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Do GMO foods cause any health related risks?



I don't believe they do but I keep hearing this from many of my friends and I would like to shut them up once and for all. If you have any studies or papers you could refer me to I would be ever so grateful.

Everything we do in life has some degree of risk associated with it. What we have to consider is whether the benefits provided outweigh the risks. I believe that in the case of genetically modified organisms, they do. The literature on this subject is vast. You ask me to provide references to silence your friends. I could provide reems. But the anti-GMO activists could also provide a selection of papers that support their arguments. It comes down to the weight of evidence, which I think is quite firmly on the "pro" side, but it takes a lot of reading and a solid understanding of the science involved to come to that conclusion. We have been consuming food with some components derived from genetically modified plants for decades with no hint of a health hazard in humans but I am not going to suggest that there aren't some contentious issues about genetic modification. Of course there are, just like with any new technology. And I'm certainly not going to say that scientists can absolutely guarantee that genetic modification of foods will have no pitfalls. Nobody can make such a guarantee. Indeed, demanding unqualified assurance about the safety of genetically modified foods is just plain naive. We don't make such demands in other aspects of life. We don't say that we will not fly in an airplane unless we are assured that it will not crash because we realize that this would be an absurd request. We fly because in our mind we know that the benefits outweigh the risks. This is also how we have to look at genetically modified foods.

First of all, let's understand that just because something may be good for Monsanto, Novartis, AstraZeneca or any other company involved in biotechnology, it isn't necessarily bad for the public. But if you listen to some

alarmists, you can get the impression that these companies are trying to foist poisons on us purely for the sake of profit. Of course, there is a buck to be made. But profits come with the production of good and useful products. No company wants to undermine its existence by marketing dangerous substances. A great deal of research has gone into genetic modification and its safety aspects. Many of the potential problems that are now being vocalized by opponents were in fact addressed long ago by the industry. The testing for allergens in modified foods has been going on since the inception of the technology. In one case, the addition of a Brazil nut gene to soybeans in order to increase the quality of the protein for improved animal feed resulted in the transfer of an allergen. In other words, someone with a Brazil nut allergy could have reacted to eating the genetically modified soybeans. But the problem was picked up in routine testing and the soybeans, which had been intended to be used for animal feed only anyway, were never marketed.

We should also note that this presents quite a different scenario from non-genetically modified food. We don't ban peanuts, or strawberries or fish because some people have allergies to these foods. And these allergies are far more prevalent than the theoretical allergies to modified foods. Indeed, it may be possible to genetically modify peanuts to eliminate the protein that is responsible for allergies.

Opponents of genetic modification suggest that we should be satisfied with the normal process of cross-breeding plants to produce improved varieties. But where is the guarantee that this procedure doesn't introduce undesired chemicals? Appropriate cross-breeding can, for example, yield plants that are more resistant to insects. And why don't insects attack them? Because these plants contain more natural toxins than other plants. Nobody knows the human consequences of eating these natural pesticides. Why are the activists not demanding that all hybrid plants, or indeed, that all plant foods be tested for natural toxins?

Let me allow for the possibility that genetically altered foods may present some yet unidentified risk. One can always conjure up some theoretical catastrophe. But let's, however, compare this to the very real benefits that genetic modification can offer. Combatting malnutrition, for one. When people think of malnutrition, they usually think of starving children. But that is not the only kind of malnutrition out there. In fact the most common kind of malnutrition in the world is iron deficiency. This can cause intellectual impairment, suppressed immunity and complications in pregnancy. There are millions of people in the world who suffer from iron deficiency anemia! Most of them subsist on rice as their dietary staple, a grain that contains very little iron, and the iron it does contain is unabsorbable because of the presence of substances called phytates. These compounds bind iron in the digestive tract and substantially prevent it from being transported across the intestinal wall into the bloodstream.

Genetic modification has resulted in a variety of rice that has more iron. This was accomplished by inserting a gene isolated from the French bean into the DNA of the rice. This particular gene codes for the synthesis of a protein called ferritin, which is an iron storage protein. In other words, the rice now can incorporate more iron from the soil. Furthermore, another gene, this time from a fungus, which codes for an enzyme that breaks down phytates was also incorporated thereby making iron more available.

Populations that subsist on rice also suffer from vitamin A deficiency. That's because rice is very low in beta-carotene, the body's precursor for vitamin A. Deficiency of this vitamin is a major cause of blindness in the developing world; it is estimated that some 250 million children have vitamin A levels low enough to cause impaired vision. Lack of vitamin A also predisposes to various cancers and skin problems.

This problem was addressed by introducing into rice four genes which code for proteins that enhance beta-carotene synthesis, two from daffodils and two from a bacterium. The rice is yellow, clearly demonstrating that it is now fortified with beta-carotene. Experiments are under way to cross the iron-rich rice with the beta-carotene-rich rice to produce a variety of super rice that can alleviate nutritional problems that affect billions of people!

There are many other fascinating possibilities. How about genetically modifying foods to contain higher levels of cancer-fighting compounds such as sulphoraphane found in broccoli? Or fresh fruits and vegetables with improved shelf lives? Edible vaccines? Crops that will flourish in salty soil? All realistic possibilities.

But I can hear the critics' minds churning away. Why am I not talking about Monarch butterflies being killed by corn that has been engineered to contain a gene from the *Bacillus thuringiensis* (Bt) bacterium to protect it against the European corn borer? Or the possibility of weeds developing resistance through cross pollination from crops that have been genetically engineered to be herbicide resistant? Or a study that claimed rats fed genetically modified potatoes developed gastric problems? Simply because in my judgement, based on the available scientific literature, these concerns have been addressed and either found to be unrealistic or solvable. Surrounding a corn field with a few rows of non-Bt corn, for example, minimizes the Monarch butterfly problem.

Genetic modification is a hugely complex scientific, economic, political and emotional issue. This certainly is not my last say on the subject. Maybe I'll even have to eat crow some time. But by then we'll probably have a genetically modified version that is nutrient filled and highly palatable. I don't believe they do but I keep hearing this from many of my friends and I would like to shut them up once and for all. If you have any studies or papers you could refer me to I would be ever so grateful.

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Joe Schwarcz

Tags: [genetic modification](#), [GMO foods](#)

Published by Alexandra Pires-Ménard on November 11, 2012 at 1:23 PM under [Health](#), [You Asked](#), [0 comments](#).

[Are the claimed health effects of zeolites a hoax?](#)



In one word, yes. “Zeolites” are promoted on the web as “detoxifying agents,” enhancing our chance for longevity. One company claims that zeolites are the answer to surviving the “World’s Toxic Crisis.” It’s website tells us that over 70,000 chemicals are dumped into the environment by industry, 65,000 of which are potentially hazardous, and that all of us, of any age, have enough toxic chemicals inside our bodies to cause constant DNA damage. Also, because of the nuclear accident in Japan we have soaked up radiation. And they have the answer to this onslaught. Let me quote directly: “ETS Zeolite is the best way to reverse heavy metal toxicity! It removes ammonia, pesticides and other chemicals from the body. It is the single most effective means of removing radiation from the body. ETS Zeolite will safely remove thousands of toxins from your body.”

So much for the flagrantly nonsensical claims. Let’s get down to the science. Zeolites are real and do indeed have some interesting uses, none of which involve “detoxifying the body.” The name “zeolite” derives from the Greek words “zein” which means “to boil” and “lithos” for “stone.” So, zeolites are “boiling stones.” It was way back in 1756 that the Swedish mineralogist, Baron A. F. Cronstedt, noted that certain rocks seemed to boil when heated with a flame. These minerals had crystallized in the presence of water which they retained in pores, or channels in their crystal structure. Upon heating, the water boiled out. But water can also be reabsorbed by dry zeolites which are therefore widely used as anti-fog agents in double and triple glazed windows. Zeolites can also trap a variety of other molecules in their porous internal structure.

A large variety of natural and synthetic zeolites exist. They are all essentially “aluminosilicates” meaning that they are composed of aluminum, silicon and oxygen. These elements constitute the crystal framework and their specific relative abundance and bonding pattern determine the size of the “channels” that permeate the crystal. Some zeolites can preferentially trap nitrogen and can therefore be used to separate the oxygen and nitrogen components of air. Others can exchange sodium ions trapped in their structure for calcium and magnesium and thus remove these from water. This is known as “water softening” and accounts for the widespread use of zeolites in detergents. If the mineral content of water is high, detergents do not work well. The right pore size zeolite can even remove undesirable compounds such as methyl mercaptan that can taint instant coffee. This objectionable skunk-like smell is just one of the 700 odd compounds in coffee fragrance. But it yields to the right zeolite! Various other organic compounds responsible for smells are also absorbed by zeolites, so powdered zeolites are

used to combat some nasty smells. Ethylene, the gas released by ripening fruits, can also be absorbed by these chemicals. Special bags for storing fruit can be impregnated with zeolites to prevent some overly ripe fruits from stimulating ripening in neighbouring fruits. Indeed the release of ethylene is why one rotten apple can spoil a whole barrel.

Speaking of rotten apples, promoting the ingestion of zeolites for detoxifying the body is balderdash. This is a classic case of scrounging up a bit of real science, in this case the absorption properties of zeolites, and stretching the facts in a stupefying, meaningless fashion for monetary gain. Implying that zeolites can remove radiation from the body is ludicrous. "Radiation" is not some substance that can be removed. Unfortunately such gobbledygook can't be removed from the web either. While zeolites can't detoxify a body, they can do some unusual things. Researchers have discovered that while young roosters are up to mating many times a day, older ones slack off. But incorporating a type of zeolite into feed enhances a rooster's desire to mate. I suppose it can then crow about the benefits of zeolites. Maybe I shouldn't even be mentioning this. It might give some quacks an idea about promoting zeolites in yet another imaginative way.

Joe Schwarcz

Tags: [detox](#), [zeolite](#)

Published by Alexandra Pires-Ménard on November 10, 2012 at 9:49 PM under [Quackery](#), [You Asked](#). [0 comments](#).

[Why are bees vanishing?](#)



Maybe it's a virus. Maybe a fungus. Maybe parasitic mites. Maybe pesticides. Maybe electromagnetic radiation from cellular phones. Nobody seems to know what is causing bees to just vanish. Bee keepers are certainly alarmed. In some cases as many as 80% of their bees just suddenly vanish! There are no dead bees around the hives, no signs of what could have happened. It seems as if the bees left for a normal day of work, looking for nectar, and just never returned. This "colony collapse disorder," as the sudden decline in bee population has been christened, is not only catastrophic for the affected bee keepers but potentially for all of us. Why? Because if the bees go, a significant part of our food supply can follow. About one third of it, mostly fruits, vegetables and nuts, can be directly traced to pollination by bees. This bizarre vanishing act is happening not only in North America but in Europe as well. One possible cause is the varroa mite, which has spread around the world from Asia. It sucks the bees' blood until they die. Indeed, back in the 1980s, a mite wiped out about half of the North American bee population but the current disappearance of the bees doesn't seem to fit the same pattern. No specific viral or fungal infections have been noted in the remaining members of the collapsing colonies either. Some researchers now suspect that pesticide poisoning may be at the bottom of this problem. Specifically, pesticides in the neonicotinoid family.

Nicotine, extracted from the tobacco plant has a long history of use as an insecticide. But it is toxic to mammals as well as to insects. A search for compounds with similar activity but less mammalian toxicity led to the neonicotinoids, which interact with receptors in the nervous system of insects, causing eventual paralysis and death, but do not affect mammals or invertebrates like earthworms. These compounds turned out to be excellent insecticides in terms of safety and efficacy, widely used to protect corn and soybean seeds against the likes of beetles, maggots and grubs. But now there is concern that if the bees are exposed to pollen contaminated with

these chemicals at low levels, they may not die, but their memories may be affected. Young bees leaving the hive on their orientation flights may not remember the location of their hive and may get lost, never to return. But that is just a theory. As is the one about cellphone signals causing the bees to become disoriented and lose their way. Answers to the mystery of the disappearing bees may finally come from researchers looking into the way certain genes are expressed in the surviving bees. If a pesticide is involved, genes that code for detoxicating enzymes will be more active, if a virus or fungus is the culprit, genes related to the immune response will be over-expressed. But for now, we just don't know. And where science leaves a void, the nuts fill it. The pattern of disappearance fits the pattern of alien abductions, one UFO devotee informed me. Apparently when he himself was kidnapped by aliens he heard a strange buzz inside the spaceship. Sounded like bees, he says.

Tags: [bees](#), [pesticide](#)

Published by Alexandra Pires-Ménard on November 2, 2012 at 12:33 AM under [Toxicity](#), [You Asked](#). [0 comments](#).

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Published by OSS on July 11, 2012 at 4:25 PM under [Health](#). [0 comments](#).

[Resistance to 2,4-D Resistant corn and soy](#)

Get ready for a new controversy. Corn and soybeans that are genetically engineered to resist the weed killer 2,4-D are heading for approval. And they are also heading for an onslaught of opposition from activists and some farmers. The idea of genetic modification for herbicide resistance is not new. Corn, soybean, canola and cotton growers in North America have been using Monsanto's "Roundup Ready" seeds for years. Previous to the introduction of this technology large amounts of chemicals had to be applied to plowed fields before seeding to eliminate weeds. With Roundup Ready crops there is less need for plowing, reducing soil erosion. After seeds are planted, application of glyphosate, the chemical name for Roundup, wipes out the weeds. Furthermore glyphosate has a better toxicological profile than most other herbicides.

But a problem has emerged, one that was actually foreseen. Some weeds have become resistant to glyphosate. This is not a consequence of genetic modification, it is a consequence of biology. Plants will eventually develop a resistance to any herbicide or pesticide. In the southern US, pigweed (Palmer amaranth) has developed resistance to glyphosate and farmers now have to resort to the expensive process of hiring workers to pull out this weed that is overrunning cotton fields by hand. The answer to the problem, farmers hope, lies in Dow Chemical's 2,4-D resistant cotton. Dow's new fangled seeds contain a gene from a soil bacterium that codes for a protein that decomposes 2,4-D into harmless chemicals. Basically, the idea is to replace crops that have become resistant to glyphosate by crops that are resistant to 2,4-D. This is a similar game to the one that we are forced to play with antibiotics. When microbes become resistant one, as they always will, we have to look for an alternate substance.

In this case, the issue, at least in some eyes, is that 2,4-D is not as safe as glyphosate. It is also saddled with the curse of having been one of the components in "Agent Orange," the infamous defoliating agent used during the Viet Nam war. It is true that 2,4-D was part of Agent Orange, but the health problems attributed to Agent Orange were caused by the notorious tetrachlorodibenzodioxin (TCDD), a contaminant in 2,4,5-T, the other component of Agent Orange. 2,4-D has actually long been used by farmers, as well as by the lawn care industry, to control weeds, albeit not without controversy. Some have suggested a link to lymphoma and endocrine

disruption but numerous investigation by various regulatory agencies have failed to support this. Recently the Environmental Protection Agency rejected a petition from the Natural Resources Defense Council to remove 2,4-D from the market on health and safety grounds.

Still, people worry that the introduction of 2,4-D resistant seeds is going to dramatically increase the use of the chemical. There is also concern that 2,4-D has a greater drift potential than glyphosate. So a farmer growing crops that are not resistant to 2,4-D may see his yield decrease if there is drift from a neighbouring farm. Dow Chemical contends it has developed technology to reduce drift. But no matter what safe guards are introduced, there will be opposition, much of it emotional. People don't want what they are labeling as "Agent Orange crops" and are expressing their opinion through petitions. They will likely also oppose Monsanto's new soybeans, corn and cotton that are resistant to the herbicide dicamba. Of course they will oppose anything that is introduced by Monsanto.

Joe Schwarcz

Tags: [Agent Orange](#), [corn](#), [genetic modification](#), [issues](#), [Monsanto](#), [soybeans](#)

Published by OSS on June 5, 2012 at 12:05 PM under [Environment](#), [Health](#), [Technology](#). [0 comments](#).

[Pesticides in Organic Produce](#)

You've heard of a tempest in a teapot. This is a hurricane in a thimble. I'm talking about a study carried out by Canada's Food Inspection Agency that found pesticide residues in organic produce. Consumers were scandalized. Their expensive organic food tainted with pesticides! The very chemicals they were trying to avoid because, as everyone knows, pesticides cause cancer! Alright now, let's just take a deep breath here and examine what this finding by CFIA really means. First of all pesticides in the amounts found as residues on produce do not cause cancer. If they did they would not be allowed by the Pesticide Management Regulatory Agency.

PMRA is extremely safety conscious and loads of safety data are required before a pesticide is allowed to be used. Yes, some pesticides in high doses can cause cancer in test animals. But so can a host of other chemicals we are exposed to in our daily life. Starting with alcohol, a potent carcinogen. And there are many naturally occurring compounds in food that can cause cancer at some dose. Psoralens in celery, aflatoxins in various moulds and all sorts of naturally occurring compounds of arsenic, chromium and selenium cause cancer at some dose. So equating pesticides with carcinogens is incorrect. When it comes to pesticide residues the question to ask is not whether they are there or not, because with our sophisticated techniques these days we can detect unbelievably small amounts.

The question to ask is whether the residues are in violation of the maximum allowed levels, which you have to remember have a huge safety margin built in. The fact is that it is extremely rare in conventional produce to have any violation, with the vast majority of tests barely detecting any residue at all. Of course people buy organic because they don't want any pesticide residues at all. Whether that is rational or not, organic is what they are paying for. And they may not always be getting it. The CFIA survey showed that for example some of the organic apples tested had residues of the fungicide thiabendazole to the extent of 0.03 ppm. That is an incredibly small number. It is even minute compared with the 0.4 ppm found on conventional apples, which itself is well below the safety level.

Any press report that suggests the finding of pesticides on organic produce presents a risk is misleading. But why should there be any residue on organic produce. Various reasons. Sometimes conventional produce is fraudulently sold as organic because profits are so lucrative. Sometimes pesticides may drift from a neighbouring farm. Sometimes there can be cross-contamination from conventional produce during shipping. Basically this

story about pesticides being found on organic produce amounts to nothing more than a testimonial to the abilities of analytical chemists to detect vanishingly small amounts of chemicals. Remember, though, that presence of a chemical does not equate to the presence of risk. It is always a question of amount. Granted, someone who is buying organic should be getting what they are paying for, so it would be helpful to have a national organic inspection system. Right now we basically rely on an honour code when a farmer claims to be growing organic crops. That's not good enough.

Tags: [chemical](#), [organic](#), [organic produce](#), [pesticide](#), [science issues](#)

Published by OSS on March 22, 2012 at 7:22 PM under [Science, Science, Everywhere](#). [0 comments](#).

[Methyl Iodide](#)

Now it's toxic strawberries from California! "Will strawberry shortcake be known for causing cancer, birth defects and miscarriages," asks a widely circulating article on the web. Well, no. Not unless you make a habit of eating that shortcake in a strawberry field that is being fumigated with methyl iodide. What we are being subjected to here is yet another case of some chemically ignorant person taking a legitimate concern and twisting it into an unrealistic and naive warning.

The claim is that since California has recently approved the use of "toxic" methyl iodide on strawberry fields, eating the berries will endanger health. The truth is that there is absolutely no reason to worry about methyl iodide in strawberries for the simple reason that there isn't any there! This is not at all to say that there is no concern about the use of methyl iodide. It is certainly a toxic substance. That of course is the reason it is used as a fumigant.

Let's backtrack a little. Soil may look dead, but it is actually teeming with life. Bacteria, fungi, insects, nematodes and a variety of weed seeds lie in wait to harass any crops that are planted. Conventional agriculture deals with this problem by treating the soil with fumigants before seeds are planted. The classic fumigant used to be methyl bromide, a gas that was pumped into the soil to kill microbes and weed seeds. But methyl bromide was eventually found to be an ozone depleting gas and its use was banned by the Montreal Protocol. One of the candidates for replacement was methyl iodide because of its chemical similarity to methyl bromide. Unlike methyl bromide, it's a liquid, which actually makes it easier to apply to the soil. It can be easily spread and the prevented from evaporating by covering the soil with a tarp. Furthermore, methyl iodide is too unstable to make it to the upper atmosphere and damage the ozone layer. On the other hand, the compound can leach into waterways.

The Environmental Protection Agency in the U.S. approved methyl iodide for use as a fumigant in 2007, but not without controversy. Methyl iodide is actually more toxic than methyl bromide and a number of scientists as well as environmental groups were opposed to the use of this chemical as a fumigant. It is known to interfere with thyroid function, it is alleged to cause developmental problems, and California classifies it as a carcinogen. While there is no evidence it causes cancer in humans, its chemical reactivity suggests that it can react with and disrupt the structure of DNA, which suggest a possible mechanism for carcinogenicity. EPA, however, concluded that if handled properly, with workers using protective clothing and respirators, methyl iodide can be safely used. ([more...](#))

Tags: [issues](#), [strawberries](#)

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[Pesticides in Utero](#)

Can the decline in rational thinking that we seem to be experiencing these days be due to pesticide exposure while we were in the womb? That may not be as harebrained as it sounds. A number of recent studies have explored this possibility by measuring levels of organophosphate pesticides either in the urine of pregnant women or in umbilical cord blood and administering various intelligence test to their offspring.

Organophosphates are a common family of pesticides and function by inhibiting the action of an enzyme that breaks down the neurotransmitter acetylcholine. So essentially they kill by overstimulating nerve activity in insects. Since human nerves also use acetylcholine as a neurotransmitter, organophosphates can be expected to interfere with the workings of our nervous system as well. And brain activity of course depends on how nerve cells communicate with each other.

In one study urine from pregnant women in a farming community was collected and analyzed for organophosphate content. The same was done for their children at 6 months of age, as well as at 1, 2, 3.5 and 5 years. When the children turned seven, intelligence tests were administered. The higher the pesticide level in the mother's urine, the worse the offspring performed in terms of working memory, processing speed, verbal comprehension, perceptual reasoning and IQ. The differences were not great, but statistically significant. Remarkably, there was no correlation with pesticides in the childrens' urine, suggesting that the pesticide effect occurs during pregnancy.

Another study examined the effects of chlorpyrifos, an organophosphate, on inner-city children whose mothers were exposed. Levels of the chemical were measured in umbilical cord and again intelligence tests were performed at seven years of age. Again there were small declines in IQ and working memory with an increase in chlorpyrifos in umbilical blood. Yet a third study examined prenatal maternal blood for organophosphates as well as for the presence of paraoxonase, a key enzyme in the metabolism of organophosphates. In this case too, cognitive development was affected in parallel to increased blood levels of organophosphates and furthermore there was a genetic involvement. Children of mothers who carried a gene that imparts slow activity to the enzyme that helps break down organophosphate were more affected. ([more...](#))

Tags: [issues](#), [pesticides](#), [uterus](#)

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