

SICKLE CELL ANEMIA LABORATORY INVESTIGATION

OBJECTIVE/RATIONALE

Disease can be identified and diagnosed by an alteration in cell structure and function. The student will be able to identify sickle cells on a blood smear.

TEKS 121.15 2B, 2D, 4C, 4E

TAKS ELA 1, 4
Science 1, 2

National Science Education Standards A9-12; C9-12; F9-12; G9-12
National Health Care Skills Standards .01, .04, .05, .06, .07, .08

KEY POINTS

Red Blood Cell Morphology Power Point Presentation

- I. Sickle cell anemia
 - A. History: First observed in 1910 by James Herrick. It was observed in a West Indian student suffering from anemia. In 1917, it was recorded that red blood cells were found sickled in a patient not suffering from anemia. In 1949, it was discovered that Hemoglobin S when electrophoresed, migrates differently than Hemoglobin A and this difference was caused by an amino acid substitution in the globin chain of the hemoglobin molecule.
 - B. Two different states:
 1. Hemoglobin AS: Patients have both HgbA and HgbS, the heterozygous state. These patients are known as carrying the sickle cell trait. The morbidity and mortality of patients in this state is not affected. The trait occurs in approximately 8% of American Blacks. In electrophoresis, the patient with the sickle cell trait has 20-40% of HgbS and 60% or more of HgbA.
 2. Hemoglobin SS: Patients are homozygous for HgbS and have sickle cell anemia. The anemia of sickle cell patients is a chronic hemolytic anemia that is normochromic and normocytic. A blood smear will show sickled cells, target cells, and nucleated red cells. There is no cure for sickle cell anemia. The life expectancy varies so much that an accurate estimate is not known. Clinical features of sickle cell anemia include: Hemolytic crisis, vaso-occlusive crisis, bone and joint abnormalities, enlarged heart, heart murmurs, retinal hemorrhage, and autosplenectomy. A sickle cells crisis is any new sickness that comes on fast in patients with sickle cells anemia. A crisis may be: vaso-occlusive crisis or hemolytic crisis, just to mention a few.
- II. Laboratory Investigation - The student will be able to identify sickle cells on a blood smear.

ACTIVITIES

- I. Complete the Sickle Cell Laboratory Investigation

MATERIALS/RESOURCES

Sickle Cell Anemia PowerPoint Presentation

Prepared sickle cell anemia red blood cell smears with coverslips (ask the local hospital to make a slide set or order from a biological supply house)

Prepared normal red blood cell smears

Microscope

Oil for oil-immersion lens

Gloves

Laboratory coat or apron

Goggles

Biohazard containers

Surface disinfectant

Paper towels

Rodak, Bernadette F. Diagnostic Hematology. Philadelphia: W. B. Saunders Company, 1995. ISBN 0-7216-4727-8

Carr, Jacqueline H. and Rodak, Bernadette F. Clinical Hematology Atlas. Philadelphia: W.B. Saunders Company, 1999. ISBN 0-7216-4174-1

ASSESSMENT

Laboratory Investigation Rubric

ACCOMODATIONS

For reinforcement, the student will review and repeat the laboratory investigation.

For enrichment, the student will research the incidence of sickle cell anemia.

REFLECTIONS

SICKLE CELL ANEMIA LABORATORY INVESTIGATION

NAME:

DATE:

PURPOSE:

In this laboratory investigation, the student will be able to identify sickle cells on a blood smear.

BACKGROUND INFORMATION:

MATERIALS:

Prepared sickle cell anemia red blood cell smears with coverslips

Prepared normal red blood cell smears

Microscope

Oil for oil-immersion lens

Gloves

Laboratory coat or apron

Goggles

Biohazard containers

Surface disinfectant

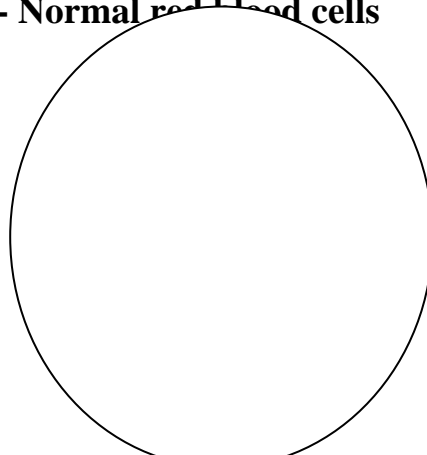
Paper towels

PROCEDURE:

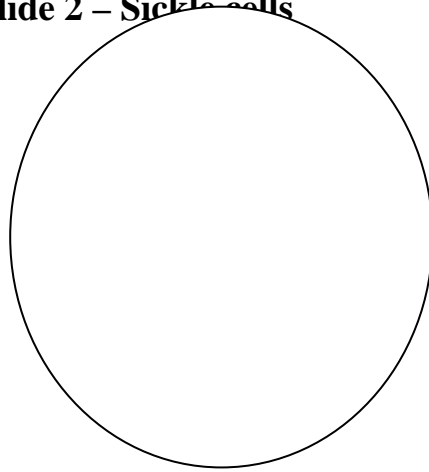
1. Wash hands and put on gloves and goggles.
2. Assemble equipment and materials.
3. Prepare work area.
4. Observe two microscopic slides and draw the red blood cells in the area provided.
5. Clean work area with surface disinfectant. Remove goggles and gloves and wash hands.

DATA:

Draw and label observations
Slide 1- Normal red blood cells



Slide 2 – Sickle cells



CONCLUSION:

1. Define the following terms: anisocytosis, poikilocytosis, macrocytes, and microcytes.
2. Predict the effect of the sickle cell shape on the red blood cell's function.
3. Explain the difference between sickle cell anemia and sickle cell trait.
4. What are the signs and symptoms of sickle cell anemia?
5. What is a sickle cell crisis?