INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH

6935 Laurel Avenue, Suite 201
Takoma Park, MD 20912

Phone: (301) 270-5500
FAX: (301) 270-3029
e-mail: ieer@ieer.org
http://www.ieer.org

Statement for Press Conference On Ecology and Genetics

by Martha R. Herbert, M.D., Ph.D.

Pediatric Neurology, Massachusetts General Hospital, and Council for Responsible Genetics

National Press Club, Washington, D.C., June 4, 2001

The Risks of an Inappropriate Technology

Last year I was invited to speak at the National Academy of Sciences on health monitoring of genetically engineered foods. At present, there is not only no required testing; there is also no health monitoring in place. The NAS staffer who invited me said, "We have no idea how to approach this. Come up with any wild ideas you can so that we can get some idea of where to begin."

This was admirably candid, but it didn't get to the heart of the matter. The heart of the matter is this: It's not just that we don't yet have any idea how to test or monitor these products; it's that, in many respects, we probably never will. As Dr. Makhijani says in his monograph, "We simply do not understand the genome-ecosystem relationships well enough to make confident estimates of the ecological impact of new structures." And this lack of understanding applies to genome-organism and even genome-cell relationships as well.

Some of the risks we cannot yet predict are health risks, which have been my focus as a physician, but there are ecological risks as well. Tests have not been performed because the regulatory apparatus has bought into the scientifically unfounded doctrine of "substantial equivalence," according to which there are assumed to be no differences between genetically engineered and traditionally bred foods. Today we want to emphasize that this erroneous notion of "substantial equivalence" at the level of food composition has its analog at the level of ecological impacts.

For years proponents argued that there was no ecological risk from genetic engineering-after all, the argument went, these organisms will be weaker and more debilitated than their natural cousins, so they could never survive or spread in the wild. This argument has stood in curious contradiction to the claims that genetically engineered crops are improvements over traditional varieties-claims that have rationalized their astonishingly rapid spread over hundreds of millions of acres world-wide, not to speak of farmed fish and modified animals. Somehow these

genetically engineered organisms are supposed to be weak and debilitated, yet at the same time triumphant advances over non-engineered foods.

The extremely rapid and widespread dissemination of identical gene mutations is quite different from how natural evolution works. Certainly mutations occur in nature, but they are abundant and vary greatly from place to place. Evolution picks and chooses among these many sporadic mutations, and it chooses differently in different environments. In nature, it is inconceivable that a single mutation would suddenly show up in millions of acres or animals all at once.

The recent humbling discovery that the human genome has at most 30-40,000 genes brings home that gene function must be complicated and multi-purpose, for human beings and for other living organisms as well. This discovery shows that the "lego" model of gene transfer is outdated and oversimplified. People enamored of this model believe that genes are discrete, context-insensitive entities that can be transferred without side effect from one organism to another. The "lego" model leads people to believe that genetic engineering is "more precise" than traditional breeding because you target a specific gene to transfer. Even this fantasy about precision reveals serious denial about what goes on in the process, which involves using gene guns or viruses to force foreign genes into cells. Genetically engineered products have been rushed to market for economic reasons at a primitive state of the technology, when there isn't even control over where the inserted gene takes up residence in the receiving organism's genome. If the inserted gene lands in the middle of another gene, the interrupted gene may no longer function properly, or neighboring genes that are normally quiet may get much more active than normal. But there has been no requirement to test for where in the recipient organism the inserted gene lands, so the effects of interrupted or otherwise altered gene functions are not even on the radar screen of current cursory testing protocols.

Physicians are no strangers to risk. When a patient is ill, we offer the best treatment available. Even the best drugs, surgeries, radiation treatments or whatnot may still have significant side effects, but each patient is given a choice, with the risks and benefits explained. And generally, the physical consequences of treatment are limited to the individual patient.

Genetically engineered food poses risks too, but on an altogether different scale, and the benefits so far are largely hypothetical. No individual person's problems are being solved, and there is as yet no evidence-only promises-that larger benefits will result, such as increased food supply or reduced chemical use. In any case, there exist other less risky and more effective ways to achieve these latter goals. Meanwhile, these foods have been put into production with hardly any notice, let alone any serious discussion other than what its critics have attempted to generate.

This kind of intervention, were it a medical clinical trial, would never have gotten past the human-subjects board of any reputable hospital. The committee would have sent the proposal back to the researchers and asked them to spell out just what was at stake. It would have recognized that the widespread use of genetically engineered foods is, in effect, an experiment, though a poorly designed one without any procedures or controls. It would insist that the subjects in the experimental trial be told the risks and given a choice. The risks to community and ecology would also need to be spelled out. If this were done as comprehensively as one is

required to spell out potential risks on a hospital informed-consent form, something like the following might appear:

"Genetically engineered foods may contain unanticipated allergens or toxins, yet there are no testing procedures in place to look for these novel chemicals. There is no health monitoring, and even if some monitoring were in place, it might be very difficult to trace the effects of foods that are not labeled. There is no legal liability, so if problems arise, the manufacturers of these products cannot be held responsible. Furthermore, many of the resulting problems may take the form of increases in common ailments like allergies and diarrhea, which would be very difficult to trace."

Ascending from the individual to the social level, if proponents of genetic engineering were required to file an environmental impact statement, it would have to include something like the following:

"The variety of foodstuffs will change and probably diminish. Locally adapted varieties may be replaced by large-scale uniform cultivation of genetically engineered monocultures. Biodiversity may diminish, and there may be greater vulnerability to widespread pest damage or crop failure due to weather problems. Birds, insects, and wildlife may suffer, because many will lose the diverse plant life that has hitherto supported them. Some genetically modified organisms may spread into the wild, and some genes may breed into wild varieties, creating new "bio-invaders" that could wreak ecological havoc. Such havoc would not be easily controlled, since genetically modified organisms, once released, can never be recalled.

"Traditional farmers may lose their knowledge and independence. Some may become agricultural workers on contract to major multinational agribusiness corporations. Many others may be displaced from the land, throwing their families and communities into poverty, dislocation and cultural disarray. Economic vertical integration in agriculture, already widespread, may proceed even more rapidly, with the result that the world food supply may be in the hands of a small group of unregulated, profit-oriented multinational corporations."

A proper informed-consent form or environmental impact statement would also need to inform people about alternatives, which are many. To begin with, there is sustainable agriculture. Multicropping can work much better than gene insertion to reduce pest infestation. Composting would improve soil quality, spare it from chemical inputs, reduce petroleum consumption, and spare our groundwater, streams, lakes and rivers the pollution of chemical and animal waste. Regional self-sufficiency can be restored, and globalization of diseases like hoof-and-mouth can be avoided. Genetics can be made to interact cooperatively with multiple other levels of biological science. Agro-ecological study of food plants and animals can receive the serious funding it deserves so that sustainable and regenerative approaches can be refined and developed in locale-specific ways. Science can pay more attention to the complex co-creative relationships of organisms in their ecosystems, instead of ignoring these treasure-troves of wise use, as genetic engineering does now. These constructive alternatives are harder to patent than genetically engineered products, but in the long run they will much better preserve health, ecosystem, culture and economy.

Truly sound science would not limit itself to the narrow and trivial tests that have been performed thus far, but would take account of the full range of risks and ramifications of this new, and in my view inappropriate, technology. I am happy to join Dr. Makhijani's call for a broad ecological perspective on the hazards of genetic engineering. We aim to raise the standard of scientific discourse in this debate so that the full range of relevant science is considered. And we hope that the public will interest itself, so that the issue may be fully and thoroughly considered by all affected parties-everyone on the planet.