

# EMS Lesson 7:

## Whose Genes Are These, Anyway?

(Post-Exhibit Visit)

### Objective:

By the end of the lesson, students will be introduced to some of the ethical questions raised by genetic testing.

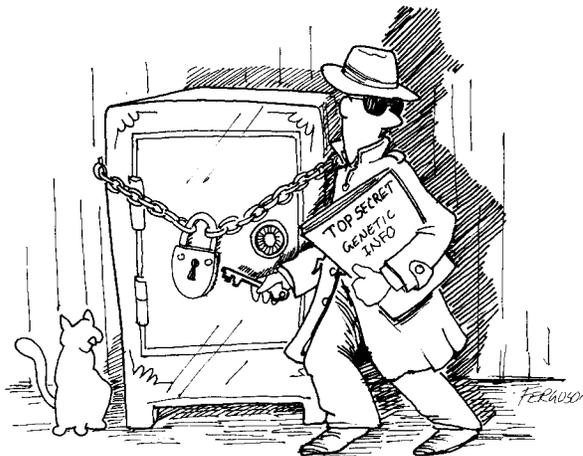
### Curriculum Link:

After students have studied and discussed the genetic process of inheritance, including dominant and recessive traits, this lesson introduces the question of who (if anyone) has rights to knowledge of each person's genetic make-up.

### Exhibit Link:

#### Action: Genetic Testing

These sections of the exhibit show that a new age of medicine is approaching with the help of genetic discoveries. It also mentions new methods of treating certain illnesses and understanding congenital defects — all of which raise ethical issues regarding privacy of genetic information.



### Time Required:

**Teacher Preparation:** One hour    **Class Time:** Two to three 30-45 minute sessions

### Materials Needed:

- Teacher resources that deal with genetics-related ethical issues.
- Optional: An insurance agent, an employer from the community, a parent, a high school student, or others working in the field of genetics who are willing to speak to the class, or provide their point of view on rights to genetic information; or, adults willing to role-play these points-of-view.

### Lesson Steps/Activity:

1. Lead a class discussion that emphasizes how each person is a unique individual, and that no two people are made up of the same combination of genes.
2. Discuss how doctors are now able to test patients to see if they are at a higher risk for certain conditions or diseases.
3. Have the class brainstorm ways that the results from genetic testing could affect the patient. If students do not generate negative effects on their own, introduce one such as the possibility that someone who tests positive for a higher risk of getting a certain disease may develop constant fear of getting the disease.
4. Have students offer opinions on who should have access to the test results and why. For example, should your employer need to know if you have hemophilia? What about your future husband or wife?
5. Assign groups of students to research and develop an argument for or against access to genetic test results for one of the following roles: insurance agent, employer, parent, high school graduate looking for a job. Make sure students understand the job description of each role and why a person in that position would be interested in having the results of genetic testing. Charge them with coming up with the most persuasive argument they can for the view they are assigned.
6. When the research is completed, have each group present a position paper and elect a representative to a class panel discussion. Have those who remain seated take notes and participate in questioning the panel.

### Extensions & Modifications:

Elementary:

- Keep the lesson limited to a class discussion in which you raise questions for students to consider the pros and cons of knowing genetic information. When possible, give real-life examples that illustrate both sides to the question of knowing genetic information.

- Social Studies extension: If possible, arrange for an insurance agent and employer to speak to the class.

Middle:

- Social Studies extension: As an alternate approach, have students go in groups of two to interview various insurance agents, parents, and employers, and high school graduates looking for jobs. When they return, have students summarize the position the interviewee took, and take a stand agreeing or disagreeing with that position.
- Have student groups write or act out a story in which someone benefits from genetic testing or someone uses genetic information for evil purposes.

Important terms: genetic counselor, privacy, rights, unique, genetic make-up, genetic testing

Additional Middle School terms: ethics, bioethics, legality

### **Writing Prompts/Discussion Questions:**

1. Discuss reasons why a person would seek genetic testing.
2. Why do you think the results of genetic testing should or should not be available to anyone who wants to see them? Defend your opinion.
3. Often topics like genetic testing have strong arguments for them and strong arguments against them. Can you think of another situation that has strong arguments on both sides of the debate?
4. Do you think that those who know the most about DNA should make decisions on how genetic testing should be used, or do you think the general population — who may know very little about DNA but are likely most affected by genetic testing — should make the decisions? Explain.

### **Additional Resources:**

Genetics Lesson Plans

<http://www.kumc.edu/gec/lessonpl.html>

This site offers teacher resources on “ethical, legal, and social implications of the Human Genome Project.”

### **National Standards Addressed:**

K-4 Content Standard C – The Characteristics of Organisms

- The behavior of individual organisms is influenced by internal cues (such as hunger) and by external cues (such as a change in the environment). Humans and other organisms have senses that help them detect internal and external cues.

Life Cycles of Organisms

- Many characteristics of an organism are inherited from the parents of the organism, but other characteristics result from an individual's interactions with the environment. Inherited characteristics include the color of flowers and the number of limbs of an animal. Other features, such as the ability to ride a bicycle, are learned through interactions with the environment and cannot be passed on to the next generation.

5-8 Content Standard C – The Molecular Basis of Heredity

- Every organism requires a set of instructions for specifying its traits. Heredity is the passage of these instructions from one generation to another.
- Hereditary information is contained in genes, located in the chromosomes of each cell. Each gene carries a single unit of information. An inherited trait of an individual can be determined by one or by many genes, and a single gene can influence more than one trait. A human cell contains many thousands of different genes.