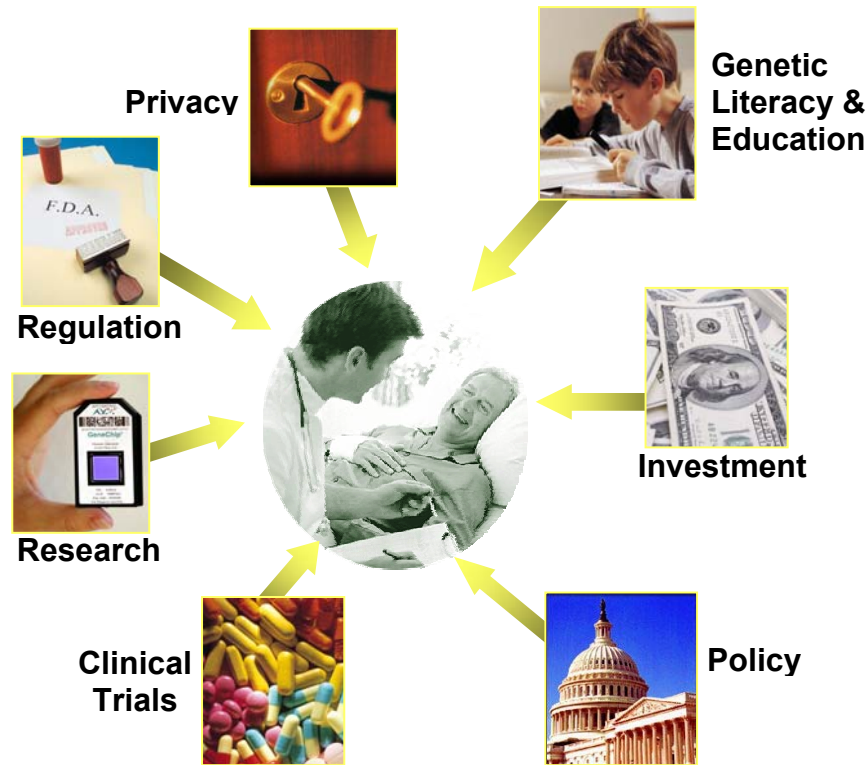


GeneChip Microarrays



Activity #5 – Discussion of Ethical Scenarios and Company Ethical Policy Statement

Introduction:

The use of GeneChip microarray technology can lead to a wide range of extremely powerful and useful genetic information to all areas of our society. Whether it is in medical research and drug manufacturing, insurance, reproductive technology, or public policy, the information this technology affects everyone in one way or another. It can change the way we live our lives! An educated and informed public is a key part of making sure this genetic information is used in the most ethical manner possible and for the benefit of all.

However, as with all technology, there is the possibility of abuse in a manner that complicates, discriminates or endangers the lives of others. Who has access to the information? What about health issues? Should insurance companies have free access to

the information? Employers? Once we are able to identify the function of genes, how much “tinkering” is too much? Should we be able to screen embryos for genetic defects? Could this be used to go beyond racial profiling and lead to a sort of genetic profiling? Can we predict the chances of someone getting a certain disease? What about being able to identify diseases for which we have no cure? The questions go on and on . . .

In this activity, you will work in groups to analyze a given ethical scenario for either pros or cons (or both). You will discuss and brainstorm ideas with your group, then report out to the class. Under the teacher’s direction, a discussion and debate will occur around the topics. The object is not to “prove” anyone right or wrong, but to look at each issue from both angles and think about your own point of view about these topics. You will also act out a scenario where you are part of an advisory committee for a DNA chip company. You will have to come up with an ethical principle statement for the company.

Goals

By the end of this lesson, you will:

- #1 - Be more informed about the ethical issues surrounding the use of genetic information in society.
- #2 - Look at the positives and negatives of the use of DNA chips
- #3 - Begin to formulate some of your own opinions about the ethical dilemmas that DNA chips and other genetic testing methods bring to society
- #4 - Think about how the ethical principles apply to a biotechnology company

Procedure

- (1) Your teacher will organize the class into small groups.
- (2) Each group will be given a different ethical scenario and asked to come up with a list of positives (pros) or negatives (cons), or both, regarding the situation
- (3) You will be given 20 minutes to discuss the situation as a group and brainstorm a pro/con list. Be sure to go around the group and get everyone’s opinion / ideas.
- (4) Once you have come up with as many points as possible, discuss your list further and narrow it down to 4 to 5 key issues.
- (5) Choose a speaker who will report out to the class what your situation was and the list your group came up with.
- (6) After time is up, the teacher will go around the room and allow each group to report out and lead a class discussion around the topic.
- (7) Once each group is finished and the class has discussed each topic, you will break back into groups and pretend you are on the ethics committee for a company that

manufactures DNA chips. Your job is to come up with a “ethical principles” statement that explains your company’s stance on the use of your technology in the areas of genetic information, genetic testing, and medical privacy.

- (8) The ethical policy statement should be 1 to 2 paragraphs and clearly explain your point of view.
- (9) You will be given 10 minutes to come up with the ethics policy statement.
- (10) Time permitting, one person from each group will read their statements to the class. If possible, you will come up with a class statement that best addresses all the statements.

Rules During Discussions and Debates

When doing your group’s discussion and brainstorming and while taking part in the class discussions, there are a few rules. These rules should be kept in mind during any class discussion and anytime someone is voicing their perspective on an issue. These rules are there to make sure everyone feels comfortable and confident to share their point of view in a positive environment. These type of discussions lead to debates, but the debate is not meant to prove a point of view or disprove another. Follow these rules to keep the talks going as smoothly as possible and give everyone the time to explain their ideas:

- #1 – Respect and listen to everyone’s opinion
- #2 – Give everyone the opportunity to talk
- #3 – Do not make any personal attacks, use specific names, or point to others
- #4 – When responding to another point of view, limit your response to no more than a few sentences to allow others to talk.
- #5 – Remember, the goal of this activity is not to prove anyone as wrong or right but simply to hold a discussion around all the possibilities

Ethical Scenarios for Discussion

The following is a list of possible situations to be used in this activity. Note that these scenarios are hypothetical but not unreasonable. Not all of the scenarios may be covered, and there may be others that the teacher may assign.

- A – The latest genetic research has led to information about the prediction of diabetes. In this scenario, it is now possible to predict, with 90% accuracy, whether a person will get diabetes at some point in their life. Hospitals would like to commonly give this test to every patient. Insurance agencies would like to have free access to these test results, saying it will lower the cost for them and for their customers.
- B – The latest genetic research has led to the ability to detect whether a person is likely

to get a certain disease. It is over 90% accurate and can even predict the time period when a person could get this disease. However, despite the research, no cure or therapy is currently available for the this disease.

- C – Some of the newest genetic research has led to the discovery of a SNP profile that is correlated to violent criminal behavior. About 60% of those currently in jail for violent crimes have this pattern. This is compared to the general population where 10% of the people tested had this SNP pattern. Police agencies around the country are fighting to be able to test all people arrested for this genetic pattern and the government is thinking of profiling all people at birth.
- D – A genetic test has been discovered that can show if a person has a strong risk of heart disease due to high cholesterol levels. The genetic test can be given to a newborn baby and is over 95% accurate. The test, however, can only be performed by a private company costs over \$5,000 and insurance companies have refused to cover the test due to high costs.
- E – The newest genetic technology allows parents to pre-screen egg and sperm DNA for the 20 of the most common diseased genes. This can be done before In Vitro fertilization, thus allowing parents to pick and choose which unfertilized egg and sperm to use in the process and almost guarantee the child is free from these 20 diseases.
- F – A large meat production company is using microarray technology to study cow gene expression. They identified 10 key genes that lead to the production of the meat with the best flavor from cows that grow and develop quicker and with a strong immune system. They plan to use this research to perform in vitro fertilization and genetically alter cow embryos before artificial insemination of the female cows. They say this will allow them to increase production and lower cost of their product.
- G – A large company recently started mandatory genetic testing of its employees. They did not disclose what they were testing for but said that the testing would improve productivity and would lead to better profits and salaries for their employees.
- H - The newest genetic research has lead to a genetic test that looks at the susceptibility a person has for getting lung cancer. This test can determine the chances of someone getting cancer depending on whether they were a non-smoker, light smoker, medium smoker, or heavy smoker. The test is inexpensive and, needless to say, the tobacco companies are very interested in the information.
- I – A company has recently discovered a genotype that is strongly correlated to athletic ability. They took 1000's of high level amateur and professional athletes and performed genetic profiling of their genotypes for specific SNPs. They are now looking for specific genes that could be related to athletic ability.