

3—10 What are some inherited diseases?

Inherited Diseases Sometimes a gene is defective, or abnormal. The abnormal gene stops the body from working properly. An abnormal gene can be passed from the parents to their offspring. The gene can cause disease in the offspring. A disease that is caused by an inherited abnormal gene is called an **inherited disease**.

Sickle-Cell Anemia Sickle-cell anemia is an inherited disease that mainly affects people of African descent. Some of the red blood cells of a person with sickle-cell anemia have an abnormal shape. Rather than being rounded, these red blood cells are shaped like a sickle or crescent. Because of their abnormal shape, sickle cells are easily trapped in blood vessels. They clog the blood vessels and block the flow of blood. The clogged blood vessels may cause severe pain and, in some cases, an early death.

The gene for sickle-cell anemia is recessive (s). The gene for normal red blood cells is dominant (S). People who inherit two recessive genes (ss) for the trait have the disease. People who inherit one dominant and one recessive gene (Ss) for the trait are carriers of the disease.

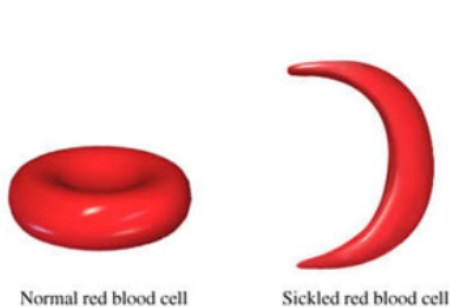


Figure 3-31

Normal versus Sickle-Cell blood cells



Figure 3-32

Foods that people with PKU cannot eat.

PKU- Phenylketonuria (fen-uhl-keet-uh-NOOR-ee-uh), or PKU, is another kind of inherited disease caused by a recessive gene. People with PKU are missing an important enzyme that is needed to break down an amino acid called phenylalanine. Many foods with proteins contain this amino acid. As a result, people who have PKU cannot eat certain protein-rich foods such as meats, eggs, cheese, and milk. If people with PKU do not watch their diet carefully, the amino acid may build up in the body and could eventually cause brain damage and mental disability.

Tay-Sachs Disease Tay-Sachs is a disease that affects mainly Jewish children with Eastern European ancestry. An abnormal gene stops the child's body from producing an enzyme that breaks down fat. As a result, fat gathers in the brain cells. This can cause brain damage and death. Most children with Tay-Sachs die before their fourth birthday.

The gene for Tay-Sachs disease also is recessive. A person who inherits two recessive genes (tt) for this trait will have the disease. A person who inherits one recessive gene and one dominant gene (Tt) is a carrier.

Huntington's Disease Unlike many inherited diseases, Huntington's disease is caused by a dominant gene. People who carry the gene will have the disease. The gene prevents the brain cells from functioning properly. The symptoms of Huntington's disease include loss of muscle control, mental illness, and death at an earlier age than average. Unfortunately, most people with the disease do not know they have it until they have already passed the gene onto their offspring.

CHECKING CONCEPTS

1. What causes inherited diseases? _____

2. How do sickle cells differ from normal red blood cells?

3. Which disease leads to the blockage of blood vessels?

4. What is the percentage chance that the offspring of two parent who are both carriers of the Tay-Sachs gene will have the disease? _____

5. Huntington's disease is carried by which type of gene?

Name _____ Class _____ Date _____

3-10 What are some inherited diseases?

Lesson Review

Complete the following.

1. What is an inherited disease? _____
2. Name two inherited diseases. _____
3. Look at the red blood cells shown. Which blood cells are from a person who has sickle-cell anemia?



4. Describe the shape of the blood cells of a person who has sickle-cell anemia. _____

5. What effect does Tay-Sachs disease have on the body? _____

6. What effect does PKU have on the body? _____

7. What effect does Huntington's disease have on the body? _____

Skill Challenge

Skills: modeling, interpreting

Complete the Punnett square for sickle-cell anemia. Then, answer the questions.

S = Normal red blood cells

s = sickle-cell

	S	s
S		
s		

1. What are the chances that a child produced by this couple will have sickle-cell anemia? _____
2. What are the chances that a child produced by this couple will be a carrier of sickle-cell anemia?

3. What are the chances that a child produced by this couple will have normal blood cells? _____

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Name _____ Class _____ Date 12/5/14

3-10 What are some inherited diseases?

Lesson Review

Complete the following.

1. What is an inherited disease? disease caused by an inherited gene
2. Name two inherited diseases. Sickle-Cell Anemia, PKU, Tay-Sachs Disease, Huntington's Disease
3. Look at the red blood cells shown. Which blood cells are from a person who has sickle-cell anemia?

Blood Cells B



Blood Cells A



Blood Cells B

4. Describe the shape of the blood cells of a person who has sickle-cell anemia. They are shaped like a sickle, or a crescent.
5. What effect does Tay-Sachs disease have on the body? It stops the body from breaking down fat. It gathers in the brain cells.
6. What effect does PKU have on the body? Stops the body from breaking down protein and can cause too much amino acid to build up in the body.
7. What effect does Huntington's disease have on the body? It prevents brain cells from functioning properly. Can cause loss of muscle control, mental illness, early death, etc.

Skill Challenge

Skills: modeling, interpreting

Complete the Punnett square for sickle-cell anemia. Then, answer the questions.

S = Normal red blood cells

s = sickle-cell

	S	s
S	SS	Ss
s	Ss	ss

1. What are the chances that a child produced by this couple will have sickle-cell anemia? 25%
2. What are the chances that a child produced by this couple will be a carrier of sickle-cell anemia? 50%
3. What are the chances that a child produced by this couple will have normal blood cells? 25%