PLTW Virtual Learning

Medical Detectives

Lesson 11

April 20, 2020

7 & 8 Grade Medical Detectives
Lesson: April 20, 2020

Objective/Learning Target:
Lesson 11, Part 6

Students will be able to understand a single dominant gene vs. a single recessive gene in some diseases.

Warm-Ups:

Answer the following questions using the 2-minute timer to see how much you know about a single dominant gene vs. single recessive gene in inherited diseases.

1. What does it mean if someone has a single dominant gene? How can it affect certain inherited diseases?

2. What does it mean if someone has a single recessive gene? How can it affect certain inherited diseases?

Lesson Introduction/Background Information:

**Remember that genetically inherited diseases are caused by abnormal genetic material, like individual genes and chromosomes, passed on to a child from one or both parents. Inherited diseases can also have varying symptoms and degrees of severity.

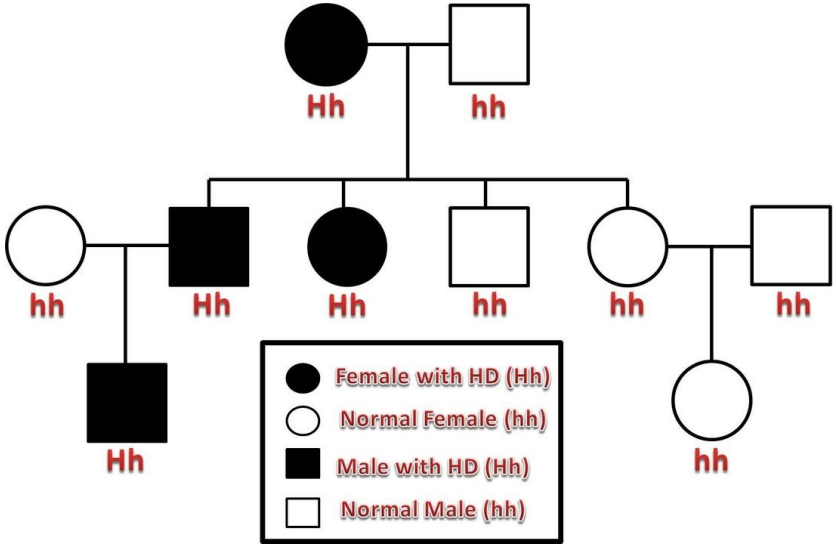
**We are going to be looking at the pedigree of two different genetic diseases: Huntington's Disease and Cystic Fibrosis.

Practice:

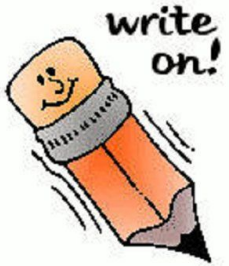
Huntington’s Disease Pedigree:

Huntington's disease is a late-onset disease caused by a single, dominant gene, known as the mutant Huntington CAG protein. By being a dominant genetic disorder, only one parent would need to have the gene. If there are 36 or more of these CAG proteins, this can cause the genetic disease. The following pedigree is for a family with a history of Huntington’s disease. Those individuals, who are already suffering from the disease are shaded in black. Notice that some additional individuals in generations 2 and 3 also have the mutant Huntington's allele and will develop Huntington’s disease but they do not show any symptoms yet. Study the pedigree chart and please answer the Following questions:

1. Who is the carrier of the gene?
2. How many children are there in the second generation?
1. What is the percentage of chances of getting this disease in the 2nd generation?
4. What is the percentage of chances of getting this disease in the 3rd generation?



Practice:

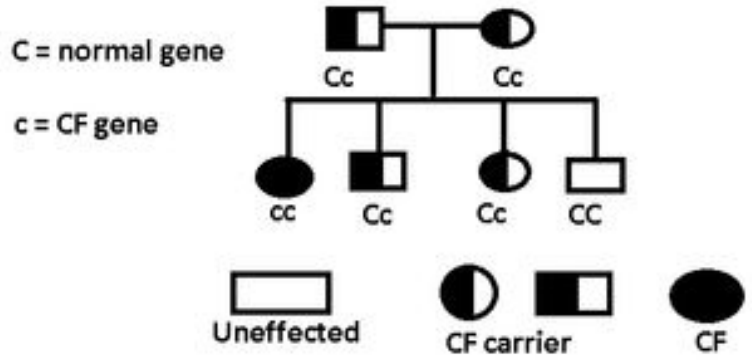


Cystic Fibrosis Disease Pedigree:

Cystic fibrosis is inherited and has an autosomal recessive inheritance pattern where both parents carry the gene, even though they may not have it. Together the parents have two copies of the CFTR gene, one from each parent. Both parents of a child with cystic fibrosis must pass on a nonworking copy of the CFTR to that child. Parents with one working copy and one nonworking copy of the gene are carriers and do not have the condition. If both parents are carriers, there is a 1 in 4 chance that the child will have cystic fibrosis.

Please answer the following questions after studying the pedigree chart:

1. Who is the carrier of the gene?
2. How many children are there in the second generation?
1. What is the percentage of chances of getting this disease in the 2nd generation?



Answer Key:

Huntington's Disease:

1. Who is the carrier of the gene? Mother
2. How many children are there in the second generation? Four
1. What is the percentage of chances of getting this disease in the 2nd generation? 50/50 - 50%
4. What is the percentage of chances of getting this disease in the 3rd generation? 50/50 - 50%

Cystic Fibrosis Disease:

1. Who is the carrier of the gene? Both parents carry a recessive gene.
2. How many children are there in the second generation? Four
1. What is the percentage of chances of getting this disease in the 2nd generation? 1 out of 4 - 25%

Self Assessment:

Click on the following link Learn Genetics,Genetic Science Learning Center to read more about genetic diseases.

Once you've arrived on the web site, go to the Human Health box located on the upper right side of the page, next click on the Genetic Disorders topic located in the top right box. Next go to the section called What are Genetic Disorders? on the left side of the web page where you will see several topics about GD. Choose two of the articles to read and answer the following questions.

1. What was the title of the topic you read?

2. What was being discussed in this information?

3. What did you find interesting about your topic? What was your take away?

Extend Your Learning/Continued Practice:

Go to the Learn Genetics,Genetic Science Learning Center and once you've arrived on the web site, go to the Human Health box located on the upper right side of the page, next click on the Family Health History topic located in the bottom left of the box and read more about common risk-associated diseases that can occur in families. Why is it important to know your family's health history? How can having this information help you or another family member?