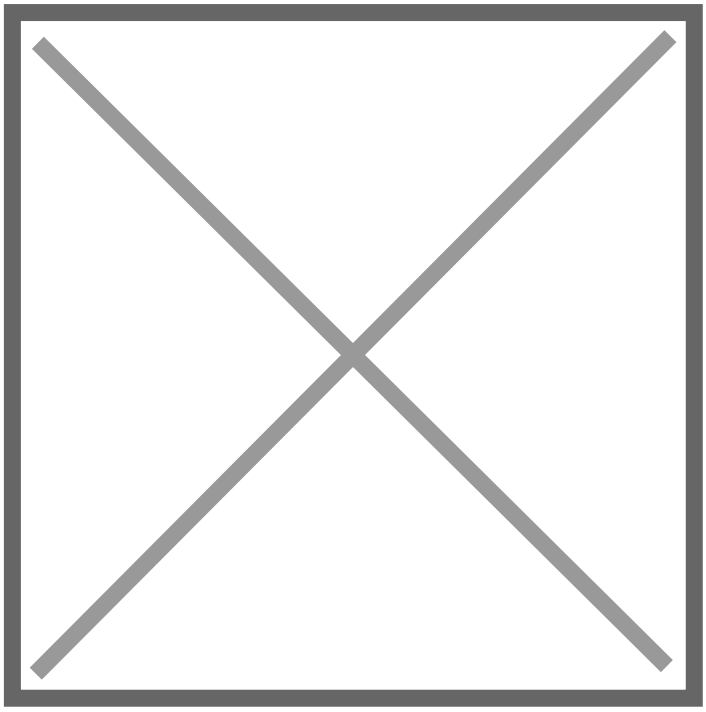
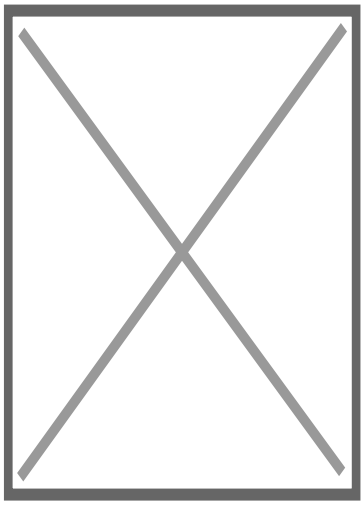
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GE food not more allergenic than the counterparts

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Allergy is an abnormal state of hypersensitivity of our body to normally innocuous substances in food, medicine or the environment. Allergy is neither new nor universal. It is not an infection that would spread. Each one of us suffer from intolerance of, or allergic reactions to, one or the other element in our environment or certain foods or drugs. Nevertheless, there is no single substance that causes allergy to us. Allergies affect millions of people and cause several deaths globally every year.

Atmospheric pollen, dust mites, animal dander, insect stings, molds, latex, cosmetics, fragrances and several others in a day-to-day contact may cause reactions in people.

Walnuts, pecans, Brazil nuts, cashews, peanuts, soybeans, some varieties of rice and wheat, cucumbers, mushrooms, fish, shellfish, eggs, milk, mother's milk, some vegetables and fruits, and drugs like penicillin and aspirin, may cause intolerance or even true allergy in certain individuals.

There have been cases where people have developed reactions to foods they have been eating for decades. To some, this happened when they shifted to a new place of residence, which did not revert when they moved back to the old place, showing that environmental influences are not necessarily the cause of the problem. But most allergies disappear as mysteriously as they appear.

While there are no reliable data on food allergies in the developing countries. In the US, five to eight percent of the children and one to two percent of the adults are prone to true allergy from some kind of food. Children as they grow may overcome their sensitivities to certain food items, but the sensitivities acquired in adulthood would not go easily. Therefore, such people have to avoid food they are allergic to.

In a classroom comprising several children of diverse genetic backgrounds but of the same age group, one or the other would be sensitive to one or the other food item. Sensitivity to eggs, fish and nuts is common. As children share their lunch at school, it isn't easy for parents to decide on what food they can pack without risking sensitive reactions from any of their child's friends. The greater and unanticipated risk is from inadvertent or accidental servings of offending foods.

In case of highly sensitive individuals, even 1/44,000 of a peanut kernel may pose a threat to his/her life. Nevertheless, there wasn't any simmer of protest against marketing any of the many conventional foods, which are established as severely allergenic to certain individuals.

Risk of allergy from GE crops

Risk of allergy from genetically engineered (GE) crops and food is projected as a major biosafety issue, stemming from baseless allegations.

A gene for the Brazil nut protein was introduced into soybean to increase the content of methionine, an essential amino acid which the human body does not synthesize. The serum from people allergic to Brazil nuts cross-reacted with extracts of transgenic soybean and not with extracts of its isogenic, which links the problem to Brazil nut proteins and not the soybean. Though no one actually developed allergy by eating the transgenic soybean which was never released for public consumption, since the transgenic is likely to affect people who are allergenic to Brazil nuts, Pioneer Hi-Bred International, the developer of the product, did not proceed with it, an example of self-regulation.

The Bt Cry 9c protein in the Aventis Starlink Bt corn controls the European corn borer. Cry 9c protein binds to the pest's gut at a site different from that of the Cry 1 proteins, and so would be effective even if the pest develops some resistance to Cry 1 proteins. Cry 9c protein was found to be slightly more stable in simulated digestion than other Bt proteins, and so it was thought that it might be allergenic. The United States Department of Agriculture (USDA) cleared the Cry 9c transgenic corn for use as both food and feed, but the US Environment Protection Agency (EPA) took a precautionary measure and approved this corn only for animal feed, as animals do not generally suffer from food allergies. Bt Cry 9c protein was never demonstrated to be allergenic. The US Centers for Disease Control (CDC) tested samples of blood from 17 people claimed to have developed allergenic reactions to Starlink and found that none of the blood samples showed cross-reactivity to Cry 9c protein. The Cry 9c gene is not deployed in any commercial product now. Since transgenic products approved as the only feed may get into the food products, as has happened with Starlink Bt Cry 9c corn that appeared in Taco Bell taco shells, no transgenic is now approved exclusively for use as feed. This shows that the regulatory regime is in fact vigilant.

Ignoring the scientific background of food allergies, and the fact that the two questioned transgenes are neither allergenic nor deployed in any product, these two cases are repeated
ad nauseam to make the world believe that all GE foods are allergenic and to repeatedly demand a blanket ban on GE food. In India, the charge was made against Bt cotton, though not a food crop. Even while Bt brinjal is still in multi-location open–field trials and not available for public consumption, it is being projected as allergenic, trashing voluminous evidence that Cry 1Ac protein is not allergenic which was also confirmed during biosafety testing on Bt brinjal by Intox at Pune and Rallis at Bangalore.

Immunological basis of allergy

The term allergy is used very loosely, and most people seem to have no idea of what it actually implies. True, allergy involves the immune system. Often food allergy is not differentiated from other types of adverse non-immunological reactions to food. Since the public fears allergy, it is being exploited to whip up fear against GE food.

Mammalian systems produce four different classes of immunoglobulin proteins (Ig), the antibodies, in response to the presence of hazardous alien proteins (called antigens) that enter the body system through food or pathogens. Vaccines contain antigens (of cholera or smallpox or other pathogens) and vaccination prepares the body into producing antibodies against specific pathogens. The antibodies bind to the antigens when encountered in the body system affording the most valuable means of our body's defense.

The IgM antibodies form first, but both the quantity and importance of the later formed IgG antibodies is far greater. IgG antibodies are the most important body defense system. They bind to the antigens neutralizing them. While IgA antibodies are specifically involved in the defense of the oral cavity, the function of IgD antibodies is not very clear.

For some poorly understood reasons, our immune system also produces another class of antibodies, the IgE, in response to a few proteins, which through a complex sequence of cascading biochemical events lead to true allergic reactions, manifesting as skin rashes, intestinal inflammation, cramps and diarrhoea or respiratory disorders. This process is anaphylaxis, on record since 2641 BCE, which varies in different individuals from mild and annoying to life threatening. The active compounds, triggered by IgE involvement, such as histamine, are mostly inflammatory agents that get into the blood stream making the problem systemic when different areas of the body are affected at the same time. Some similar reactions do not involve the IgE antibodies (anaphylactoid reactions), but nonetheless cause health hazards.

Some non-protein compounds, like penicillin and aspirin, may also cause severe reactions; these agents called haptens must bind to an endogenous carrier protein to cause the
symptoms.

Diagnosis of allergy

Identifying an allergen is a long drawn process. For each individual, list of suspected sources allergens is drawn and through a dermal prick test, the possibilities are narrowed down by eliminating those that do not cause any reaction at the test site on the skin. Identification of the offending substance and demonstrating that it is true allergy involving IgE antibodies is done through an enzyme-linked immunological assay procedure.

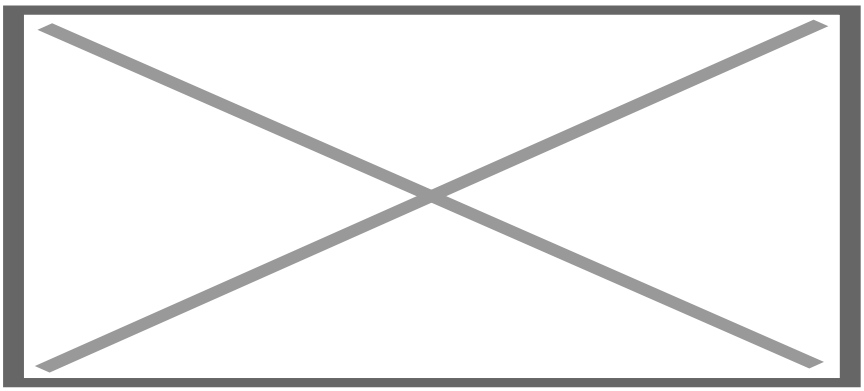
Treatment of allergy

The best way to avoid allergy is to avoid contact with the allergen, identified based on each individual's
experience.

Repeated exposure to small quantities of an allergen over a long period of time results in higher and higher titres of IgG antibodies, which in course of time would be adequate to neutralize the allergen before it had a chance to elicit IgE antibodies. This is how we overcome allergies naturally, otherwise allergies are clinically treated (immunotherapy). This slow process has

worked well in treating environment-based allergies, and its success has just been demonstrated with peanuts on children who earlier developed strong reactions on eating even small quantities.
While there is no assured treatment to cure allergies, anaphylactic reactions are treated using anti-histamine or steroid drugs.

Allergenic potential of foods
Protein that is degraded by the gastric enzymes before reaching the intestine is very unlikely to cause allergy. This has been the basis to investigate a protein further for its allergenic potential.



Based on voluminous data on the biochemistry of over 200 known allergenic proteins, tests have been developed to identify potential food allergens. It is now understood that only certain short stretches of amino acids (the components of proteins) constitute allergenic sites. These identified sites, not the whole protein, trigger the production of IgE antibodies. A consensus document on the biosafety of Bt in crops (Organization for Economic Cooperation and Development, July 2007), records that none of the Bt proteins deployed in crops, including Cry 1Ac, Cry 1Ab, Cry 2Ab and Cry 9c, share similar amino acid sequences with known proteinaceous food allergens. So far, no allergenic reactions have been reported during extensive biosafety tests on GE crops in several countries or on consumption of foods from GE crops for more than a decade.
Transgenic crop varieties are substantially equivalent to their isogenics, except for the protein coded by the transgene. The risk of allergy needs to be considered when a GE food or drug contains new protein(s), coded by the introduced genes, but not present in the isogenic variety. For example, the Bt protein in the Bt potato tuber is new. Now this protein is known to be safe for human consumption. Similarly, the iron carrier protein ferritin, whose gene from bean or soybean is being introduced into rice to enhance its iron content, is not allergenic.
If a gene product in the non-transgenic (isogenic) variety were an allergen, it would be so in the transgenic as well. Proteins that are normally not allergenic will not suddenly become allergens in a transgenic plant. Whether a particular protein is allergenic or not, depends more on the consuming individuals rather than on the protein itself. This makes identification of allergenic proteins quite tricky. The remote possibility that Bt crop foods might sporadically cause allergenic reactions in a few individuals, in spite of voluminous evidence to the contrary, cannot be the reason to dump the whole technology which is otherwise beneficial in a number of ways.
It is near impossible to test for all the antigens and haptens in a product for the potential of allergy. Even so, scientists have not been complacent and every new protein in a transgenic food or feed is examined for allergenicity. In fact, among all the foods we consume, the GE foods are the most thoroughly tested for allergenicity and toxicity.
Concern for public safety is very essential, but spreading fear on political compulsions and exploiting ignorance, is scare mongering. What we need is a rational attitude with concern for the larger benefits of the larger sections of the society, and not irrational blanket bans on the entire technologies. No one ever said that the production of any of the large number of conventional foods known to cause severe allergies in a few people should be stopped.