

HS Lesson 7: Where Can We Go From Here?

(Pre-Exhibit Visit)

Objectives:

1. Students will be aware that genetic issues impact many areas of life, such as medicine, food and agriculture, and law.
2. Students will be aware that there are many ethical issues related to genetics.

Curriculum Connection:

This lesson is best taught at the end of a unit on genetics but before talking about genetic technologies. However, it does not require extensive prior knowledge of genetics terminology.

Exhibit Link:

This activity connects well with *Genetic Testing*. Having students role play the decision-making process will create interest in the area of the exhibit discussing the same kinds of ethical choices that people currently face or will likely face.



Class Time Required:

90 minutes

Materials Needed:

For each group:

- A slip of paper with a genetics ethical scenario
- Biology textbook and/or book or Internet sources for research (Teachers without easy access to the Internet could print off some handouts from various websites to give to the students in lieu of using the actual world wide web.)

Focus Activity:

Divide students into groups of three. Have them begin the activity by making a list of genetic technologies they are aware of.

Lesson Steps:

1. Discuss their answers and clarify any misconceptions.
2. Give each group one of the following scenarios:
 - A. Both you and your spouse have each lost a brother to Tay-Sachs disease. You hope to have kids, but are referred to a genetic counselor before deciding for sure. Your combined income is \$50,000, but you have health insurance that gives you full coverage.
 - B. You and your spouse are in your early forties and have decided you would like to have another child. You have heard there is a higher risk of Down's syndrome for women over the age of 40. Your combined income is \$150,000 and your insurance provides 80% coverage. You already have two healthy children, a girl who is eight and a boy who is six.
 - C. You and your partner are both Caucasian. You have two children, both of whom have a rare disorder known as Fragile X. You are considering another child, so you seek the advice of a genetic counselor. You wish to know the chance that your next child will also have the disorder. Your combined income is \$90,000, but you have insurance that provides full coverage.
 - D. You have one child, age three, who has cystic fibrosis. You are two months pregnant with your second child; you and your husband separated a month ago. You have been referred to a genetic counselor. Your income is \$25,000. You will be receiving some money for child support, but you do not have insurance.
 - E. You have just married. You and your spouse are healthy, but the husband's brother has two children with sickle cell anemia and the wife's sister has the same disease. You are thinking of having children and have sought the advice of a genetic counselor. You and your spouse do not currently have insurance and your combined income is \$51,000.

Teacher's Note: Scenario D regarding cystic fibrosis could lead to a discussion of abortion. If you wish to avoid this possibility, simply omit this particular scenario.

3. Ask students what they know about genetic counseling. Discuss what a genetic counselor does. For example, in many of the scenarios, a genetic counselor provides information and offers advice to a couple regarding their chances of having a baby, the potential health risks involved in having a baby, the costs associated with having a child who has a genetic disorder, and so on.
4. Have the groups designate roles in their group depending on the situation — e.g., parent, genetic counselor, spouse)
5. Give each group a different scenario and have one student read it aloud.
6. Using resources available in their textbooks, the “parents” should research the basics about their disorder. Those members of the group designated as the “genetic counselor” should join up with other members of the class selected for the same role and research possible options available to the parents such as genetic testing, gene therapy and amniocentesis. You may even have the counselor research the costs. Then, each member will return to his/her original group and will role play the decision making process based on the information about the disorder, family history, income, insurance, etc. For example, the parents could come in and tell the genetic counselor their concerns about the potential disorder. The counselor could present the parents with their options. Then, as a group they would make a collective decision on what to do. They should end the process by writing down the decision their group made and the reasons why.
7. Have students defend their positions to the other members of the class.

Extensions & Modifications:

- For further scenarios, see additional resources, “Genetics Role Play.”
- For lower level students, eliminate the economic aspects — income and insurance — of the scenarios. You can also do the research on the disorders for your students and supply them with some basic information.
- For more advanced students, have them also research the role of genetic counseling and what it can be used for.

Important terms: genetic counselor, amniocentesis, gene therapy

Writing Prompts/Potential Discussion Questions:

1. Using the situation you role played in class today, come up with an alternate decision and provide reasons why a person might make this decision. What kinds of issues do people struggle with in making such decisions?
2. In this activity, many people decided to have a child, while others felt it wasn't worth the risk. Discuss the pros and cons of governmental laws requiring genetic testing for parents with a family history of genetic disorders. Discuss problems with implementing such legislation.
3. Currently genetic counseling is only available to those who can afford it. Should this service be available to everyone? Should the government pay for it?
4. The US government is currently requiring phenylketonuria (PKU) testing of all infants and supports testing for cystic fibrosis (CF) for all couples before conception. Should tests be required (knowing that the test doesn't look for all CF mutations)?

Additional Resources:

Your Genes, Your Health

<http://www.ygyh.org/>

An excellent educational web site containing information about all the genetic disorders discussed in this lesson.

Genetics Role Play Lesson

<http://www.accessexcellence.org/AE/ATG/data/released/0350-SharonNelson/description.html>

This lesson contains additional scenarios.

National Standards Addressed:

Standard F – Science and Technology in Local, National, and Global Challenges

Individuals and society must decide on proposals involving new research and the introduction of new technologies into society. Decisions involve assessment of alternatives, risks, costs, and benefits and consideration of who benefits and who suffers, who pays and gains, and what the risks are and who bears them. Students should understand the appropriateness and value of basic questions — “What can happen?” — “What are the odds?” — and “How do scientists and engineers know what will happen?”