

Unit 6: Genetic Ethics

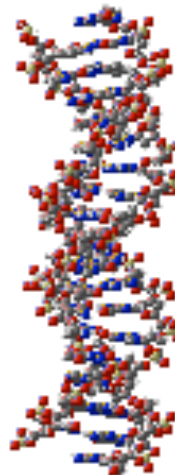
US275 Scientific Ethics
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Arcadia University



1

Basic concepts of DNA and Heredity

- Describe the basic structure of DNA and chromosomes.
- Explain how the message of DNA is coded in a gene.
- Describe how genetic information is passed from parent to offspring.



2



27. Roll the dice

For many basic genetic traits, Genetic Counselors are able to use simple probability to determine the likelihood of having a child with a specific trait. Many recessive genetic medical conditions can also be examined in the same way when it is known that one or both of the parents may be a carrier for the specific trait.

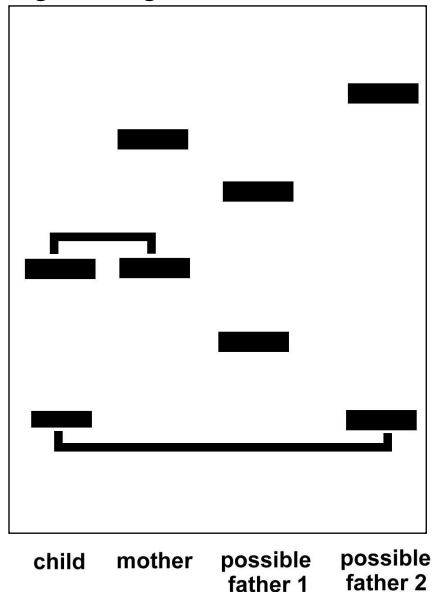
In your discussion group:

Discuss whether or not it is ethical for parents that are carrying the allele for a debilitating genetic condition to attempt to have a child. Assume that the parents know that there is a 25% (1 out of 4) chance of having a child with the genetic disorder and a 75% (3 out of 4) chance of having a healthy child. Do the ethical arguments change if the likelihood of having a healthy child increases or decreases?

DNA Testing

- Describe how DNA patterns can be used in identification.

Agarose gel results:



Assignment

28. When should information in a genetic census be used?

In your discussion group:

Discuss the following statement with your group: Assume for the sake of argument that a genetic census is completed and a national data base is created. Under what circumstances, if any, should the information be used? Does it matter if the databank is searched to identify a match for a bone marrow or blood transfusion, to identify potential donors for an organ transplant, or to identify the perpetrator of a violent crime?

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DNA Analysis

- Explain what can be learned by sequencing an organisms genome.
- Describe how knowing an individual's specific gene characteristics can provide information about risk of diseases.



6

Assignment

29. Gene Patenting

Review the article Genetics and Patenting (2010) Humane Genome Project Information at

http://www.ornl.gov/sci/techresources/Human_Genome/elsi/patents.shtml

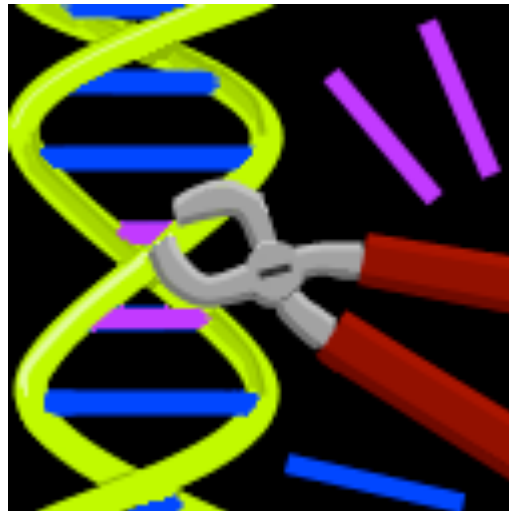
In your discussion group:

Consider is it ethical to patent genes in the human genome?

7

Recombinant DNA

- Describe the basic process of mixing DNA from two different sources into a recombinant molecule.



8

Assignment

30. Bacterial Factories

In your discussion group:

Discuss the following statement:

Microorganisms such as bacteria have been used for generations as a human tool for food preservation (ex. bread, wine, and cheese production). Recently bacteria have been discovered that control pollution (ex. oil eating bacteria). Normal evolutionary processes allow the transfer of genes and characteristics between bacteria, but strains bacteria with a specific desired trait may not be easily found. Is it appropriate to use genetic engineering to create strains of bacteria to fulfill specific functions?

Genetically Modified Organisms

- Describe how recombinant DNA technology can be used to change the characteristics of an organism
- Describe examples and concerns associated with genetically modified crops.



Glowing Tobacco plant expressing the firefly luciferase gene.

Assignment

31. How to feed a hungry world.

Read

1. "How to feed a hungry world" (2010) Nature 466:531-532
<http://www.nature.com/nature/journal/v466/n7306/full/466531a.html>

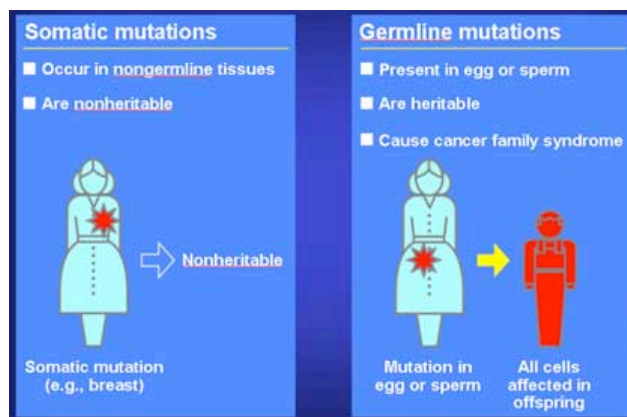
2. "Regulation must be revolutionized." (2010) Nature 466: 561
http://www.goldenrice.org/PDFs/Nature_Opinion_Potrykus_2010.pdf

In your discussion group: Consider the example of Golden Rice, which has improved nutritional properties that will prevent blindness and death. The current approval process could take many years to ensure safety of the product, but traditional agricultural methods are associated with some safety risks such as exposure to chemical pesticides and herbicides or contamination. What regulatory criteria should a genetically modified source meet in order to be available for consumption?

11

Gene Therapy

- Explain how gene therapy can be used for the treatment of a disease.
- Compare and contrast somatic and germline gene therapy.



No Assignment!

No assignment for this topic.

Work on the final project.



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Any Questions?

Email me at:
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