

## Genetically Engineered Foods

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Genetic engineering of plants and animals is filled with controversy. Some scientists believe that they are able to improve the foods we eat with this technology. They are able to build vectors incorporated within genes of their choosing and inset these genes into the DNA of a living organism to produce the improved version with the new specific trait. This can be done by numerous techniques such as recombinant DNA, microinjection, electro and chemical prolation, and bio-ballistics.

According to current statistics, 45% of corn and 85% of soybeans in the United States is genetically engineered (GE). Estimates of 70-75% of processed foods found at our local supermarkets are believed to contain GE ingredients.

Other GE foods are canola, papayas, radicchio, potatoes, rice, squash or zucchini, cantaloupe, sugar beets, flax, tomatoes, and oilseed rape. One non-food crop that is commonly GE is cotton. The GE hormone recombinant bovine growth hormone (rBGH or Prosilac) was one of the first GE products allowed to enter the nation's food supply. The U.S. Food and Drug Administration (FDA) approved Monsanto's rBGH in 1993.

What are the health and environmental concerns regarding GE foods?

- Allergens
- Nutrition
- Toxins
- Antibiotic Resistance
- Immune-suppression and Cancer Risks
- Soil Contamination
- Creation of "Super-weeds" and "Super-bugs"
- Addressing World Hunger

Allergens:

It is known that genetic engineering can unexpectedly transfer pan-allergens and allergens. Pan-allergens are substances that are commonly found in a diversity of plants and have several important biological functions in these plants. Some common pan-allergens are profiling, seed storage proteins, and protease.

Certain genetically modified foods have included additional plant-defense protein. This could be a factor in the increasing the risk of cross-reactivity. An example is StarLink corn. Also there are reported reactions of individuals allergic to fish reacting to GE tomatoes genetically altered with flounder genetic material.

Concerns regarding Bt proteins in corn have been raised by scientist advisors to the Environmental Protection Agency (EPA). These as well as the United Nations (UN) Food and Agricultural Organization (FAO) and World Health Organization (WHO) have recommended further testing regarding the allergic potential of new proteins. To date these studies have not been performed.

#### Nutrition:

There is evidence that some of the GE foods contain fewer nutrients than non-GE foods. The Journal of Medicinal Food published a study in 1999 in which it documented that GE soybeans contain scientifically less phytoestrogens. Monsanto's internal research shows that their GE soybeans contain approximately 38% more Kunitz trypsin inhibitor, which is a known anti-nutrient and allergen. I would like to be able to make an informed choice to eat GE food. This requires proper labeling that is not currently available to consumers.

#### Toxins:

The literature I have explored indicates that genetic engineering is an imprecise technology and is not able to insert a new gene with accuracy. This transfer of genetic material may disrupt the tightly controlled network of DNA in the recipient organism. This process may be able to result in unpredictable effects depending where the new gene will position itself in the host DNA. This unpredictable effect may transfer high concentrations of plant toxins as documented by an FDA scientist in an internal memo. According to a 1999 study, GE potatoes weakened rats' immune systems and negatively affected their kidneys, thymuses, spleens, gastrointestinal tracts, and brains.

#### Cancer Risks:

One of the features of GE foods is their ability to withstand unlimited application of chemicals, including pesticides. Bromoxynil and glyphosate have been associated with developmental disorders in fetuses, tumors, carcinomas, and non-Hodgkin's lymphoma. Studies indicate that Monsanto's recombinant Bovine Growth Hormone (rBGH) causes treated cows to produce milk with an increased second hormone, IGF-1. This hormone is associated with human cancers. Recommendations by the Congressional watchdog agency, Government Accounting Office (GAO), recommended that rBGH not be approved. The European Union, Canada, and others have banned it. The UN has also refused to certify that using rBGH is safe.

The issue of rBGH has been prominent in Oregon. A local Oregon company, Tillamook Creamery, has banned a GE growth hormone for dairy cows made by Monsanto. After listening to consumers' complaints, the Tillamook County Creamery Association on February 19, 2005 asked all of its 147-member farmers

to halt use of rBST. rBST is the scientific acronym for the artificial growth hormone.

There has been aggressive pressure from Monsanto for the nation's second largest maker of block cheese, Tillamook Creamery to reverse this decision. The Oregon Chapter of Physicians for Social Responsibility has been instrumental in the ban of rBGH. Oakhurst Dairy of Portland, Maine, it was sued by Monsanto when it labeled their product as rBST-free. They settled the suit by labeling their products with the fine print "FDA has found no significant difference between milk derived from rBST treated and non-rBST treated cows." Although the labeling will not reflect it, whenever you eat Tillamook cheese you are eating rBGH-free cheese.

#### Antibiotic Resistance:

The use of antibiotic marker genes used in GE foods is a cause for alarm. Scientists use the marker gene for antibiotic resistance to determine if they have been successful in inserting the gene that they are trying to transfer. The concern is that this technique may result in dangerous levels of antibiotic resistance in humans. Studies from the University of Illinois and University of Newcastle have identified the ability of DNA transfer from GE foods to microbes in the gut. The WHO has issued warnings and the British Medical Association has called for a ban on using antibiotic marker genes.

#### Soil Contamination:

GE plants are engineered to resist insecticides. Insects are becoming resistant to insecticides thereby contributing to an increase in pesticides. Bt corn was genetically modified to produce the Bt toxin and kill insects. Studies found that the Bt toxin at 234 days was still present in the soil. No other studies have been conducted beyond 234 days. Another possibility is that non-targeted insects or organisms could be affected.

#### Creation of Super-bugs and Super-weeds:

Due to the transfer of insecticide-resistant genes from GE crops to weeds by cross-pollination, farmers are needed to use more and more pesticides. Analysis of the USDA's statistics indicates that pesticide use has actually increased with the use of GE crops. It is interesting to note that the companies selling GE crops own 60% of the global pesticide market and that 70% of the GE crops are resistant to these companies' specific brand chemicals. This allows the farmer to spray the GE crops with a specific pesticide without harming the plant.

## Addressing World Hunger:

There is a question about GE food alleviating world hunger. The United States is already producing one and a half times the needed amount of food to feed everyone in the world with a nutritious and adequate diet. Food scarcity is not the problem but the issues of poverty, inequality, and access are.

Eighteen African countries signed a statement created in 1988 by 24 delegates to the UN FAO in response of Monsanto's advertising using photos of starving African children under the headline "Let the Harvest Begin." The statement which stated "We...strongly object that the image of the poor and hungry from our countries is being used by giant multinational corporations to push a technology that is not safe, environmentally friendly, or economically beneficial to us. We do not believe that such companies or gene technologies will help our farmers to produce the food that is needed in the 21<sup>st</sup> century. On the contrary, we think it will destroy the diversity, the local knowledge and the sustainable agricultural systems that our farmers have developed for millennia and that it will thus undermine our capacity to feed ourselves."

By focusing on giving the poor access to inexpensive, sustainable agricultural technologies, we can provide them with a way to feed themselves. Many poor farmers rely on saving seeds for replanting. By using terminator technology, which results in a crop's seeds being sterile, we may be contributing to world hunger rather than addressing it.

According to a recent report in Wired, several plant geneticists are reporting that better crops can now be developed without GE technology by using Smartbreeding techniques instead. This process applies precise genetic mapping to the ancient agricultural technique of crossbreeding. It searches for a crop's genome for a chosen characteristic. It is hoped that the new crops, called super-organics, will be safe, and will need very little pesticides, fertilizer, and water. The goal is that they will please the consumer, the farmer, the activist, and the FDA.

There may be many benefits to GE crops, but I do not believe that there have been adequate studies to determine the safety of GE crops for human health and for the environment.

As a health care professional, my concern for the patient population is the possibility of:

- Increased risk of allergic reactions and associated allergy related diseases.
- Nutritional value of diet.
- Antibiotic Resistance.
- Increased risk of immune-suppression and cancer risks.

References:

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- Public Interest Research Groups: <http://pirg.org/ge/GE.asp?id2=4812&id3=ge&>
- The Center for Food Safety: <http://www.centerforfoodsafety.org/powerpoint.cfm>
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