Unit 3.1 Learning Objectives

Preface

Sickle cell anemia is a disease passed down through families in which red blood cells form an abnormal sickle or crescent shape. Red blood cells carry oxygen to the body and are normally shaped like a disc. Sickle cell anemia is caused by an abnormal type of hemoglobin called hemoglobin S which causes red blood cells to become shaped like crescents or sickles. The fragile, sickle-shaped cells deliver less oxygen to the body's tissues. They can also get stuck more easily in small blood vessels or can break into pieces that can interrupt healthy blood flow. These problems decrease the amount of oxygen flowing to body tissues even more.

Sickle cell disease (SCD) affects millions of people throughout the world and is a major public health concern. Each year about 3% of people with sickle cell disease die. Many of these deaths are sudden. It is thought that a high percentage of these sudden deaths are due to heart attacks. Individuals with sickle cell disease are more prone to blood clots which can lead to strokes, pulmonary embolisms, and heart attacks. Another complication of the disease is an increased susceptibility to bacterial and viral infections.

In this lesson students will obtain a portion of Anna Garcia’s autopsy report which shows that she had sickle cell disease. They will learn more about the components and function of blood in order to better understand how sickle cell disease affects the body. They will examine Anna’s blood with a microscope and complete a blood test called a hematocrit in order to determine whether Anna’s sickle cell disease was causing her other related health problems. They will learn about what it is like for a person dealing with this serious disease by reading her diary entries. Finally, they will write diary entries for an assigned sickle cell patient. The entries will detail how the patient is feeling, describe the treatment being given, and include a narrative of all of the biomedical professions the patient encounters during their treatment journey.

Understandings

1. Sickle cell disease is caused by an abnormal type of hemoglobin which causes red blood cells to become shaped like crescents or sickles.
2. Sickle cell disease and anemia cause many health problems and affect daily life for someone with the disease.

Knowledge and Skills

It is expected that students will:

- Explain the function of each of the major components of blood.
- Recognize that anemia is a deficiency in red blood cells or hemoglobin.
- Recognize that a hematocrit, a test performed to determine if someone is anemic, is the percent of the volume of whole blood that is composed of red blood cells.
- Compare normal vs. sickle-shaped red blood cells.
- Demonstrate how sickle-shaped red blood cells lead to decreased oxygen flow to body tissues.
- Create diary entries for a sickle cell patient and reflect on what living with sickle cell anemia is like.

Essential Questions

1. What is sickle cell disease?
2. Why does the sickling of red blood cells cause health problems?
3. What is sickle cell anemia?
4. How is anemia diagnosed?
5. How does sickle cell disease affect daily life?