MaLa Scientific

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US Patented Blood Cell Visual Models and NGSS Standards.

NGSS standards: Mala Scientific Blood Cell Visual Models embrace student centered inquiry-based pedagogy. Our blood cell visual models are designed for hands-on experience along with Teacher-Student color guides to learn instantly the blood cell components, and what can go wrong when leukemias and infection related blood cell diseases occur. This experience will leave students with lasting knowledge of normal blood cell biology, leukemias and other blood cells diseases.

High School Life Sciences

HS Structure and Function: Anatomy, Physiology, Inheritance, Development and Differentiation

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. [Assessment Boundary: Assessment does not include identification of specific cell or tissue types, whole body systems, specific protein structures and functions, or the biochemistry of protein synthesis.]

> *How does HS-LS1-1 relate to the Blood cell visual model? Transport of oxygen by red blood cells is an essential function for life.* ***Sickle cell anemia*** *is a perfect example of a DNA mutation that impacts this function. Sickle cell disease is an inherited genetic disorder caused by a specific DNA mutation resulting in a change in hemoglobin protein structure. As a result, the specialized disc-shaped red blood cells transform into sickle-shaped cells thereby blocking the circulation and transport of oxygen and nutrients. The Mala Scientific Blood Cell models and lesson plans present this change in visual models as well as lesson plans.*

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Clarification Statement: 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.] [Assessment Boundary: Assessment does not include interactions and functions at the molecular or chemical reaction level.]

> *HS-LS1-2. To address this unit, our visual blood cell models and lesson plans address how trillions of cells move within multicellular organisms. Blood cells that carry oxygen or provide important immune or protective mechanisms must circulate throughout the body. This is possible due to the hierarchical organization of specialized cells called endothelial cells lining the blood vessels that act as barriers as cells move in an orderly manner through capillaries. The interacting systems in this hierarchical organization are capillaries and arteries that depend on proper functioning of elastic tissue and smooth muscles to regulate and deliver the proper amount of blood through the interconnecting cardiovascular and respiratory systems.*

HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. [Assessment Boundary: Assessment does not include specific gene control mechanisms or rote memorization of the steps of mitosis.

The Mala Scientific blood cell models address the critical role of cellular division and differentiation in producing and maintaining complex organisms. Stem cells in our bone marrow populate the bone marrow by cell division. Through a process of differentiation blood cells develop into various types of white blood cells as well as red blood cells that carry oxygen. White blood cells are the front line of defense in fighting foreign infections. For example, eosinophils and basophils increase in number during allergies, asthma, hay fever, hives, and parasitic infections. During allergic reactions basophils release two enzymes, histamine, and heparin. To counter their effect, we take antihistamine. The Mala Scientific blood cell models demonstrate conditions such as ***eosinophilia and basophilia****. In addition, the control of cellular division and differentiation can be disrupted resulting in either partially differentiated or immature (blast) cell production, or overgrowth of certain blood cells (lymphocytes, monocytes, neutrophils, eosinophils, basophils) resulting in* ***Lymphatic Leukemia, Monocytic Leukemia, or Myeloid Leukemia****. Mala Scientific blood cell models and lesson plans address this critical control of cell division and differentiation.*