

Blood

OVERVIEW:

In this activity, students will explore the role of blood, its components, and the task that these components play in the human body. Students will identify the components of blood, then compare and contrast the samples under a microscope. Finally, students will have the opportunity to visit a medical facility or talk with medical personnel who will explain the process that blood goes through when it is tested.

CONCEPTS:

National Science foundation Standards:

Standard C: Life Science (Structure and Function in Living Systems)

- Cells as the fundamental unit of life.
- Levels of organization in living systems for structure and function, e.g., cells, organs, tissues, organ systems, whole organisms, and ecosystems.
- Life functions in cells.
- Specialized cells, tissues, and organs and their functions.

Benchmark 6: The Human Organism

A: Human Identity

- Like other animals, human beings have body systems for obtaining and providing energy, defense, reproduction, and the coordination of body functions.

C: Basic Function

- Organs and organ systems are composed of cells and help to provide all cells with basic needs.

OBJECTIVES:

Student will:

- Identify the components of blood and the role of blood in the human body
- Draw detailed samples of blood samples that are observed under a microscope
- Compare and contrast blood samples
- Visit a medical facility or talk with medical personnel

PROCEDURES:

- Allow 1 hour to present the background information and to complete the activity.
- Present the background information
- Complete the activity (Part A.) Microscope Observations and Field Trip
- Prearrange for a tour and/or a speaker of a medical laboratory.
- Follow up activity with discussion questions (see Part B.) These questions may be used for assessment purposes.

MATERIALS:

- Background information: Blood
- Centrifuge
- Blood Samples

- Microscope
- Slide
- Handout: Microscope Observations

BACKGROUND:

People normally say that “Blood is the fluid of life”. Have we ever stopped to think about the importance of blood? What role it plays in our body and why millions of people constantly require blood? Many organizations out there call on people to donate blood, to help the sick and wounded in hospitals.

Blood helps our bodies in many ways; it helps in transportation of oxygen throughout our body from the lungs; it also transports carbon dioxide from the body tissue to the lungs; it also helps transport nutrients; and finally in transporting disease fighting substances to the body tissue and waste to the kidneys.

Blood contains the following components:

- Red Blood Cells
 - White Blood Cells
 - Platelets
 - Fluid Plasma
- **Red Blood cells (RBC):** These contain Hemoglobin, which is a complex iron-containing protein that carries oxygen throughout the body and gives blood the red color. There are about one billion red blood cells in 2-3 drops of blood. Red blood cells are manufactured in the bone marrow and are continuously being produced and broken down.
 - **White Blood Cells (WBC):** These help the body fight infections from substances such as bacteria, fungi, and viruses. A majority of WBCs are also produced in the bone marrow.
 - **Platelets** are the smallest blood cells. An important role they play is clotting blood and preventing bleeding.
 - **Plasma** is the fluid portion of blood. It is a straw-colored clear liquid, a protein-salt solution in which RBCs, WBCs and platelets are suspended. Plasma is 90 percent water and constitutes about 55 percent of blood volume. Some functions of plasma include; maintaining a satisfactory blood pressure and volume; supplying critical proteins for blood clotting and immunity; and it serves as a medium of exchange for vital minerals such as sodium and potassium, thus helping maintain a proper balance in the body.
 - **Why test blood?** Blood is tested, first and foremost, to find out the cell count in each component; to help physician’s determine the severity of anemia, leukemia, or tissue damage; and to determine toxicology by identifying toxins in a person’s blood. Some machines used in a medical lab are:
 - **Centrifuge-** it separates blood components; RBCs which are the heaviest, will sink to the bottom, then plasma, which is the lightest rises to the top and WBCs and platelets are suspended in the middle.
 - **Hematology Analyzer-** Processes blood for Complete Blood Counts
 - **Microscope-**an instrument in which magnifying lenses present an enlarged image of a very small object so that it can be seen by the naked eye.

Activity 2: Field Trip

Visit a medical laboratory or arrange for someone from a laboratory to visit and speak to the class.

Sample Questions:

- Explain some of the equipment that is used to test blood
- What role does blood play in the human body?
- What is blood used for?
- How much blood is donated each year?
- How much blood is transfused each year?
- Who donates blood?
- Where is blood donated?
- What are the criteria for blood donation?
- What is the most common blood type?
- What tests are performed on donated blood?
- When are blood donors needed most?
- What information can be obtained through a blood test?

Part B:

Ask the following questions and allow time for discussion.

Share:

What was some of the equipment you observed in the laboratory? What was it used for?

Process:

What happens to our body when we have a blood disease?

Generalize:

What are the parts of blood? What role does each play?

Apply:

What information can be obtained through a blood test?

References:

http://www.aabb.org/All_About_Blood/FAQs

<http://kidshealth.org/PageManager.jsp>

<http://www.bmtnews.org/bmt/bmt.book>

<http://sln.fi.edu/biosci/blood/blood.html>