Societal Concerns with Biotechnology

Biotechnology is the use of living systems and organisms to develop or make products, or any technological application that uses biological systems, living organisms or derivatives to make or modify products or processes for specific use. New tools and products developed by biotechnologists are useful in research, agriculture, industry and the clinic.

There are four main societal concerns in the biotechnology field. Here's a closer look at these concerns in this ever-changing field, along with some of the main reasons why we use this controversial science.

4 Societal Concerns With Biotechnology

There are four main concerns we, as a society, have when it comes to this ever-advancing field.

Harm to the environment. This concern is perhaps the most widely cited by those opposed to GMOs. It is very difficult to predict what will happen in an ecosystem where a new organism has been introduced — whether genetically modified or not.

Take weeds for example. If farmers introduce a herbicide-resistant marker into a plant, there is the possibility those traits may be transferred to a weed, making it resistant to herbicides as well.

Bioterrorism. Governments are worried terrorists will use biotechnology to create new Superbugs, infectious viruses, or toxins for which we have no cures.

According to the CDC, bioterrorism happens when viruses, bacteria or other germs are released intentionally to inflict harm on or kill people, plants or livestock. The agency says the most likely agent to be used in an attack is anthrax — a serious disease caused by a bacteria found naturally in soil.

The use of viruses and diseases as a weapon in warfare has been well documented in history. Native Americans were infected by the British army in the 1760s when they were given blankets from a smallpox hospital. During World War II, Japan released bombs on China containing fleas infested with disease.

In modern times, bioterrorists are able to transfer diseases and viruses through explosives, food and water, and even aerosol sprays. But the use of biotechnology as a weapon was banned by the Geneva Convention.

Laboratory/production safety. It's hard to protect yourself if you don't know what you're working against. Some new technologies, usually non-biologicals such as nanoparticles, make commercial production lines before they have been sufficiently tested for safety. There is also concern about technician safety in laboratories — even under secure conditions — when working with organisms of unknown virulence.

Ethical issues. Besides the age-old debate over whether cloning genes is sacrilegious, innumerable ethical questions arise over the appropriateness of licensing genetic inventions and other IP issues. In addition, the construction of genes from scratch (the first artificial gene was actually synthesized in

1970) means we might someday be able to create life from a chemical soup which will most certainly go against the ethical or religious beliefs of a significant number of people.

There are also other ethical concerns including when scientists use humans as clinical trial subjects. People will often try anything in order to help combat illness or disease — especially when there is no known cure. How do scientists protect their subjects when they are unsure of the results or side effects of any study?

Activists are critical of the use of animals as test subjects in biotechnology. Scientists may manipulate animal genes all for the benefit of human lives. The animal therefore, becomes nothing more than a piece of property, rather than a living being.

Why Is it Used?

We use biotechnology to make medicines and vaccines to fight diseases. And we are now turning to biotechnology to find alternatives to fossil-based fuels for a cleaner, healthier planet.

Modern biotechnology provides breakthrough products and technologies to combat debilitating and rare diseases, reduce our environmental footprint, feed the hungry, use less and cleaner energy, and have safer, cleaner and more efficient industrial manufacturing processes.

More than 13.3 million farmers around the world use agricultural biotechnology to increase yields, prevent damage from insects and pests and reduce farming's impact on the environment. Growing biotech crops can also help lower the cost of production, cutting back on expenses like fuel, water and herbicides. This is especially important for farmers who can't afford the high costs of agriculture, and can help farmers in developing nations.

A Changing Field

The field of biotechnology is fast-paced and rapidly changing. Often, the pace at which new technologies are developed far exceeds that of regulatory change and adaptation, which generates significant bioethics issues, especially since many of the new developments are those that impact human lives directly through what we eat, drink and the medications we take.

Many scientists and regulators are very aware of this disconnect. Thus, the rules for issues such as stem cell research, patenting genetic inventions and new drug development are constantly changing. The relatively recent emergence of genomics and methods for creating artificial genes present new threats to the environment and the human race as a whole.

The Bottom Line

Biotechnology is a constantly evolving field of science. Although it has many benefits — including lowering our environmental footprint, and helping treat disease and illness — it doesn't come without its disadvantages. The four main concerns revolve around ethical, safety, bioterrorism and environmental issues.