

WHAT'S THE DISEASE?: TEACHER GUIDE

Subject: Science

Grade Level: Middle School

Last Updated: 7/1/2014

Case Summary

Physicians need help in diagnosing a young patient. Students will evaluate symptoms and arrive at a final diagnosis. Students will also determine facts from myths about Sickle Cell Disease. The activity will allow students to determine the probability of passing the disease on.

Learning Objectives

At the end of this case, students should know:

1. Symptoms and characteristics of Sickle Cell Disease

At the end of this case, students should be able to:

1. Dispute common misconceptions of Sickle Cell Disease
2. Defend conclusions of scientific investigations
3. Use Punnett Squares as a tool to determine probability of inheritance of specified genes/traits

Standards/Objectives

North Carolina Standards (NCSCOS)

1.01, 1.02, 1.04, 1.05, 1.06, 1.07, 1.08

1. Identify and create questions and hypotheses that can be answered through scientific
2. Develop appropriate experimental procedures for: • Given questions. • Student generated
3. Analyze evidence to explain observations, make inferences and predictions.
4. Prepare computer simulations to: • Test hypotheses. • Evaluate how data fit.
5. Use oral and written communication to: • Communicate findings. • Defend conclusions of scientific investigations.

Assessment

Student worksheets will be collected and a quiz will be administered.

Implementation Strategy

This case will be completed in one 75 minute course. Students will be introduced to the facilitators and divided into groups of 4-5.

Activity 1: Final Diagnosis

Students will receive the medical record for Sally Carmichael (found in student materials) and instructed to identify items they need to know. The facilitators will guide the students to ask for information on diseases. Information will be provided for Sickle Cell Disease, Asthma and Diabetes (found in student materials). Based on this information students will develop a

hypothesis. Then a second and third symptom will be given and the students will repeat the process each time. After the third symptom is revealed, a lab report (found in student materials) will be made available identifying the structure of the RBCs.

Symptoms:

- Tired
- Out of breath
- White of eyes is yellowish

Optional: you-tube video on sickle cell disease: <http://www.youtube.com/watch?v=R4-c3hUhhyc>

Activity 2: Fact or Myth

In their groups students will be given a statement about Sickle Cell Disease on note cards. They will decide if it is fact or myth. Both myths and facts will be explained. The team with the most correct will win a prize.

Statements:

1. Sickle Cell Disease has no cure.
 - Fact, Bone marrow or stem cell transplants can cure sickle cell anemia. However, transplants have many risks, including infection, [rejection](#), and graft-vs-host disease. Therefore, they are currently not an option for most patients. Also, sickle cell anemia patients are often unable to find well-matched donors.
2. Sickle Cell Disease is fatal.
 - Both Fact and Myth, if not taken care of, yes, but people with sickle cell can live a long life. In the past, sickle cell patients often died from organ failure between ages 20 and 40. Thanks to a better understanding and management of the disease, today, patients can live into their 50s or beyond.
3. Indian, Arabics, Greeks, and Turks can have the trait or disease.
 - Fact
4. Sickle Cell Disease is only found in African American children
 - Myth
5. 1 in 12 African Americans are affected in the US.
 - Fact. They prominently carry the trait and disease, but they are not the only ones to get it.
6. People are tested for Sickle Cell Disease when they are born.
 - Fact. This is done during newborn screening.
7. People with Sickle Cell Disease cannot play sports, like football, basketball, or even track.
 - Myth, keep in mind, they need to get proper rest, know their limits, and stay hydrated.
8. Some people with Sickle Cell Disease are in pain constantly.
 - Both Fact and Myth, because some people are constantly in pain, while others don't have to experience any pain.
9. Sickle Cell Disease can only be found in children
 - Myth

10. If I have the disease, my children will definitely have the disease as well.
 - Myth, it depends on your partner. If you have a child with a person who doesn't have it then your children will carry the trait
11. People can grow out of Sickle Cell Disease.
 - Myth
12. I have the sickle cell trait meaning I won't get sick at all.
 - Myth, people with the Sickle Cell trait are LESS likely to see, or be affected by, symptoms.
13. If I have Sickle Cell Disease, then I am immune to the flu, or common cold.
 - Myth, common illnesses can become highly dangerous for a person with sickle cell. Make sure that you take precautions.
14. People with Sickle Cell Disease are contagious
 - Myth, SCD and SCT are genetic you cannot get sickle cell by sitting next to a person.
15. Students with Sickle Cell Disease don't have to go to school
 - Myth, people with Sickle Cell not under control have a tendency not to be in class because of illness, however, people with sickle cell under control do NOT normally get sick all the time.
16. Children with Sickle Cell Disease have a harder time learning
 - Myth, Sickle Cell Disease or Trait does not affect learning.

Activity 3 Genetic Counseling:

Students will be given a short introduction into genetics and inheritance. They will then complete genetic counseling worksheet (found in student materials). The facilitators will work with the students to complete the Punnett Square for a carrier (XY) and a non carrier/disease (XX). They will then complete the next two squares using first disease (YY) and non carrier/disease (XX) and second carrier (XY) and disease (YY).

For each group a set of parents will be drawn. Then the students will write the possibilities for the children and put them in a bag. Then each student (child) will draw their genetic type. Facilitators will help relate this back to their Punnett Squares.

Quiz

A short quiz will be given.

Resources

Joslin Diabetes Center. (n.d.). *General diabetes facts and information*. Retrieved May 5, 2011, from http://www.joslin.org/info/general_diabetes_facts_and_information.html?gclid=CMDBwf6V0agCFYTr7QodwA_diQ

National Heart Lung and Blood Institute. (n.d.). *Signs of anemia, symptoms of anemia*. Retrieved May 5, 2011, from http://www.nhlbi.nih.gov/health/dci/Diseases/anemia/anemia_signsandsymptoms.html

WebMD. (n.d.). *Asthma symptoms*. Retrieved May 5, 2011, from <http://www.webmd.com/asthma/guide/asthma-symptoms>