

GMOs and Human Health

Dr. Mae-Wan Ho told the ***People's Health Assembly*** that *GM is proving bad for health because it goes against the grain of the new genetics science*

A GMO or genetically modified organism is one whose natural genetic material has been modified by having synthetic genetic material inserted into it. That is how we have GM crops grown for food and feed, for fibre and for a range of pharmaceuticals and industrial products in the latest offering, if we don't manage to stop it.

Maybe you have heard the mantra from certain scientists that GM food is perfectly safe because the technology is so very precise and wonderful and the regulation the strictest in the world; that GM is good for biodiversity, increases yield, reduces pesticide use, and so on. All of the claims have been falsified, with data collected by the US Department of Agriculture and by independent scientists .

The World Health Organization has just issued a report, *Modern food biotechnology, human health and development: an evidence-based study* (23 June 2005) claiming that although there may be potential risks involved in the use of GMOs, the GM crops that are grown today are not likely to present health risks.

Yet there has been a string of incidents indicating GM food and feed are far from safe. These include studies carried out by biotech companies producing the GM crops, which they have kept secret under confidential business information.

- Kidney and blood abnormalities in rats fed one of Monsanto's GM maize in Monsanto's secret dossier.
- Villagers in the south of the Philippines who suffered mysterious illnesses when another GM maize came into flower in a nearby field two years in a row. Antibodies to the Bt protein inserted into the GM maize were found in the villagers.
- A dozen cows that died after eating a third GM maize made by Syngenta, and others in the herd had to be slaughtered because of mysterious illnesses. Autopsies failed to be carried out, which is why Greenpeace and farmers are demonstrating in front of the Robert Koch Institute
- Senior scientist Arpad Pusztai and colleagues in Scotland found young rats fed GM potatoes ended up with damage in every organ system; the most dramatic being an increase in thickness of the stomach lining to twice that in controls. Scientists in Egypt found similar effects in mice fed GM potatoes with another gene.

- The US Food and Drug Administration had data dating back to early 1990s that rats fed GM tomatoes had developed small holes in their stomach.

To cut a long story short, different species of GM food and feed crops with different genes had adversely affected several species of animals. You don't have to be a scientific genius to see that there may be something in the genetic engineering process itself that's harmful .

So what's wrong with GMOs?

First, new genes and combinations of genes made in the laboratory, which have never existed in billions of years of evolution, are being introduced into our food chain.

Allergies and other toxicities come to mind. In fact, 22 out of 33 proteins incorporated into GM crops were found to have similarities to known allergens, and are therefore suspected allergens.

The synthetic genetic material are introduced into the cells of organisms with invasive methods that are uncontrollable, unreliable and unpredictable, and far from precise.

It ends up damaging the natural genetic material of the organism with many unpredictable, unintended effects, including gross abnormalities that you can see, and metabolic changes that may be toxic that you can't see.

Many foreign synthetic genes are copies of those from bacteria and viruses that cause diseases.

They also contain antibiotic resistance marker genes to help track the movements of the foreign gene inserts and select for cells that have taken up the foreign genes.

Right from the beginning, in the mid 1970s, geneticists themselves have worried that releasing those synthetic genetic material runs the risk of creating new viruses and bacteria that cause diseases, and spreading antibiotic resistance to make infections untreatable. As the result of the Asilomar Declaration, a moratorium was imposed. Unfortunately, the moratorium was short-lived, as geneticists were in a hurry for commercial exploitation of genetic engineering.

The dangers arise because the genetic material persists long after the cells or organism is dead, and can be taken up by bacteria and viruses that are in all environments

This process - called horizontal gene transfer and recombination - is the main route to creating dangerous pathogens.

Genetic engineering is nothing if not greatly enhanced horizontal gene

transfer and recombination, and nasty surprises have already been sprung.

Researchers in Australia 'accidentally' transformed a harmless mousepox virus into a lethal pathogen that killed all the mice, even those that were supposed to be resistant to the virus. Headlines in the *New Scientist* editorial: "The Genie is out, Biotech has just sprung a nasty surprise. Next time, it could be catastrophic."

The lead article continued in the same vein: "Disaster in the making. An engineered mouse virus leaves us one step away from the ultimate bioweapon."

The researchers added a gene coding for an immune signalling molecule to the virus, which they thought would boost antibody production; instead, it suppressed immune responses. The researchers had previously put the same gene into a vaccinia virus and found it delayed the clearance of virus from the animals, so it may well have the same immune suppressive effects for all viruses. Imagine what would happen if this gene ever got into a smallpox virus!

More surprisingly, researchers at the University of California in Berkeley found that disrupting a set of disease-causing genes in *Mycobacterium tuberculosis*, the tuberculosis bacterium, resulted in a hyper-virulent mutant strain that killed all the mice by 41 weeks, while all the control mice exposed to the unmodified bacterium survived.

There is yet another insidious danger.

The synthetic genes created for genetic modification are designed to cross species barriers and to jump into the natural genetic material of cells. Such constructs jumping into the natural genetic material of human cells can trigger cancer .

This is not just a theoretical possibility. It has happened in gene therapy, which is genetic modification of human cells.

In 2000, researchers in the Necker Hospital in Paris, France treated infants with X-linked Severe Combined Immune Deficiency apparently successfully by isolating bone marrow cells from the patients, applying gene therapy, and then injecting the genetically modified cells back into the patients. But since 2002, 3 infants have developed leukaemia. One child has died. The foreign synthetic gene has inserted near a human gene that controls cell division, making it overactive, resulting in uncontrollable multiplication of the white blood cells.

I have only scratched the surface of the problems and hazards of genetic modification. But you can already see that there has been a massive campaign of misinformation and disinformation on the part of the GM proponents.

The greatest danger, I think, is the mindset of the GM proponents

Genetic engineering of plants and animals began in the mid 1970s under the illusion that the genetic material is constant and static and the characteristics of organisms are hardwired in their genes. One gene determines one characteristic. But geneticists soon discovered to their great

surprise that the genetic material is dynamic and fluid, in that both the expression and structure of genes are constantly changing under the influence of the environment. Geneticists have coined the term, "the fluid genome", which encapsulated this major paradigm change. The genome is the totality of all the genetic material in an organism.

The processes responsible for the fluid genome are precisely orchestrated by the organism as a whole in a dance of life that's necessary for survival. In contrast, genetic engineering in the lab is crude, imprecise and invasive. The rogue genes inserted into a genome to make a GMO can land anywhere in any form and has a tendency to be unstable, basically because these rogue genes do not know the language of the dance. Genetic engineers haven't learned to dance with life.

That is why dozens of prominent scientists from seven countries launched ourselves as the Independent Science Panel, to overcome the campaign of disinformation from pro-GM scientists who are working to promote the corporate agenda, and to reclaim science for the public good. We compiled all the evidence against GM crops as well as the evidence on the successes and benefits of all forms of sustainable non-GM agriculture. Based on this evidence, we are calling for a ban on the environmental releases of GM crops and a comprehensive shift to sustainable agriculture. I hope the Assembly will support this call!

Plenary lecture to the People's Health Assembly 2, 17-22 July 2005, Cuenca, Ecuador. For further information please visit the Institute of Science in Society website: www.i-sis.org.uk

The Independent Science Panel (ISP) is a panel of scientists from many disciplines, committed to the **Promotion of Science for the Public Good.**