u> <u>Activating Prior Knowledge</u> means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content ● <u>Visuals</u> - GIFs, pictures- assist students in understanding. Use visual thinking strategies to set learning lens ● Video to review/ introduce topics– use closed captioning to help students see the words and pronunciations while they listen ● <u>Word stretching / Vowel stretching</u> when instructing allows student to listen closely to the pronunciation of the word ● <u>Performance Level Descriptors</u> - description of expected output from students based on earned NYSESLAT levels in the modality of listening (Scroll for grades 9-12) 	<p><u>Speaking</u></p> <ul style="list-style-type: none"> ● <u>Sentence Frames</u> - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i> ● <u>Academic Conversation Starters:</u> 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... ● <u>Choral Reading</u> - To build fluency, self-confidence and motivation with reading/speaking ● Create <u>movement</u> 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 ● <u>Performance Level Descriptors</u> - description of expected output from students based on earned NYSESLAT levels in the modality of speaking(Scroll for grades 9-12) 	<p><u>Reading</u></p> <ul style="list-style-type: none"> ● <u>Supplementary Text</u> to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension. ● <u>Visual Aids</u> - 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 ● <u>4 Square / Frayer models</u> to help students gain a deeper understanding of vocabulary. ● <u>Highlighting</u> important text to assist students in answering questions after the reading. ● <u>Chunking</u>-Break reading of text into chunks or paragraphs ● <u>Performance Level Descriptors</u> - description of expected output from students based on earned NYSESLAT levels in the modality of reading(Scroll for grades 9-12) ● <u>Vocabulary Morphology</u>- 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. 	<p><u>Writing</u></p> <ul style="list-style-type: none"> ● <u>Sentence Frames</u> - to begin a sentence- such as <i>Biodiversity is...</i> or <i>An example of competition is....</i> ● <u>Cloze passages</u> with word banks ● <u>Word banks</u> ● <u>Graphic Organizers</u> to help break down the writing process and organize thoughts ● <u>Standards-based sentence stems</u> ● <u>Performance Level Descriptors</u> - description of expected output from students based on earned NYSESLAT levels in the modality of writing(Scroll for grades 9-12) 	<p><u>Instructional Accommodations (depending on the student's needs)</u></p> <ul style="list-style-type: none"> ● <u>Extended time</u> for tests in class, projects and assignments ● <u>Directions read.</u> Broken down as necessary ● <u>Model</u> how to complete the activity in the lesson ● <u>Oral simplification</u> of directions or questions ● <u>Translated version</u> of test when available. Student may have both version English and native language version ● Use of approved bilingual glossaries from NYS in each subject
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<p>Special Education Modifications</p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><u>Instructional</u></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><u>Technology:</u></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><u>Other:</u></p> <ul style="list-style-type: none"> ● Arrange seating for maximum engagement and minimum distraction ● Accessible lab space (counter level) 	<p><u>In Class Assessments</u></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
<p>Step Up to Writing</p> <p>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>		