

Ethical, Legal, and Social Issues of Biotechnology

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Printed: September 20, 2012

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CONCEPT

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Ethical, Legal, and Social Issues of Biotechnology

- Identify some of the ethical, legal, and social issues raised by biotechnology.



Right or wrong? Good or bad? Legal or illegal?

The completion of The Human Genome Project is one of the most important scientific events of the past 50 years. However, is knowing all of our DNA a good thing? The advancement of biotechnology has raised many interesting ethical, legal and social questions.

Ethical, Legal, and Social Issues

Imagine someone analyzes part of your DNA. Who controls that information? What if your health insurance company found out you were predisposed to develop a devastating genetic disease. Might they decide to cancel your insurance? Privacy issues concerning genetic information is an important issue in this day and age.

ELSI stands for Ethical, Legal and Social Issues. It's a term associated with the Human Genome project. This project didn't only have the goal to identify all the genes in the human genome, but also to address the ELSI that might arise from the project. Rapid advances in DNA-based research, human genetics, and their applications have resulted in new and complex ethical and legal issues for society.

Concerns from Biotechnology

The use of biotechnology has raised a number of ethical, legal, and social issues. Here are just a few:

- Who owns genetically modified organisms such as bacteria? Can such organisms be patented like inventions?
- Are genetically modified foods safe to eat? Might they have unknown harmful effects on the people who consume them?

- Are genetically engineered crops safe for the environment? Might they harm other organisms or even entire ecosystems?
- Who controls a person's genetic information? What safeguards ensure that the information is kept private?
- How far should we go to ensure that children are free of mutations? Should a pregnancy be ended if the fetus has a mutation for a serious genetic disorder?

Addressing such issues is beyond the scope of this concept. The following example shows how complex the issues may be:

A strain of corn has been created with a gene that encodes a natural pesticide. On the positive side, the **transgenic** corn is not eaten by insects, so there is more corn for people to eat. The corn also doesn't need to be sprayed with chemical pesticides, which can harm people and other living things. On the negative side, the transgenic corn has been shown to cross-pollinate nearby milkweed plants. Offspring of the cross-pollinated milkweed plants are now known to be toxic to monarch butterfly caterpillars that depend on them for food. Scientists are concerned that this may threaten the monarch species as well as other species that normally eat monarchs.

As this example shows, the pros of biotechnology may be obvious, but the cons may not be known until it is too late. Unforeseen harm may be done to people, other species, and entire ecosystems. No doubt the ethical, legal, and social issues raised by biotechnology will be debated for decades to come. For a recent debate about the ethics of applying biotechnology to humans, watch the video at the link below. In the video, a Harvard University professor of government and a Princeton University professor of bioethics debate the science of "perfecting humans." <http://www.youtube.com/watch?v=BPna-fSNOE>

Vocabulary

- **ELSI:** Ethical, legal and social issues associated with the Human Genome project.
- **transgenic:** Organism that has been genetically modified with new genes.

Summary

- Biotechnology has raised a number of ethical, legal, and social issues. For example, are genetically modified foods safe to eat, and who controls a person's genetic information?

Practice

Use this resource to answer the questions that follow.

- <http://www.hippocampus.org/Biology> → Biology for AP* → Search: **Practical and Ethical Concerns**

1. What are two concerns associated with biotechnology?
2. Why could genetically engineered plants replace naturally grown plants?
3. What is cloning? What was the first cloned large mammal?
4. What are two ethical considerations associated with the human genome sequence?

Review

1. Identify an ethical, legal, or social issue raised by biotechnology. State your view on the issue, and develop a logical argument to support your view.