GlobalResearch
Center for Research on Globalization

Potential Health Hazards of Genetically Engineered Foods

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Global Research, June 18, 2017
Global Research 22 February 2008

Theme: Biotechnology and GMO, Science and Medicine

First published by Global Research in February 2008

This article discusses the potential health risks of genetically engineered foods (GMOs). It draws on some previously used material because its importance bears repeating. It also cites three notable books and highlights one in particular – Jeffrey Smith's "Genetic Roulette: The Documented Health Risks of Genetically Engineered Foods." Detailed information from the book is featured below.

Genetically engineered foods saturate our diet today. In the US alone, over 80% of all processed foods contain them. Others include grains like rice, corn and wheat; legumes like soybeans and soy products; vegetable oils, soft drinks; salad dressings; vegetables and fruits; dairy products including eggs; meat, chicken, pork and other animal products; and even infant formula plus a vast array of hidden additives and ingredients in processed foods (like in tomato sauce, ice cream, margarine and peanut butter). Consumers don't know what they're eating because labeling is prohibited, yet the danger is clear. Independently conducted studies show the more of these foods we eat, the greater the potential harm to our health.

Today, consumers are kept in the dark and are part of an uncontrolled, unregulated mass human experiment the results of which are unknown. Yet, the risks are enormous, it will take years to learn them, and when we finally know it'll be too late to reverse the damage if it's proved conclusively that genetically engineered foods harm human health as growing numbers of independent experts believe. Once GM seeds are introduced to an area, the genie is out of the bottle for keeps. There is nothing known to science today to reverse the contamination already spread over two-thirds of arable US farmland and heading everywhere unless checked.

 This is happening in spite of the risk because of what F. William Engdahl (right) revealed in his powerfully important, well documented book titled "Seeds of Destruction: The Hidden Agenda of Genetic Manipulation." It's the diabolical story of how Washington and four Anglo-American agribusiness giants plan world domination by patenting animal and vegetable life forms to gain worldwide control of our food supply, make it all genetically engineered, and use it as a weapon to reward friends and punish enemies.

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Today, consumers eat these foods daily without knowing the potential health risks. In 2003, Jeffrey Smith explained them in his book titled “Seeds of Deception.” He revealed that efforts to inform the public have been quashed, reliable science has been buried, and consider what happened to two distinguished scientists – UC Berkeley’s Ignacio Chapela and former Scotland Rowett Research Institute researcher and world’s leading lectins and plant genetic modification expert, Arpad Pusztai. They were vilified, hounded, and threatened for their research, and in the case of Pusztai, fired from his job for doing it.

He believed in the promise of GM foods, was commissioned to study them, and conducted the first ever independent one on them anywhere. Like other researchers since, he was shocked by his findings. Rats fed GM potatoes had smaller livers, hearts, testicles and brains, damaged immune systems, and showed structural changes in their white blood cells making them more vulnerable to infection and disease compared to other rats fed non-GMO potatoes. It got worse. Thymus and spleen damage showed up; enlarged tissues, including the pancreas and intestines; and there were cases of liver atrophy as well as significant proliferation of stomach and intestines cells that could be a sign of greater future risk of cancer. Equally alarming, results showed up after 10 days of testing, and they persisted after 110 days that’s the human equivalent of 10 years.

Later independent studies confirmed what Pusztai learned, and Smith published information on them in his 2007 book called “Genetic Roulette: The Documented Health Risks of Genetically Engineered Foods.” The book is encyclopedic in depth, an invaluable comprehensive source, and this article reviews some of the shocking data in it.

Compelling Evidence of Potential GMO Harm

In his introduction, Smith cites the US Food and Drug Administration’s (FDA) policy statement on GM food safety without a shred of evidence to back it. It supported GHW Bush’s Executive Order that GMOs are “substantially equivalent” to ordinary seeds and crops and need no government regulation. The agency said it was “not aware of any information showing that foods derived by these new methods differ from other foods in any meaningful or uniform way.” That single statement meant no safety studies are needed and “Ultimately, it is the food producer” that bears responsibility “for assuring safety.” As a consequence, foxes now guard our henhouse in a brave new dangerous world.

FDA policy opened the floodgates, and Smith put it this way: It “set the stage for the rapid

deployment of the new technology," allowed the seed industry to become "consolidated, millions of acres (to be) planted, hundreds of millions to be fed (these foods in spite of nations and consumers objecting, and) laws to be passed (to assure it)." The toll today is contaminated crops, billions of dollars lost, human health harmed, and it turns out the FDA lied.

The agency knew GM crops are "meaningfully different" because their technical experts told them so. As a result, they recommended long-term studies, including on humans, to test for possible allergies, toxins, new diseases and nutritional problems. Instead, politics trumped science, the White House ordered the FDA to promote GM crops, and a former Monsanto vice-president went to FDA to assure it.

Today, the industry is unregulated, and when companies say their foods are safe, their views are unquestioned. Further, Smith noted that policy makers in other countries trust FDA and wrongly assume their assessments are valid. They're disproved when independent studies are matched against industry-run ones. The differences are startling. The former report adverse affects while the latter claim the opposite. It's no secret why. Agribusiness giants allow nothing to interfere with profits, safety is off the table, and all negative information is quashed.

As a result, their studies are substandard, adverse findings are hidden, and they typically "fail to investigate the impacts of GM food on gut function, liver function, kidney function, the immune system, endocrine system, blood composition, allergic response, effects on the unborn, the potential to cause cancer, or impacts on gut bacteria." In addition, industry-funded studies creatively avoid finding problems or conceal any uncovered. They cook the books by using older instead of younger more sensitive animals, keep sample sizes too low for statistical significance, dilute the GM component of feeds used, limit the duration of feeding trials, ignore animal deaths and sickness, and engage in other unscientific practices. It's to assure people never learn of the potential harm from these foods, and Smith says they can do it because "They've got 'bad science' down to a science."

The real kinds show GMOs produce "massive changes in the natural functioning of (a) plant's DNA. Native genes can be mutated, deleted, permanently turned off or on….the inserted gene can become truncated, fragmented, mixed with other genes, inverted or multiplied, and the GM protein it produces may have unintended characteristics" that may be harmful.

GMOs also pose other health risks. When a transgene functions in a new cell, it may produce different proteins than the ones intended. They may be harmful, but there's no way to know without scientific testing. Even if the protein is exactly the same, there are still problems. Consider corn varieties engineered to produce a pesticidal protein called Bt-toxin. Farmers use it in spray form, and companies falsely claim it's harmless to humans. In fact, people exposed to the spray develop allergic-type symptoms, mice ingesting Bt had powerful immune responses and abnormal and excessive cell growth, and a growing number of human and livestock illnesses are linked to Bt crops.

Smith notes still another problem relating to inserted genes. Assuming they're destroyed by our digestive system, as industry claims, is false. In fact, they may move from food into gut bacteria or internal organs, and consider the potential harm. If corn genes with Bt-toxin get into gut bacteria, our intestinal flora may become pesticide factories. There's been no research done to prove if it's true or false. Agribusiness giants aren't looking, neither is FDA,

consumers are left to play “Genetic Roulette,” and the few animal feeding studies done show the odds are against them.

Arpad Pusztai and other scientists were shocked at their results of animals fed GM foods. His results were cited above. Other independent studies showed stunted growth, impaired immune systems, bleeding stomachs, abnormal and potentially precancerous cell growth in the intestines, impaired blood cell development, misshaped cell structures in the liver, pancreas and testicles, altered gene expression and cell metabolism, liver and kidney lesions, partially atrophied livers, inflamed kidneys, less developed organs, reduced digestive enzymes, higher blood sugar, inflamed lung tissue, increased death rates and higher offspring mortality as well.

There’s more. Two dozen farmers reported their pigs and cows fed GM corn became sterile, 71 shepherds said 25% of their sheep fed Bt cotton plants died, and other reports showed the same effects on cows, chickens, water buffaloes and horses. After GM soy was introduced in the UK, allergies from the product skyrocketed by 50%, and in the US in the 1980s, a GM food supplement killed dozens and left five to ten thousand others sick or disabled.

Today, Monsanto is the world’s largest seed producer, and Smith notes how the company deals with reports like these. In response to the US Public Health Service concerning adverse reactions from its toxic PCBs, the company claims its experience “has been singularly free of difficulties.” That’s in spite of lawsuit-obtained records showing “this was part of a cover-up and denial that lasted decades” by a company with a long history of irresponsible behavior that includes “extensive bribery, highjacking of regulatory agencies, suppressing negative information about its products” and threatening journalists and scientists who dare report them. The company long ago proved it can’t be trusted with protecting human health.

In his book, “Seeds of Destruction,” Engdahl names four dominant agribusiness giants – Monsanto, DuPont, Dow Agrisciences and Syngenta in Switzerland from the merger of the agriculture divisions of Novartis and AstraZeneca. Smith calls these companies Ag biotech and names a fifth – Germany-based Bayer CropScience AG (division of Bayer AG) with its Environmental Science and BioScience headquarters in France.

Their business is to do the impossible and practically overnight – change the laws of nature and do them one better for profit. So far they haven’t independent because genetic engineering doesn’t work like natural breeding. It may or may not be a lot of things, but it isn’t sex, says Smith. Michael Antoniou, a molecular geneticist involved in human gene therapy, explains that genetic modification “technically and conceptually bears no resemblance to natural breeding.” The reproduction process works by both parents contributing thousands of genes to the offspring. They, in turn, get sorted naturally, and plant breeders have successfully worked this way for thousands of years.

Genetic manipulation is different and so far fraught with danger. It works by forcibly inserting a single gene from a species’ DNA into another unnaturally. Smith puts it this way: “A pig can mate with a pig and a tomato can mate with a tomato. But this is no way that a pig can mate with a tomato and vice versa.” The process transfers genes across natural barriers that “separated species over millions of years of evolution” and managed to work. The biotech industry now wants us to believe it can do nature one better, and that genetic engineering is just an extension or superior alternative to natural breeding. It’s unproved,

indefensible pseudoscience mumbo jumbo, and that's the problem.

Biologist David Schubert explains that industry claims are "not only scientifically incorrect but exceptionally deceptive….to make the GE process sound similar to conventional plant breeding." It a smoke screen to hide the fact that what happens in laboratories can't duplicate nature, at least not up to now. Genetic engineering involves combining genes that never before existed together, the process defies natural breeding proved safe over thousands of years, and there's no way to assure the result won't be a deadly unrecallable Andromeda Strain, no longer the world of science fiction.

The industry pooh-pooh's the suggestion of potential harm, and unscientifically claims millions of people in the US and worldwide have eaten GM food for a decade, and no one got sick. Smith's reply: How can we know as "GM foods might already be contributing to serious health problems, but since no one is monitoring for this, it could take decades" to find out. By then, it will be too late and some industry critics argue it already may be or dangerously close.

Today, most existing diseases have no effective surveillance systems in place. If GM foods create new ones, that potentially compounds the problem manyfold. Consider HIV/AIDS. It went unnoticed for decades and when identified, many thousands worldwide were infected or had died.

Then there's the problem of linkage. In the US and many countries, GM foods are unlabeled so it's impossible tracing illness and diseases to specific substances ingested even if thousands of people are affected. It can plausibly be blamed on anything, especially when governments and regulatory agencies support industry claims of reliability and safety.

It's rare that problems like the L-Tryptophan epidemic of the late 1980s are identified, but when it was thousands were already harmed. L-Tryptophan is a natural amino acid constituent of most proteins and for years was produced by many companies including Showa Denko in Japan. The company then got greedy, saw a way to increase profits from a product designed to induce sleep naturally, and gene-spliced a bacterium into the natural product to do it. The result was many dozens dead, over 1500 crippled, and up to 10,000 afflicted with a blood disorder from a new incurable disease called Eosinophilia Myalgia Syndrome or EMS.

It's a painful, multi-system disease that causes permanent scarring and fibrosis to nerve and muscle tissues, continuing inflammation, and a permanent change in a person's immune system. It cost the company two billion dollars to settle claims. Hundreds have since died, in all likelihood from contracting EMS.

This is the known toll from a single product. Consider the potential harm with Ag biotech wanting all foods to be unlabeled GMOs worldwide and governments unable to balk because WTO Agreement on Agriculture (AoA) and Trade Related Intellectual Property Rights (TRIPS) rules deny them. They're also prevented under WTO's Sanitary and Phytosanitary Agreement (SPS). It states that national laws banning GMO products are "unfair trade practices" even when they endanger human health. Other WTO rules also apply – called "Technical Barriers to Trade." They prohibit GMO labeling so consumers don't know what they're eating and can't avoid these potentially hazardous foods.

The 1996 Biosafety Protocol was drafted to prevent this problem, and it should be in place

to do it. Public safety, however, was ambushed by Washington, the FDA and the agribusiness lobby. It sabotaged talks and insisted biosafety measures be subordinate to WTO trade rules that apply regardless of other considerations, including public health and safety. The path is thus cleared for the unrestricted spread of GMO seeds and foods worldwide unless a way is found to stop it.

Independent Animal Studies Showing GMO Harm

Rats fed genetically engineered Calgene Flavr-Savr tomatoes (developed to look fresh for weeks) for 28 days got bleeding stomachs (stomach lesions) and seven died and were replaced in the study.

Rats fed Monsanto 863 Bt corn for 90 days developed multiple reactions typically found in response to allergies, infections, toxins, diseases like cancer, anemia and blood pressure problems. Their blood cells, livers and kidneys showed significant changes indicative of disease.

Mice fed either GM potatoes engineered to produce Bt- toxin or natural potatoes containing the toxin had intestinal damage. Both varieties created abnormal and excessive cell growth in the lower intestine. The equivalent human damage might cause incontinence or flu-like symptoms and could be pre-cancerous. The study disproved the contention that digestion destroys Bt-toxin and is not biologically active in mammals.

Workers in India handling Bt cotton while picking, loading, weighing and separating the fiber from seeds developed allergies. They began with “mild to severe itching,” then redness and swelling, followed by skin eruptions. These symptoms affected their skin, eyes (got red and swollen with excessive tearing) and upper respiratory tract causing nasal discharge and sneezing. In some cases, hospitalization was required. At one cotton gin factory, workers take antihistamines daily.

Sheep grazing on Bt cotton developed “unusual systems” before dying “mysteriously.” Reports from four Indian villages revealed 25% of them died within a week. Post mortems indicated a toxic reaction. The study raises questions about cottonseed oil safety and human health for people who eat meat from animals fed GM cotton. It’s crucial to understand that what animals eat, so do people.

Nearly all 100 Filipinos living adjacent to a Bt corn field became ill. Their symptoms appeared when the crop was producing airborne pollen and was apparently inhaled. Doing it produced headaches, dizziness, extreme stomach pain, vomiting, chest pains, fever, and allergies plus respiratory, intestinal and skin reactions. Blood tests conducted on 39 victims showed an antibody response to Bt-toxin suggesting it was the cause. Four other villages experienced the same problems that also resulted in several animal deaths.

Iowa farmers reported a conception rate drop of from 80% to 20% among sows (female pigs) fed GM corn. Most animals also had false pregnancies, some delivered bags of water and others stopped menstruating. Male pigs were also affected as well as cows and bulls. They became sterile and all were fed GM corn.

German farmer Gottfried Glockner grew GM corn and fed it to his cows. Twelve subsequently died from the Bt 176 variety, and other cows had to be destroyed due to a “mysterious” illness. The corn plots were field trials for Ag biotech giant Syngenta that later

took the product off the market with no admission of fault.

Mice fed Monsanto Roundup Ready soybeans developed significant liver cell changes indicating a dramatic general metabolism increase. Symptoms included irregularly shaped nuclei and nucleoli, and an increased number of nuclear pores and other changes. It's thought this resulted from exposure to a toxin, and most symptoms disappeared when Roundup Ready was removed from the diet.

Mice fed Roundup Ready had pancreas problems, heavier livers and unexplained testicular cell changes. The Monsanto product also produced cell metabolism changes in rabbit organs, and most offspring of rats on this diet died within three weeks.

The death rate for chickens fed GM Liberty Link corn for 42 days doubled. They also experienced less weight gain, and their food intake was erratic.

In the mid-1990s, Australian scientists discovered that GM peas generated an allergic-type inflammatory response in mice in contrast to the natural protein that had no adverse effect. Commercialization of the product was cancelled because of fear humans might have the same reaction.

When given a choice, animals avoid GM foods. This was learned by observing a flock of geese that annually visit an Illinois pond and feed on soybeans from an adjacent farm. After half the acreage had GM crops, the geese ate only from the non-GMO side. Another observation showed 40 deer ate organic soybeans from one field but shunned the GMO kind across the road. The same thing happened with GM corn.

Inserting foreign or transgenes is called insertional mutagenesis or insertion mutation. When done, it usually disrupts DNA at the insertion site and affects gene functioning overall by scrambling, deleting or relocating the genetic code near the insertion site.

The process of creating a GM plant requires scientists first to isolate and grow plant cells in the laboratory using a tissue culture process. The problem is when it's done it can create hundreds or thousands of DNA mutations throughout the genome. Changing a single base pair may be harmful. However, widespread genome changes compound the potential problem manyfold.

Promoters are used in GM crops as switches to turn on the foreign gene. When done, the process may accidently switch on other natural plant genes permanently. The result may be to overproduce an allergen, toxin, carcinogen, antinutrient, enzymes that stimulate or inhibit hormone production, RNA that silences genes, or changes that affect fetal development. They may also produce regulators that block other genes and/or switch on a dormant virus that may cause great harm. In addition, evidence suggests the promoter may create genetic instability and mutations that can result in the breakup and recombination of the gene sequence.

Plants naturally produce thousands of chemicals to enhance health and protect against disease. However, changing plant protein may alter these chemicals, increase plant toxins and/or reduce its phytonutrients. For example, GM soybeans produce less cancer-fighting isoflavones. Overall, studies show genetic modification produces unintended changes in nutrients, toxins, allergens and small molecule metabolism products.

To create a GM soybean with a more complete protein balance, Pioneer Hi-Bred inserted a

Brazil nut gene. By doing it, an allergenic protein was introduced affecting people allergic to Brazil nuts. When tests confirmed this, the project was cancelled. GM proteins in other crops like corn and papaya may also be allergenic. The same problem exists for other crops like Bt corn, and evidence shows allergies skyrocketed after GM crops were introduced.

Another study of Monsanto's high-lysine corn showed it contained toxins and other potentially harmful substances that may retard growth. If consumed in large amounts, it may also adversely affect human health. In addition, when this product is cooked, it may produce toxins associated with Alzheimer's, diabetes, allergies, kidney disease, cancer and aging symptoms.

Disease-resistant crops like zucchini, squash and Hawaiian papaya may promote human viruses and other diseases, and eating these products may suppress the body's natural defense against viral infections.

Protein structural aspects in GM crops may be altered in unforeseen ways. They may be misfolded or have added molecules. During insertion, transgenes may become truncated, rearranged or interspersed with other DNA pieces with unknown harmful effects. Transgenes may also be unstable and spontaneously rearrange over time, again with unpredictable consequences. In addition, they may create more than one protein from a process called alternative splicing. Environmental factors, weather, natural and man-made substances and genetic disposition of a plant further complicate things and pose risks. They're introduced as well because genetic engineering disrupts complex DNA relationships.

Contrary to industry claims, studies show transgenes aren't destroyed digestively in humans or animals. Foreign DNA can wander, survive in the gastro-intestinal tract, and be transported by blood to internal organs. This raises the risk that transgenes may transfer to gut bacteria, proliferate over time, and get into cells DNA, possibly causing chronic diseases. A single human feeding study confirmed that genes, in fact, transferred from GM soy into the DNA gut bacteria of three of seven test subjects.

Antibiotic Resister Marker (ARM) genes are attached to transgenes prior to insertion and allow cells to survive antibiotic applications. If ARM genes transfer to pathogenic gut or mouth bacteria, they potentially can cause antibiotic-resistant super-diseases. The proliferation of GM crops increases the possibility. The CaMV promoter in nearly all GMOs can also transfer and may switch on random genes or viruses that produce toxins, allergens or carcinogens as well as create genetic instability.

GM crops interact with their environment and are part of a complex ecosystem that includes our food. These crops may increase environmental and other toxins that may accumulate throughout the food chain. Crops genetically engineered to be glufosinate (herbicide)resistant may produce intestinal herbicide with known toxic effects. If transference to gut bacteria occurs, greater problems may result.

Repeated use of seeds like Monsanto's Roundup Ready soybeans results in vicious new super-weeds that need far greater amounts of stronger herbicides to combat. Their toxic residues remain in crops that humans and animals then eat. Even small amounts of these toxins may be endocrine disruptors that can affect human reproduction adversely. Evidence exists that GM crops accumulate toxins or concentrate them in milk or animals fed GM feed. Disease-resistant crops may also produce new plant viruses that affect humans.

All type GM foods, not just crops, carry these risks. Milk, for example, from cows injected with Monsanto's bovine growth hormone (rbGH), has much higher levels of the hormone IGF-1 that risks breast, prostate, colon, lung and other cancers. The milk also has lower nutritional value. GM food additives also pose health risks, and their use has proliferated in processed foods.

Potential harm to adults is magnified for children. Another concern is that pregnant mothers eating GM foods may endanger their offspring by harming normal fetal development and altering gene expression that's then passed to future generations. Children are also more endangered than adults, especially those drinking substantial amounts of rbGH-treated milk.

Conclusion

The above information is largely drawn from Smith's "Genetic Roulette." The data is startling and confirms a clear conclusion. The proliferation of untested, unregulated GM foods in the span of a decade is more a leap of faith than reliable science. Microbiologist Richard Lacey captures the risk stating: "it is virtually impossible to even conceive of a testing procedure to assess the health effects of (GM) foods when introduced into the food chain, nor is there any valid nutritional or public interest reason for their introduction." Other scientists worldwide agree that GM foods entered the market long before science could evaluate their safety and benefits. They want a halt to this dangerous experiment that needs decades of rigorous research and testing before we can know.

Unchecked and unregulated, human health and safety are at risk because once GMOs enter the food chain, the genie is out of the bottle for keeps. Thankfully, resistance is growing worldwide, many millions are opposed, but reversing the tide won't be easy. Washington and Ag biotech are on a roll with big unstated aims – total control of our food, making it all genetically engineered, and scheming to use it as a weapon to reward friends and punish enemies.

Smith is hopeful that people will prevail over profits. Hopefully he's right because human health and safety must never be compromised. Resistance already halted the introduction of new crop varieties, and Smith believes that with enough momentum existing ones may end up withdrawn. He cites an example he calls a "Shift away from GM foods in the United States" in 2007. Leading it is an initiative launched last spring to remove GM ingredients from the entire natural food sector. It's led by a coalition of natural food products producers, distributors and retailers along with the Institute for Responsible Technology (IRT). It's called the Campaign for Healthier Eating in America, and its aims are big – to educate consumers about GM food risks and promote healthy alternatives through shopping guides.

A Pew survey reported that 29% of Americans, representing 87 million people, strongly oppose these foods and believe they're unsafe. That's a respectable start if backed up with efforts to avoid them, and more information how is at ResponsibleTechnology.org. Jeffrey Smith founded IRT in 2003 "to promote the responsible use of technology and stop GM foods and crops through both grassroots and national strategies." It seeks safe alternatives and aims to "ban the genetic engineering of our food supply and all outdoor releases of (GM) organisms, at least until (or unless scientific opinion) believes such products are safe and appropriate based on independent and reliable data."

IRT urges consumers to become educated about the risks, mobilize to combat them and act in our mutual self-interest. It's beginning to happen, and Smith believes "there is an

excellent chance that food manufacturers will abandon GM foods in the near future" if a public groundswell demands it. He ends his book saying: "Although GMOs present one of the greatest dangers, with informed, motivated people, it is one of the easiest global issues to solve." Hopefully he's right.

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