

Long-term testing of genetically engineered (GE) foods is a hot potato that no one wants to handle. GE foods – also called bioengineered or genetically modified (GM) foods – are marketed without sufficient safety testing. The world’s five largest seed companies have made an enormous investment in the development of GE varieties. Lack of proven damage can only constitute lack of risk after long-term testing has been done. As the WTO studies the degree of risk or safety of GE foods, scientific evidence is essential.

THE ROLE OF U. S. GOVERNMENT AGENCIES

When Michael Pollan of the NEW YORK TIMES MAGAZINE visited federal agencies and Monsanto representatives, he received contradictory reassurance of the safety of New Leaf™ Bt potatoes.

1. Bt toxin, as a pesticide, is exempt from food-additive labeling regulations – James Maryanski, FDA
2. Bt potatoes, as a food, are exempt from pesticide labeling regulations – James Maryanski, FDA
3. Bt bacterial culture is safe when fed to mice, therefore Bt potatoes must be safe – EPA 1

The FDA grants approval on the basis of summaries of the short-term tests done by or for the seed companies.² This in spite of the finding – at an FDA conference – that “There are no direct methods to assess potential allergenicity of proteins from sources that are not known to produce food allergy.”³ The Department of Agriculture (USDA) has actually invested taxpayers’ money in Monsanto’s development of the highly controversial Terminator technology.⁴

Genetic Theories

FDA approval of GE foods is based on a theory called substantial equivalence. If it passes tests for suspected allergens and toxins, and if it looks, tastes, and smells like a potato, it must be nutritionally equal to other potatoes and free from unsuspected allergens and toxins. Dr. John Fagan explains the weakness of the substantial equivalence theory this way: “Any claim of substantial equivalence is only as good as the series of tests upon which that claim is based. In practical terms, if a genetically engineered food is different from its non-genetically engineered counterpart, that difference will be detected only if a test is carried out that is capable of measuring the specific characteristic which is different between the two.”⁵

Unfortunately, that logic is flawed. Micro-biologist John Fagan explains: “Foods altered through genetic engineering often contain proteins and other components that have never before been part of the human diet: proteins from bacteria and viruses and, in the future, proteins from insects, scorpions and people. There is no way to predict whether those foods are safe to eat.”⁶

How Accurate is Biotechnology?

Michael Pollan also talked to Dave Stark, a molecular biologist at the Monsanto subsidiary, Naturemark. Stark told him, “There’s still a lot we don’t understand about gene expression. A great many factors influence whether, or to what extent, a new gene will do what it’s supposed to, including the environment.”⁷

Harvard geneticist Richard Lewontin told Pollan that an organism is like an ecosystem: “You can always intervene and change something in it, but there’s no way of knowing what all the downstream effects will be or how it might affect the environment. We have such a miserably poor understanding of how the organism develops from its DNA that I would be surprised if we don’t get one rude shock after another.”⁷

Potential Hazards

Knowing that the HIV virus that causes AIDS is a retro-virus is grounds for suspicion about GM foods because some, if not all, contain retro-viruses as vectors. But suspicion isn't proof. Dr. Mae-Wan Ho, in an article published in *The Ecologist*, described the risks in readable scientific terms:

“Gene multiplications and a high proportion of gene transfers are mediated by vectors which have the following undesirable characteristics:

- a. many are designed from disease-causing viruses, plasmids and mobile genetic elements -- parasitic DNA that have the ability to invade cells and insert themselves into the cell's genome causing genetic damages.
- b. they are designed to break down species barriers so that they can shuttle genes between a wide range of species. Their wide host range means that they can infect many animals and plants, and in the process pick up genes from viruses of all these species to create new pathogens.
- c. they routinely carry genes for antibiotic resistance, which is already a big health problem.
- d. they are increasingly constructed to overcome the recipient species' defense mechanisms that break down or inactivate foreign DNA.”⁸

“The new proteins produced in genetically engineered foods could: a. Themselves, act as allergens or toxins b. Alter the metabolism of the food producing organism, causing it to produce allergens or toxins, or causing it to be reduced in nutritional value.”⁹ As John Fagan sums it up, “. . . the small risk that any given product will produce unanticipated effects translates into virtual certainty of harm when many new genetically engineered foods have become part of the diet of large populations over extended periods of time.”¹⁰

GE Myths

“We have been told that horizontal gene transfer (between species) is confined to bacteria. . . . It is possible for any gene in any species to spread to any other species, especially if the gene is carried on genetically engineered gene-transfer vectors. . . . We have been assured that “crippled” laboratory strains of bacteria and viruses do not survive when released into the environment. . . . There is now abundant evidence that they can either survive quite well and multiply, or they can go dormant and reappear after having acquired genes from other bacteria to enable them to multiply. . . . We have been told that DNA is easily broken down in the environment. Not so. DNA can remain in the environment where they can be picked up by bacteria and incorporated into their genome. . . . We are told that DNA is easily digested by enzymes in our gut. Not true. The DNA of a virus has been found to survive passage through the gut of mice.”⁸

New Diseases

Dr. Mae-Wan Ho associates the emergence of the following new diseases with genetic engineering. “AIDS, ebola, hepatitis C, monkeypox, hantavirus, and a new highly virulent strain of infectious bursal disease (IBDV)⁸

Cauliflower Mosaic Virus Research

The latest research on a common vector, the Cauliflower Mosaic Virus (CaMV) indicates that “Horizontal transfer of the CaMV promoter . . . has the potential to reactivate dormant or creating (sic) new viruses in all species to which it is transferred. . . . the close relationship of CaMV to hepadnaviruses such as the human hepatitis B is especially relevant. In addition, because the CaMV promoter is promiscuous in

function, it has the possibility of promoting inappropriate over-expression of genes in all species to which it happens to be transferred. One consequence of such inappropriate over-expression of genes may be cancer.”¹¹

Short-Term Tests

An official Canadian document, as cited by Dr. Richard Wolfson, states that insect-resistant potatoes were “. . . deemed safe for human consumption following short-term tests conducted on animals. The animals fed these potatoes showed no significant adverse effects in the short-term.”¹² Roy Fuchs of Monsanto explained that the amount of Bt toxin in Bt potatoes is insufficient for conventional testing, “So we put the genes in bacteria, produce the gene product and test it by conventional methods.”¹³ The “gene product” may not have the same effect when consumed in potatoes as when produced by bacteria.

Independent Testing

Designing tests for GE foods is not as simple as it sounds. Prof Arpad Pusztai, of the Rowett Research Institute in Aberdeen, Scotland, fed GM potatoes and normal potatoes to separate groups of rats. “. . . lectins are known to damage immune-system cells, so the feeding experiments with rats were designed to see if the damage occurred when the lectins were present in the potatoes.”¹⁴ “The control rats were fed potatoes simply spiked with the lectin. This suggests that the GM process itself was responsible for the changes in the rats. . . . the stomach linings of rats fed on GM potatoes are worse than those fed on a normal diet.”¹⁵

Prof. Pusztai was severely criticized and then fired for publishing inconclusive test results. “The institute accused him of going public with an unproven theory and muddling his results with those from other experiments.¹⁶ However, “Over 20 scientists (including toxicologists, genetic engineers and medical experts) from 13 different countries have since re-examined Dr. Pusztai’s work. They report his conclusions were justified.”¹⁷

Market Testing of Processed Foods

The BBC Online has posted two mutually contradictory positions on the effectiveness of testing processed foods for evidence of genetic engineering. The position of science editor Dr. David Whitehouse, on March 18, 1999, was that the only way to be sure is “. . . to know exactly where the foods ingredients came from.”¹⁸ On June 30, 1999, The BBC Online posted claims that processed foods can be tested to show the percentage of genetically-engineered DNA in the food product.¹⁹ This kind of testing provides information for import bans or product labeling in Europe and third world countries.

Because much of the U. S. soy and corn crops are bioengineered, Europe has not imported any corn or soybeans from the United States this year. If such import bans on GE foods become the norm, American farmers may only be able to export crops for which no GE varieties have been approved.

Phil Angell of Monsanto told Michael Pollan that Europeans are worried about GE foods because, “They don’t have a trusted agency like the FDA looking after the safety of their food supply”²⁰ However, “. . . the FDA is being sued for allowing biotech foods on the market without adequate review. And the man who approved the foods at the FDA came to the FDA from a law firm where he represented Monsanto, and after his stint at the FDA, he want to work directly for Monsanto’s Washington office.”²¹

Notes:

Pollan, Michael, "Playing God in the Garden," The New York Times Sunday Magazine ©1998 The New York Times Company, 10/25/28

"FDA Talk Paper: FDA evaluation of bioengineered soybean and corn varieties," 10/7/96
<http://vmpcfzan.fda.gov/~ird4/tpbtoeng.html>

"Conference on scientific issues related to potential allergenicity in transgenic food crops," U. S. Food and Drug Administration, Center for Food Safety and Applied Nutrition, CFSAN handout, 1994, April 18-19, 1994, Annapolis, MD

Dr. Mae-Wan Ho, biologist, "Should Chemical Corporations Control Food Crops?" Bangor Daily News, Bangor, ME 9/30/98 <http://pharminfo.news-real.com/story199819301716643039stp.html>

Fagan, John, "Toxicity from genetically engineered foods," <http://www.holisticge/poison.html> (Dr. Fagan is a professor of molecular biology at Maharishi University of Management, Fairfield, Iowa 52557, Phone (515)-472-1167. Email jfagan@mum.edu)

Fagan, John, "The Failings of the Principle of Substantial Equivalence in Regulating Transgenic Foods," <http://www.netlink.de/gen/jfsubeq.htm>

Quoted by Pollan, (See note 1)

Dr. Mae-Wan Ho, "The Unholy Alliance," The Ecologist, Vol.27 No.4, July/August, 1997

Fagan, John, "Assessing the Safety and Nutritional Quality of Genetically Engineered Foods," <http://www.netlink.de/gen/jfassess.htm>

Fagan, (See note 6)

Mae-Wan Ho, Angela Ryan and Joe Cummins, "Cauliflower Mosaic Viral Promoter – A Recipe for Disaster?" Scandinavian University Press, <http://www.scup.no/mehd/ho>

Agriculture Canada, (reference # dd96-06) cited by Richard Wolfson, PhD in "The New Poison Plants," from Alive: Canadian Journal of Health and Nutrition, July, 1997, <http://www.holisticmed.com/ge/poison.html>

Fuchs, Roy, head of scientific affairs at Monsanto; quoted in "Unpalatable Truths," ©New Scientist, 4/17/99

"Gene Potatoes Damage Rats Immune Systems," The Times of London, 8/12/98

"GM safety research stokes new row," BBC News, October 4, 1999, http://news.bbc.co.uk/hi/english/sci/tech/newsid_4640000/464416.stm

“Genetic Foods TV Claims ‘flawed’” Evening Mail 5/24/99,
<http://pharminfo.new-real.com/story/19999522/21/5-/4081321st.html>

Croft Woodruff, “Where are the safety studies on Frankenstein foods?” croft@cwhealth.com

Dr. David Whitehouse, “No Test for GM Foods,” BBC News Online, 3/18/99,
<http://news.bbc.co.uk/1/hi/english/sci/tech/newsid298000/298868.stm>

GM Foods,” BBC Online, 6/30/99 <http://www.bbc.co.uk/tw/story/science/9906pizza.shtml>
Phil Angell, quoted by Pollan, Michael

Russell Mokhiber and Robert Weissman, “Biotech rudeness,” © 1999, Focus on the Corporation, 7/23/99
<http://www.enn.com/features/1999/07/072399>