Table 1

*Next Generation Science Standard Overview*

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| Standard  HS-LS From Molecules to Organisms: Structures and Processes  The chart below makes one set of connections between the instruction outlined in this article and the *NGSS*. Other valid connections are likely; however, space restrictions prevent us from listing all possibilities. The materials, lessons, and activities outlined in the article are just one step toward reaching the performance expectation listed below. | |
| Performance Expectations  HS-LS1-2  Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.  HAP.10.3  Investigate the structure and function of different types of blood vessels (e.g., arteries, capillaries, veins). Identify the role each plays in the transport and exchange of materials. | |
| Dimensions: | Connections to Classroom Activity: |
| Science and Engineering Practice |  |
| Asking Questions and Defining Problems  Develop and Use Models | Students investigate a case study determining what condition has occurred in the cardiovascular system. Students use the case study to identify a real-life health problem by considering how the cardiovascular system operates.  Students use videos and activities as models to see and consider the flow of the cardiovascular system. Students create mental models that demonstrate the flow of the cardiovascular system and effects of a heart attack. |
| Disciplinary Core Idea |  |
| L.4.1  Students will demonstrate an understanding of the organization, functions, and interconnections of the major human body systems.  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. | Students rely on their understanding that humans are made up of organ systems and each system has a specific function internally. This will aid students in identifying how the cardiovascular system contributes to the body as a whole. |
| Crosscutting Concept |  |
| Cause and effect:  Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.  Systems and System Models  Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales. | Students investigate how a disturbance in the cardiovascular system leads to an effect in the nutrients of the body. Cause and effect is present by allowing students to see how introducing harmful chemicals from smoking affect the cardiovascular system. Systems and system models are represented by observing how one element of the cardiovascular system interacts with the rest. |

**Connections to the *Common Core State Standards* (NGAC and CCSSO 2010):**

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| **ELA**  WHST.11-12.5  Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. | Students initially write about the initial thinking from the case study. After being introduced to more information, students create mental models which can be half-written and half-drawing. |
| **Mathematics**  MP.4  Model with mathematics. | When creating their mental models, students must model with mathematics by proportioning their drawing to demonstrate level of damage. |