SLMNA NEWSLETTER

SRI LANKA MEDICAL NUTRITION ASSOCIATION OFFICIAL NEWSLETTER

Linking nutrition research to practice...

THIS MONTH'S FEATURED ARTICLES

- Capture of the Month
- Article of the Month
- Influence of Dietary Intake during Pregnancy and Breastfeeding on allergic disease outcome in Offspring
- Food of the Month
- Genetically Modified Foods
- Past Events
- Upcoming Events

Message from editors...

Nutritional Genomics

Dear Readers,

The interaction of genetics and environment determines the etiopathogenesis of any disease. Genetics determines the susceptibility of an individual to disease while environmental factors determine who among these susceptible will develop the disease, which is important, especially in non-communicable diseases.

It is considered that diet and nutrients are the most influential environmental stimuli. Nutrients in a specific quantity are necessary for optimal health. Nutrients interact and modulate varying underlying molecular mechanisms related to various physiological functions at three levels: genome, proteome, and metabolome.

Genetics is the study of genes which are inherited molecules. They are transferred from generation to generation. Genes manage to make the proteins in our bodies and decide differences among each other. Humans have around 20,000 to 25,000 genes. In 2000, the human genome project sequenced and outlined the first comprehensive map of human genetic makeup. Even though humans are similar in genetics, we all have slight differences in our genetic blueprints due to single nucleotide polymorphisms (SNPs) that make each of us unique. These variations determine both the effect nutrients have on our bodies and how we metabolize the food that we eat.

Nutritional genomics combines the study of nutrition and genetics to discover the different ways people respond to food based on their genetic makeup. Nutrigenetics and nutrigenomics are closely associated but two different areas of nutritional research. Both fields involve the study of the implication between nutrition, metabolism, and genetic mechanism.

Nutrigenomics defines how the diet acts on genes and changes gene expression which is seen in cancer and other non-communicable diseases. It studies how people with different genetic makeups are affected by different foods. This emerging field brings the goal of implementing personalized nutrition advice and developing functional foods that will optimize health according to individual needs.

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Message from editors...

Nutritional Genomics

Nutrigenetics explains how genes affect the diet which is generally notable in illnesses like phenylketonuria and lactose intolerance.

There are important factors to be considered regarding nutritional genomics. We have to recognize diet as a significant risk factor for certain diseases in some individuals. And also, ordinary dietary nutrients can act on the human genome, to change gene expression or structure. The extent to which diet affects the balance between healthy and disease circumstances may depend on an individual's genetic makeup. Most diet-governed genes perform a task in the onset, progression, and acuteness of chronic diseases. Therefore "personalized nutrition" can be used to prevent, less severe, or cure chronic diseases. A personalized diet can help us to know the right nutrient to take or avoid those that may potentially harm our health

Until next time,

Dr. Gayathri and Dr. Nishanthika

JUNE 2023 | VOLUME 9 | ISSUE 3

CAPTURE OF THE MONTH

“ Be like a flower. Survive the rain. But use it to grow..."

Influence of dietary intake during pregnancy and breastfeeding on allergic disease outcome in offspring

Dr. Rammiya Sivarajasundaram

Allergic diseases

Allergy is referred to as an immediate hypersensitivity reaction initiated by the development of allergen-specific IgE antibodies by immunologic mechanism. The substances causing allergies are known as allergens and are found in dust mites, pets, pollen, insects, foods, and some medication. Allergic diseases mainly include asthma, atopic dermatitis, allergic rhinitis, and food allergy. Many factors influence the development of allergic diseases such as an individual's genetic background, contact with allergens, and environmental factors.

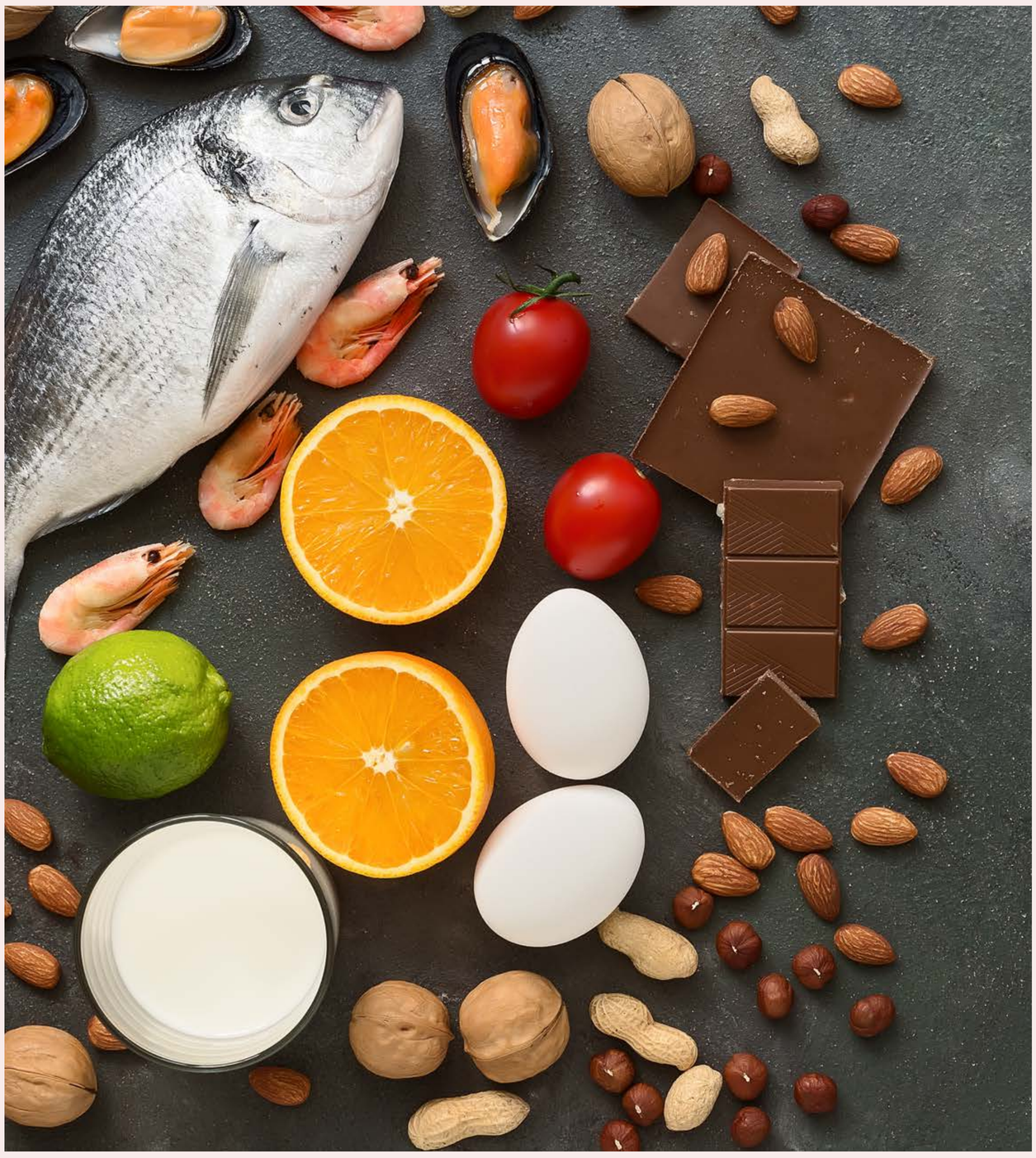
The prevalence of allergic disease increased worldwide over recent years. Allergic diseases are a burden not only to the individual but to the whole family. Therefore, it is beneficial to prevent allergic diseases at the primary level by proven recommendations.

It is known that allergic disease is strongly influenced by genetics hence allergic diseases tend to run in families. Children who have at least one first-degree relative (either parent/ sibling) with allergic conditions are considered to have a high risk of developing allergies.

Foods that are considered to be highly allergenic according to the American Academy of Allergy, Asthma, and Immunology are cow's milk, soy, egg, wheat, fish, peanut, tree nut, and shellfish.

Maternal avoidance of allergenic foods during pregnancy and lactation

There is a belief in society that maternal avoidance of allergenic foods during pregnancy and breastfeeding prevents the child from developing allergic diseases and it has been followed by many people. The foods commonly avoided during this time are egg, fish, crab, prawn, cow's milk, soy, vegetables such as brinjal, and tomato, and fruits such as pineapple. However, it is not proven that avoidance of these foods during pregnancy reduces the incidence of allergic disease in the offspring and this practice is no longer recommended.



The avoidance of cow's milk, egg, and animal products such as fish, vegetables, and fruits will compromise the nutrition of the mother

Avoidance of allergenic foods during lactation also does not have benefits as per evidence and it is not recommended. But in some cases, for example, if a child shows symptoms of allergy during breastfeeding as an option mother may try avoidance of allergenic foods for a particular period and observe the progression of symptoms. In such instances, if a mother wants to avoid certain foods during pregnancy or lactation, she needs to consult a nutritionist regarding her diet.

Breastfeeding and the introduction of complementary feeding

In addition to anti-inflammatory and anti-microbial factors, breast milk contains immunomodulatory agents and oligosaccharides. These oligosaccharides promote the growth of beneficial bacteria in the colon, especially bifidobacteria.

Short-chain fatty acid (SCFA) oligosaccharide metabolites stimulate the regulatory T lymphocyte maturation and promote oral tolerance, systemic metabolic, and anti-inflammatory effects. Therefore, breast milk improves natural defence and immune regulation.

The American Academy of Allergy, Asthma and Immunology (AAAAI) and the Australian Society of Clinical Immunology and Allergy (ASCIA) recommend exclusive breastfeeding for at least four to six months and Continue breastfeeding until as long as desired by mother and baby. There is evidence to support that continuing breastfeeding while introducing complementary foods can reduce the development of food allergies. According to available evidence, exclusive breastfeeding for the first six months reduces the incidence of atopic dermatitis in children less than two years, reduces the early onset of wheezing in children less than four years, and reduces the incidence of cow milk protein allergy in the first two years of life. Evidence is not sufficient regarding the effect of breastfeeding in the prevention of allergic rhinitis.

Consequences of inadequate fluid intake in the elderly

American Academy of Pediatrics recommends delaying the introduction of complementary feeding for at least 4 months of age. But WHO recommends exclusive breastfeeding up to 6 months of age and better to start complementary feeding by the completion of 6 months of age unless there is an indication. Currently, available evidence has not proved that delaying complementary feeding will prevent allergic disease in infants. At the same time, it is evident that delaying the introduction of highly allergenic foods into an infant's diet increases the chance of developing allergic disease. These general guidelines and suggestions are not suitable for each patient, for example, a child with an established food allergy. In such instances, it is advisable to seek advice from a paediatrician or immunologist. During complementary feeding, one single ingredient food should be introduced at a time, and after three to five days only the next food should be introduced. By this parents or caregivers can easily identify the food which causes allergic reactions

All foods can be given to the child irrespective of allergenic properties. But there are some suggestions regarding the introduction of highly allergenic foods.

1.Foods can be introduced one by one into a child’s diet at home. Better to avoid new food introduction away from home for example restaurants.

2.Parents or caregivers should be educated regarding the symptoms and signs of allergic reactions.

If the child did not develop any reaction to a particular food it can be gradually introduced into the child’s diet

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Genetically Modified Foods

By Dr. K. Nishanthika

GMOs are “Organisms (i.e. plants, animals or microorganisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating and/or natural recombination” according to WHO. GM foods are produced from genetically modified organisms.

Currently, the GM crops cultivated across the world are GM corn, GM canola, GM cotton seed, and GM soy mainly. Other than these, there are GM sugar beet, papaw, apple, squash, and milk products made from GM bovine growth hormone.

The genome decides the characteristics of every organism. This genome can be modified in such a way that a gene or genetic material responsible for a favourable trait can be integrated into another host organism to transfer this particular trait.

How are Genetically Modified Foods produced?

There are three ways to modify the genes

1.Directly transfer the DNA

The DNA from the donor organism is coated on gold or tungsten microparticles. These particles are accelerated to high velocity and bombarded to target tissue in the form of embryonic tissue from seeds. Similarly, electroporation which allows the negatively charged DNA to travel along the electric potential gradient can also be used to deliver DNA into host cells.

2.Transfer of DNA indirectly

Here a bacterium vehicle is used to transfer donor DNA into host DNA. Agrobacterium tumefaciens is an organism that has the capacity to transfer genes into host DNA via the Ti plasmid. The gene with the desired trait is identified and isolated and then transferred into bacteria. The bacterial cells then transfer the DNA into plant cells. This DNA can be taken into plant DNA leading to the expression of the new trait by the host plant.

3.Polyethylene glycol

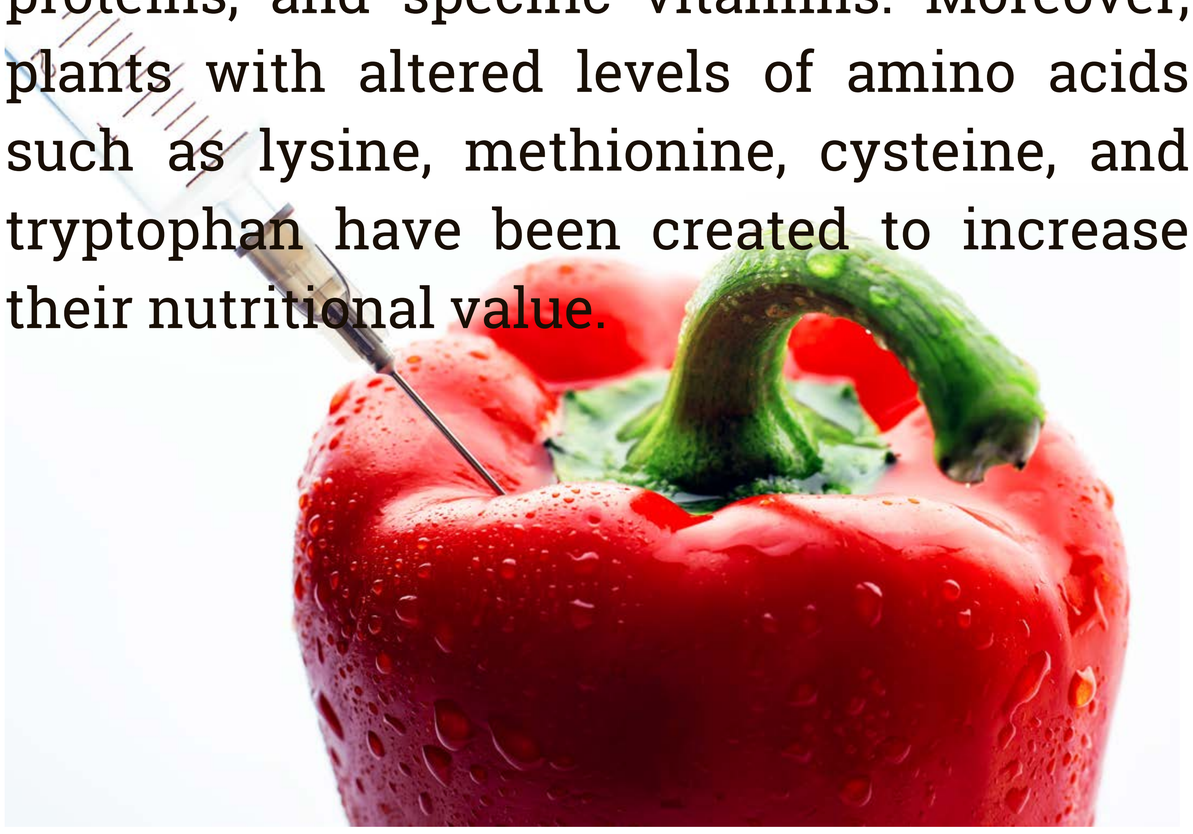
Polyethylene glycol is used to transfer naked DNA into plant protoplast in the presence of calcium ions.

Advantages of Genetically Modified Foods

1. Increased nutritional value of foods

Genetically modified foods are modified in such a way that their chemical composition can be altered. This results in foods enriched with the desired chemicals than traditional food products. It could help to provide a concentrated source of nutritionally beneficial components such as phytochemicals, vitamins, prebiotics, unsaturated fatty acids, and probiotics.

The best example of the benefits of genetic engineering is Golden rice which was produced by modifying the genome by adding extra copies of genes involved in the synthesis of B carotene, a precursor of vitamin A. This process of enriching rice is done by transferring genes from Erwiniauredovora bacteria and jonquil flowers to rice grains so that expression of the enzyme of phytoene synthase is increased resulting in increased activity and increased synthesis of B-carotene. Golden rice was developed in the hope of combating the deadly vitamin A deficiency and its deadly consequences because of its highly nutritious value. Similarly, genetic engineering has been used to modify to improve the nutritional value of other plants to get the desired amount of lipids, proteins, and specific vitamins. Moreover, plants with altered levels of amino acids such as lysine, methionine, cysteine, and tryptophan have been created to increase their nutritional value.



The polysaccharide components of plants can also be altered to produce favourable starch variety. The am flora potato which was genetically modified is one such example. These potato plants are modified to have an increased content of amylopectin in the bulbs by suppressing the expression of granule-bound starch synthase which is responsible for the synthesis of amylose which led to an increased concentration of amylopectin. This is valuable in the industries involved in the production of paper and starch.

2. Improvement in the agriculture industry

Genetic modification also helps to improve their functional qualities which is invaluable for industrial purposes. For example, the metabolism of tomatoes and thereby the time required for ripening is modified so that tomatoes can last longer by genetic modification. The FlavrSavr tomato is modified so that the activity of the enzyme polygalacturonase is suppressed by silencing the gene responsible which leads to delayed ripening of tomato which is preferred by agriculture industries.

The other desired quality acquired by genetic engineering is the reduced contents of sugar, with increased cyclodextrins, with altered activity of polyphenol oxidase which is responsible for the darkening of potatoes. Similarly, potatoes are modified so that the alkaloids level are reduced in order to prolong storage. The other important functional quality achieved by genetic engineering is the resistance of crops to pests. For instance, the potato crop is modified so that the gene isolated from bacillus thuringiensis bacteria and modified into potato crop helped improved resistance to potato beetle and thereby increased potato production. The same gene is used in maize as well against the corn borer. This modification allows plants to synthesize toxins that inhibit pests but does not affect humans or animals when consumed by them.

3. Improved nutritional value of animal products

Like plants, farm animals have been modified genetically to improve their nutritional values and to achieve economic profits. Mainly cattle and pigs are modified to have increased growth hormone production and thereby their protein and mass are increased. Fish like carp, trout, and salmon have been developed in a way so that they require less feeding while maintaining high growth

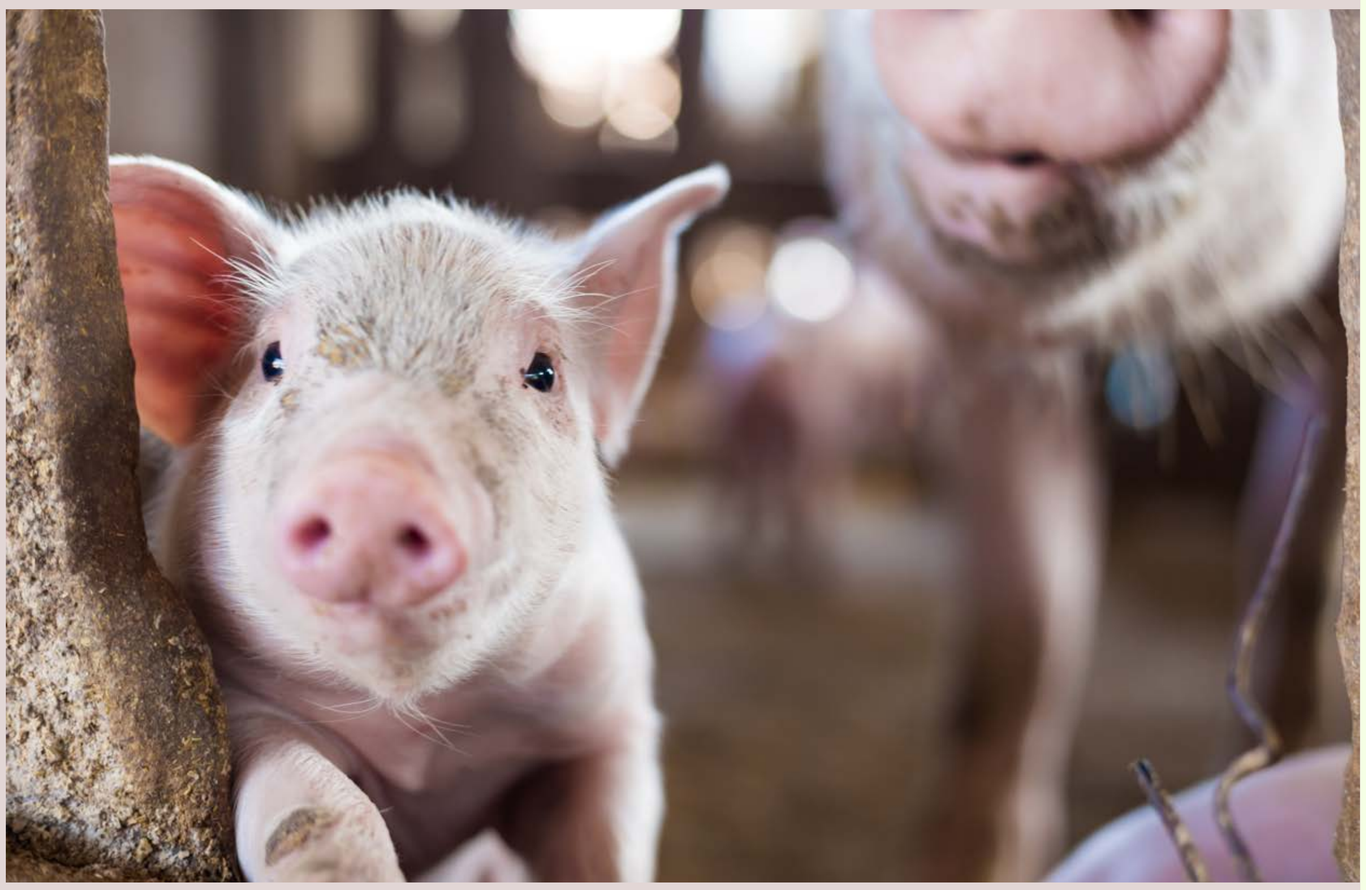


Table 1 - Benefits of GM foods

Type of food	Genetic modification advantage
Rice	Increased level of β-carotene
Potato	Increased amylopectin content, Reduced alkaline content, Cyclodextrin production Resistance to potato beetle
Tomato	Delayed ripening Resistance to pests
Maize	Resistance to pests
Milk	High-temperature tolerance Reduced content of lactose A high content of casein
Meat	Higher growth rate Increased content of beneficial poly unsaturated fatty acids

Potential adverse effects of genetically modified foods

According to WHO “All genetically modified foods currently available on the international market have passed safety assessments, and no effects on human health have been shown as a result of consuming GM foods” (WHO). Furthermore, WHO states that the safety of GM foods should be assessed individually on a case-by-case basis using international guidelines

Consumers have a lot of anxieties when genetically modified foods are involved because of the complexity involved in the concept of genetic modification and of course, due to ethical issues involved in the process.

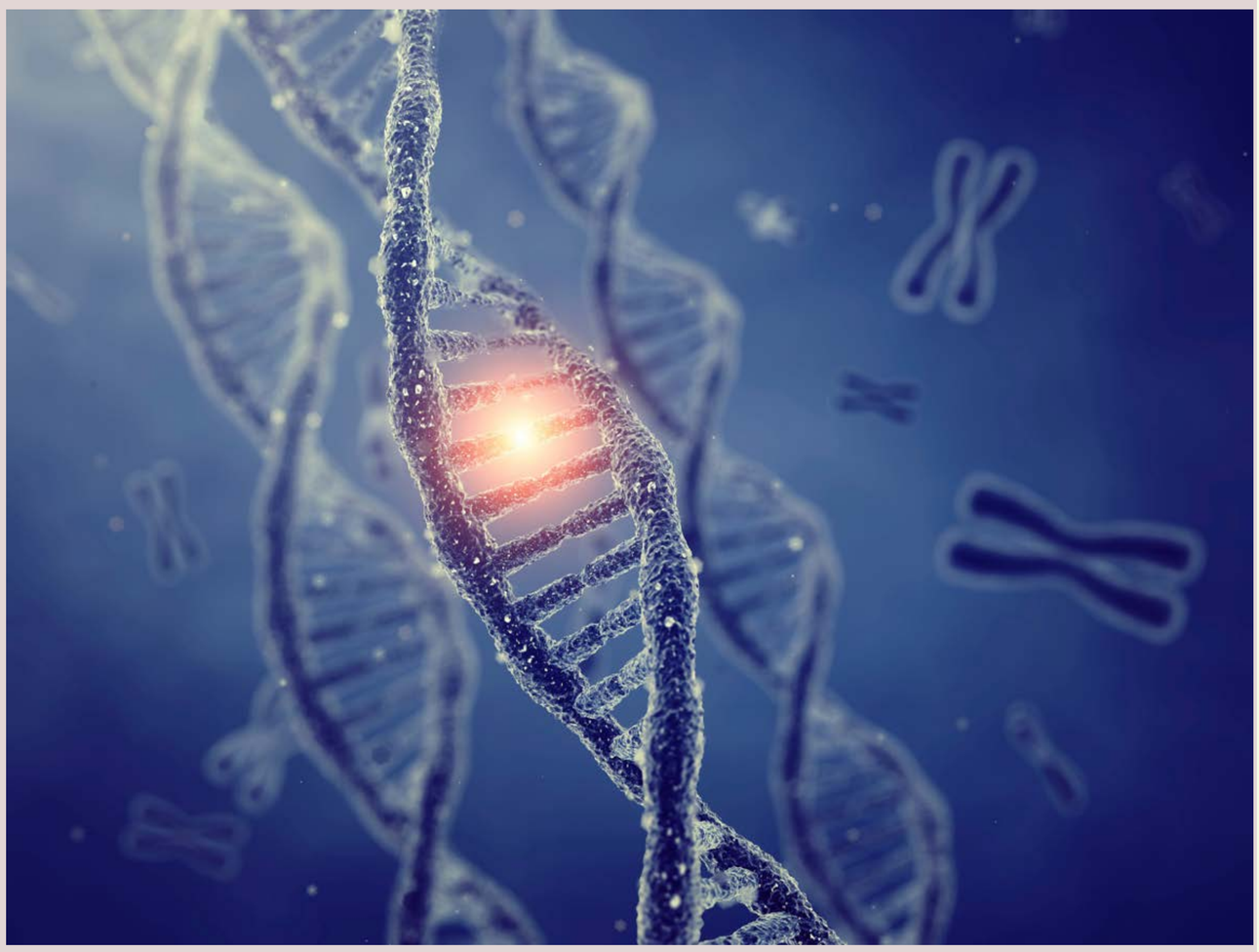
There are three main concerns involved with the safety of genetically modified foods.

1) Allergenicity of GM foods
2) Risks of transfer of genes from GM foods to human digestive tracks
3) Risks of transfer of a gene from GM species to other species (outcrossing)

GM foods and allergy

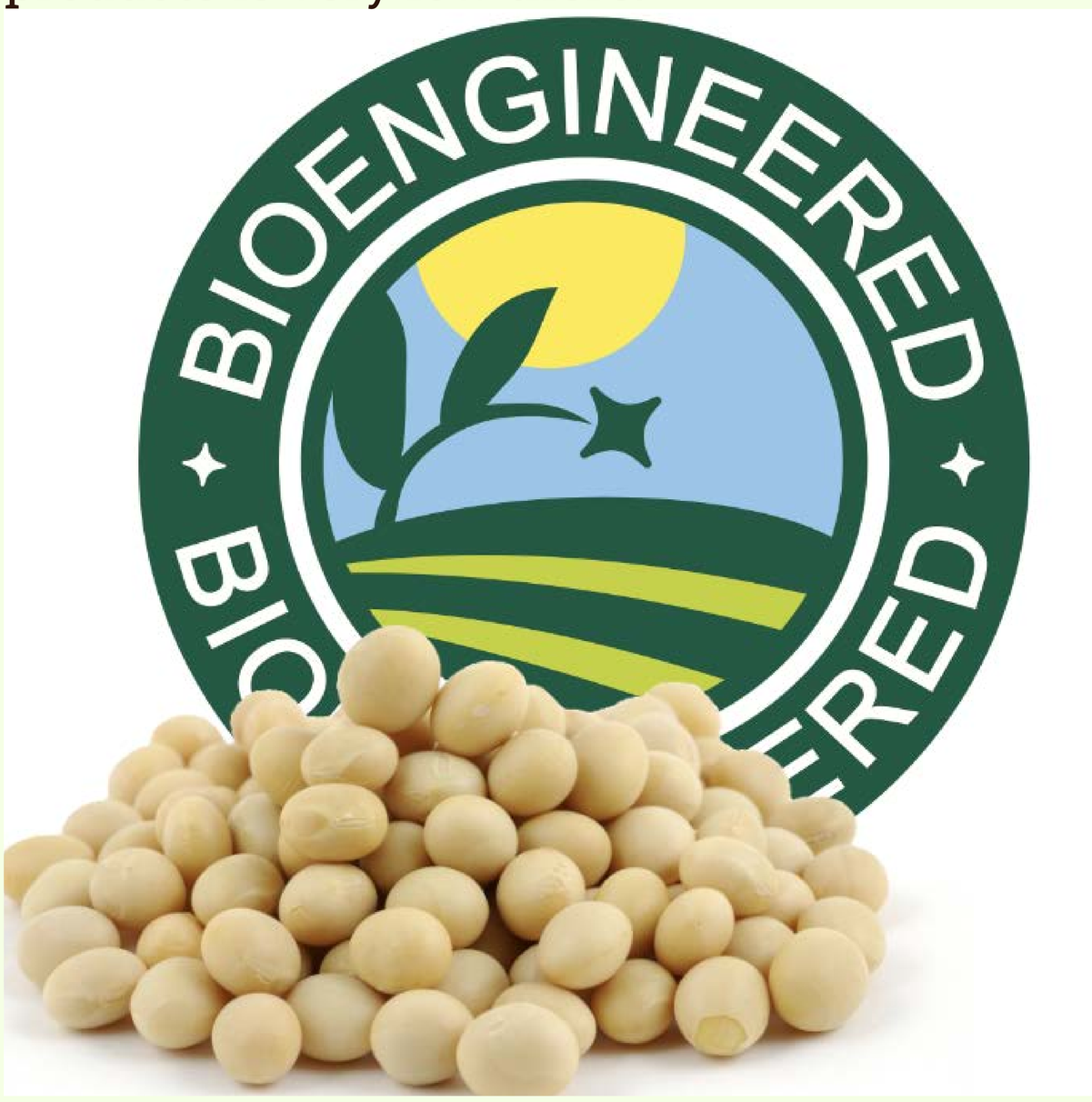
Food-related allergies are common and it occurs as a hypersensitive reaction to a specific protein or allergen present in the food. The development of new proteins with potential allergenicity is a significant concern about GM foods.

The transfer of genes from one cell to another leads to the expression and synthesis of new proteins. There are instances where some have developed an allergic reaction to corn tortillas which is thought to be, in the public but then the Food and drug administration of the USA found out that there is no link between the development of allergies in those people and Cry9C protein. This finding is supported by WHO which states that "no allergic reaction has been reported by GM food currently available in the market". (WHO)

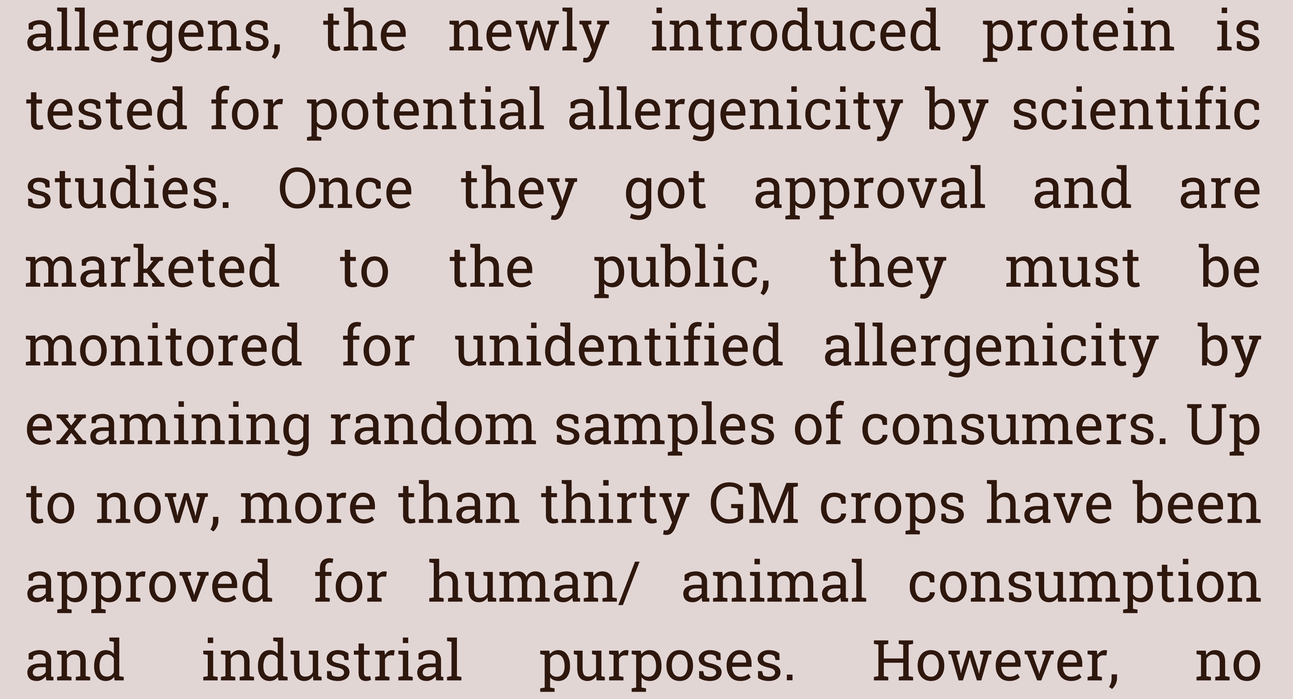


Similarly, Harvard University states "There is no evidence that GMOs are any more or less allergenic than their non-modified counterparts."

Despite the evidence, there are concerns from the public that GM food is causing an increase in food allergies in children. However, it must be stated that there are no GM varieties of the common allergens like eggs, shellfish, nuts, and studies have shown that food allergies cannot be attributed directly to genetic modification. Furthermore, the rise in the allergy to soy products in the UK is found to be caused by non-GMO soy products than GM soy products as the exposure to GM soy products is very low there.



Before any foods containing GM foods get approval for marketing, the new protein should be tested for allergens and compared with all the allergens known, according to the international regulations on food safety by FAO/WHO. After comparing with all known allergens, the newly introduced protein is tested for potential allergenicity by scientific studies. Once they got approval and are marketed to the public, they must be monitored for unidentified allergenicity by examining random samples of consumers. Up to now, more than thirty GM crops have been approved for human/ animal consumption and industrial purposes. However, no products marketed for human consumption have been proven to contain allergens. (WHO)



However, the tight regulation and monitoring of GM foods are imperative to prevent adverse allergic reactions by prompt identification of the culprit protein. The identification of an allergic protein in the soybean which was genetically modified by transferring a gene from Brazil nut in 1966 and the subsequent development of allergic reactions in the volunteers in the US is an example of why strict monitoring is important in GM foods. The food product was not approved for the market. Another example is the development of respiratory reaction in the mice which was fed with peas engineered to resist. These experiments are often quoted as the reason for the negative perception among some people concerning safety of the genetically modified foods.

However, they are examples of why we need tight monitoring, rather than how they can cause allergic reactions because the GM products available in the market are already assessed and analyzed for allergens before they are approved.

In addition, currently, researchers have successfully used GM technology to develop a nonallergenic variety of commonly allergenic foods. An example is the removal of gluten from wheat by genetic modification by suppressing the enzyme responsible for making gluten in the wheat. Currently, 73 percent of gluten is reduced from wheat by GM technology, and we can expect gluten-free wheat for people with gluten intolerance shortly

2. Gene transfer

There is concern about the possibility of the transfer of genes from genetically modified plants when they are consumed by humans and processed in the human gut. The modified gene in the plant is transferred to the intestinal microflora and from the microflora to the gut enterocyte. Plant foods leave undigested genetic material after digestion in the human gut. If the plant contains transgenic material, the modified genetic material could remain in the gut and get integrated into enterocytes. If transgenic material has antibiotic resistance, which is used as a biomarker, then it will cause adverse effects when ingested. Therefore, WHO recommends strongly to avoide using transgenic material with antibiotic resistance as a biomarker in GM food production

GM foods contain less than 5 unique protein-encoding genes which can transfer new traits to the host. But these genes are chemically similar to other genes normally present in foods

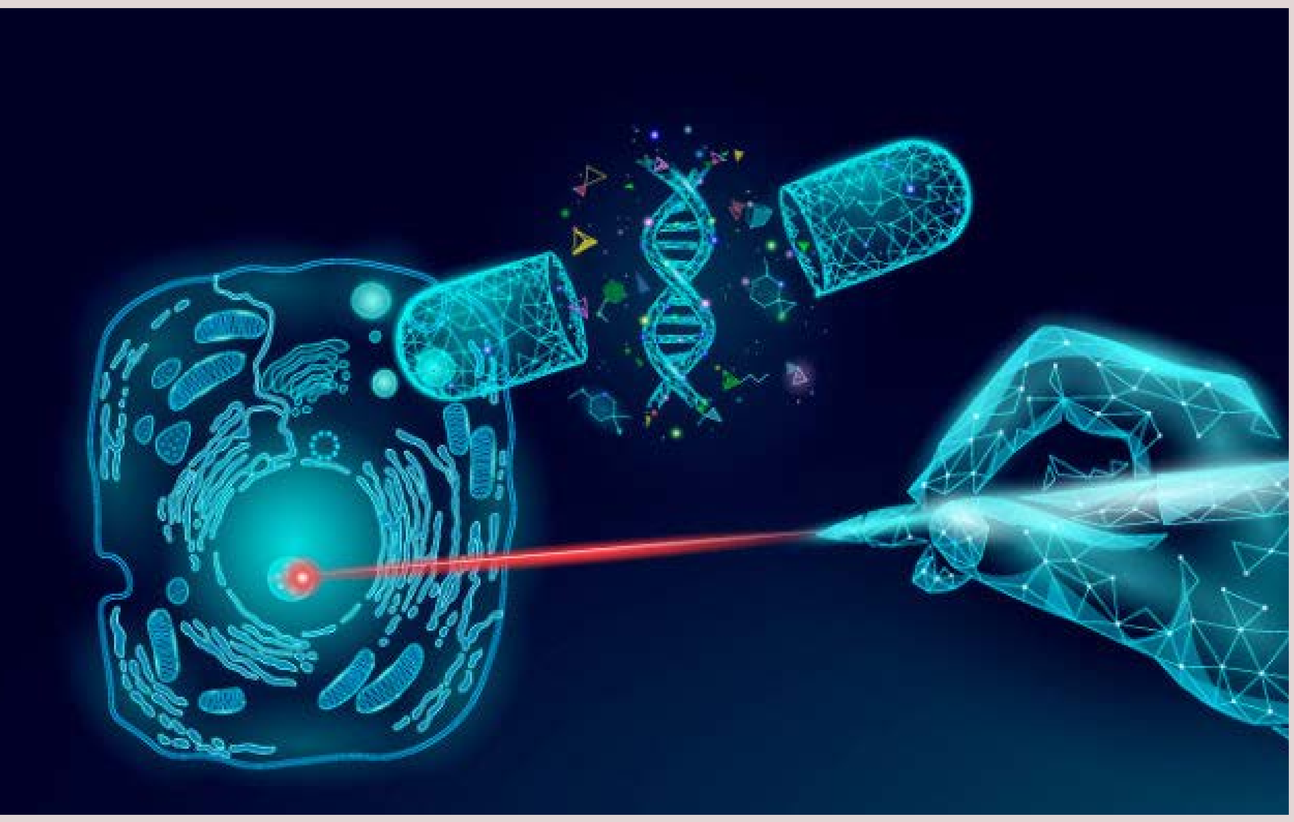
Effect of food processing on the fate of DNA

The type of food and method of processing influence the state of the genetic material that remains intact in the human gut. Semi-processed foods such as ground wheat grains, biscuits, popcorn bread, and ketchup have been found to contain a high molecular weight of undigested DNA material while some products of maize and silage farm-fed animals have been found to have intact DNA suggesting that if horizontal gene transfer to either gut bacteria or the cells of the animal consumer is an issue, then this feed would pose a significant risk. Around 3.7% of transgenic material was found to remain intact in the human gut surviving gastric and duodenal enzymes after consumption of GM soy products, in a study. However, by the time GM soy reached the large intestine, it was fully degraded.

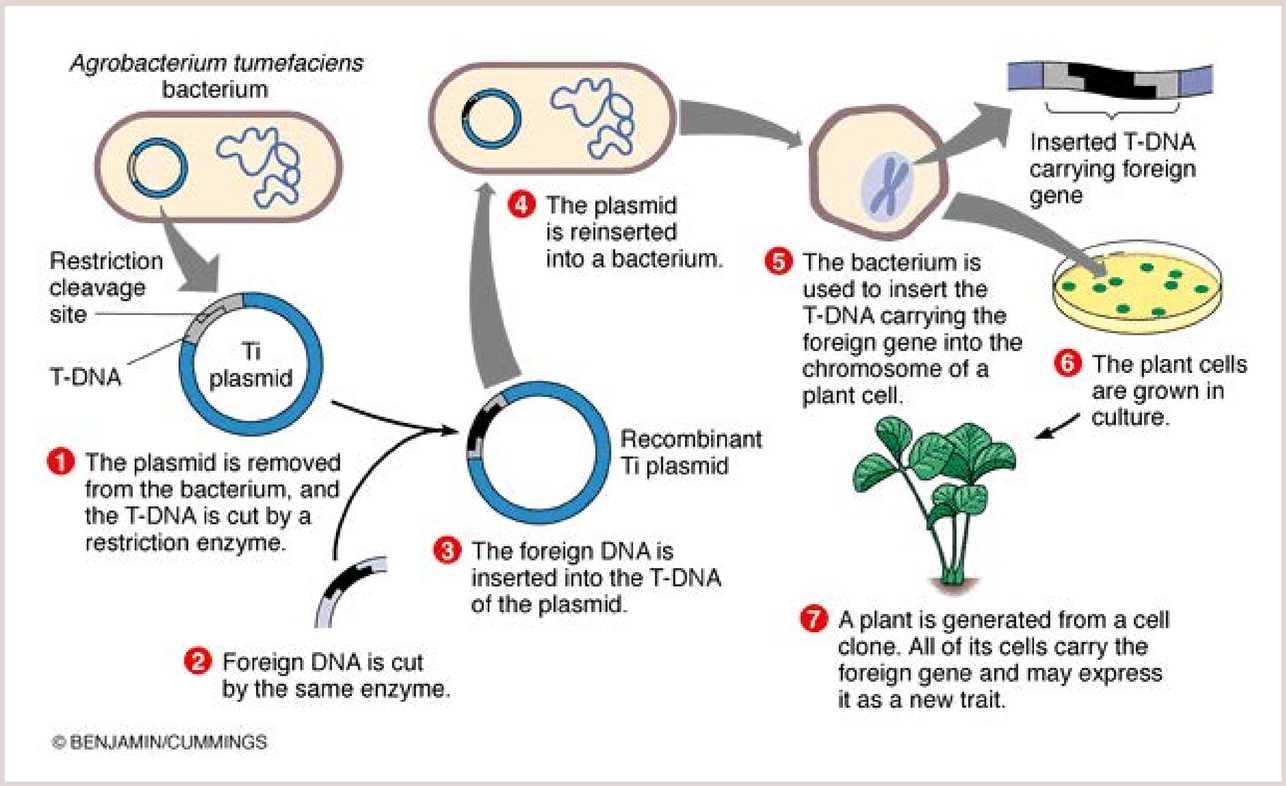
To date, “no in vivo study has reliably demonstrated the integration of DNA fragments from GM crops into the gut microbiota of a mammalian species” according to a study by Wilcks et al. The study revealed that there was no uptake of ampicillin-resistant plasmid DNA by the gut microbiome of rats (E.coli or B.subtilis) in vivo even if the plasmid from the intestine was able to transform bacteria in vitro For example, an investigation of the incorporation of plasmid DNA encoding for ampicillin resistance by the gut microbiome of mono-associated rats (either with E. coli or B. subtilis) showed no uptake in vivo, even if the plasmid isolated from the intestine was able to transform bacteria in vitro.

2. Gene transfer

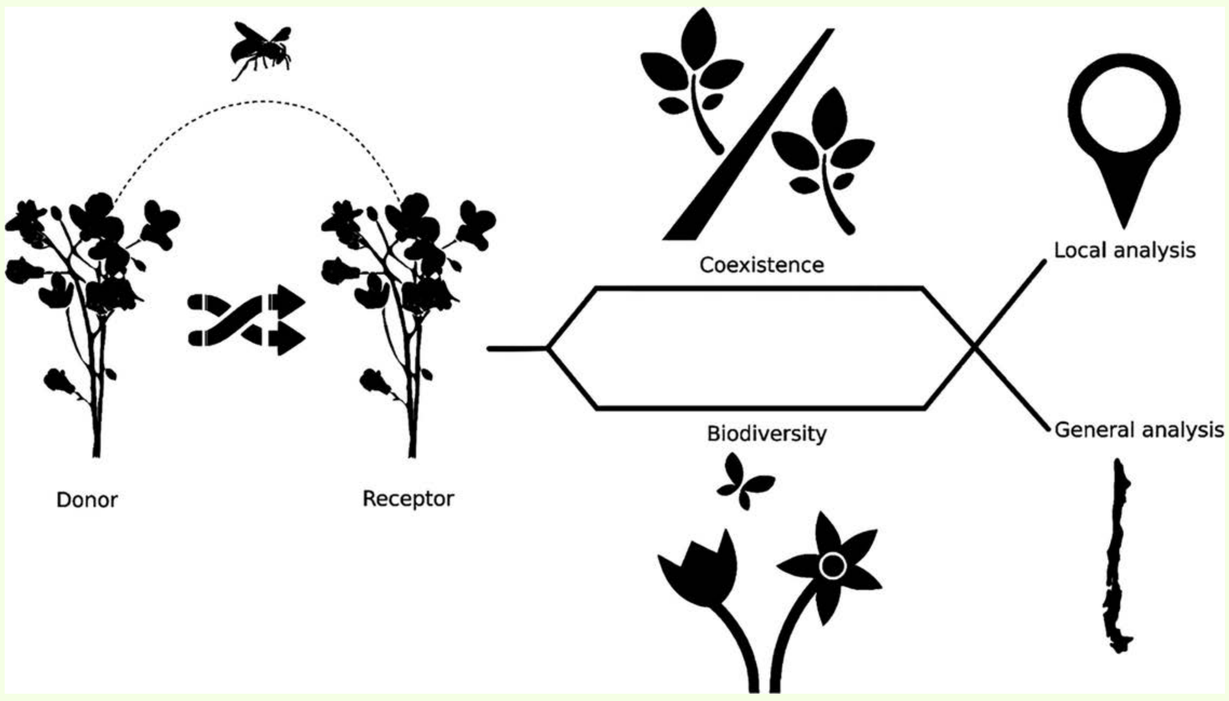
However, identifying the rare integration of transgenic material into the human gut is difficult with the available technologies. Furthermore, reviews have shown that there is no evidence to say that transgenes in GM crop-derived foods have a higher tendency for integration than the host plant food. Similarly, there is no evidence of expression of plant genes after the transfer of transgenic material from plant to gut bacteria or enterocytes of the consumer, even though this needs further experiment to fully understand.



However, even if the proportion of dietary DNA that could get integrated into gut enterocytes is extremely low, the potential adverse effects that can arise from it should not be ignored, and as recommended by WHO this should be taken into assessment of the safety of GM foods before approval.



4. Outcrossing

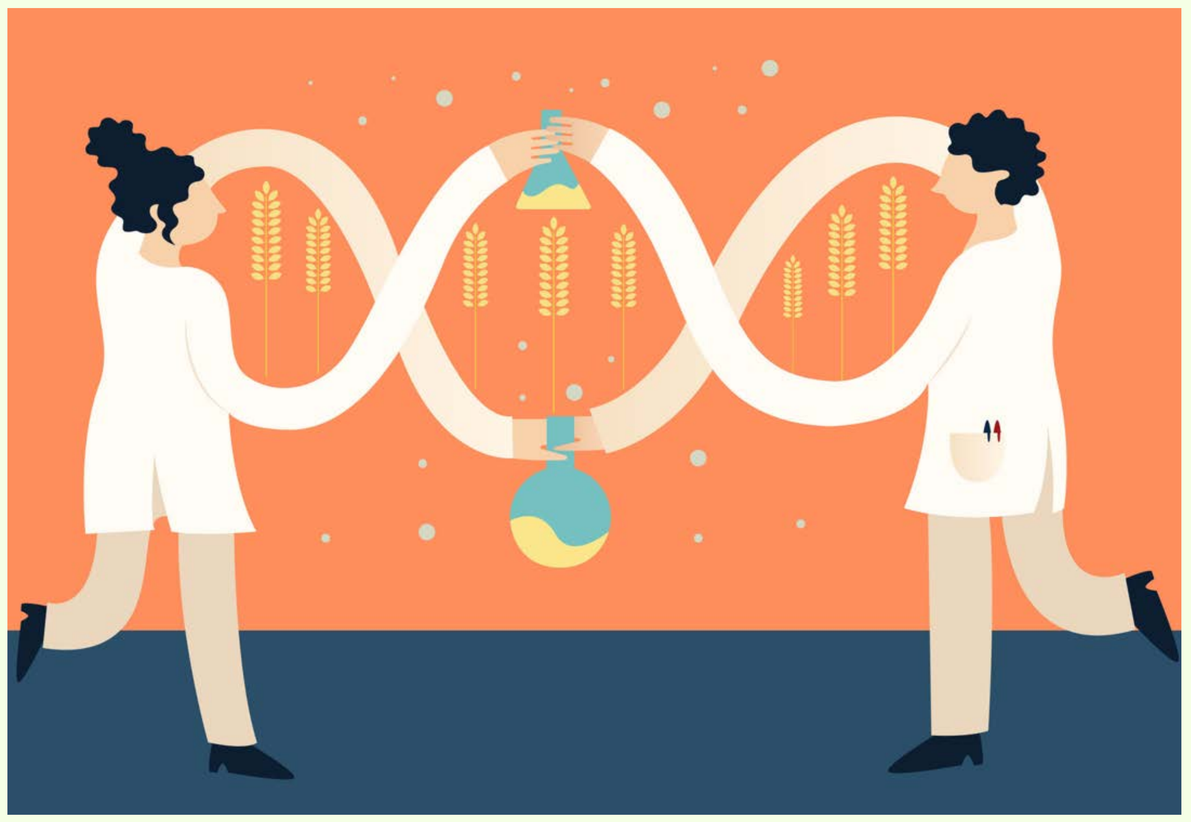


This refers to the mixing of crops from GM technology and crops from traditional seeds. This can occur when GM crops are cultivated adjacent to traditional crops by pollination. This outcrossing can affect food safety and food security according to WHO. To avoid such occurrences, there are guidelines stipulating that GMO plants should be physically isolated from closely related plants by a buffer zone that is sized proportionally to how far the pollen can travel. However, this cannot be completely avoided, and GM food contamination is unavoidable, therefore the possibility of GM food contamination should be considered when assessing and approving food products in the market. And it is possible to identify allergens and toxins that can contaminate during the outcrossing by thorough assessment and surveillance.

GM foods a way forward

Despite tremendous evidence that points out that GM crops are safe to eat, the debate over their use continues to spread and remain static in major parts of the world Sri Lanka included. Despite a great deal of evidence of the promise of benefits from GM foods, the majority of the world remains ignorant about it or restricting import or local production of it, promoting myths and fears about it among consumers. Except for the USA, Canada, and some South American countries, GM crop production is limited in other countries.

In Europe, only Spain and Poland are cultivating GM crops. India is cultivating GM cotton crops but having trouble promoting the cultivation of GM crops for human consumption. Similarly, the golden rice which was developed with the motto to combat Vitamin A deficiency is ignored by the developing countries. The only country that has a plan to cultivate golden rice is Bangladesh. Vitamin A deficiency is a big problem causing millions of deaths annually and irreversible blindness in Africa. And Africa has no interest in introducing any type of GM crops, and GM foods are still banned in Kenya.



The recent advisory board of the National Academies of Sciences, Engineering, and Medicine of the US found that there is “no substantiated evidence of a difference in risk to human health between commercially available GM crops and conventionally bred crops” According to WHO GM technology will help to improve food security by increasing the copy yield, quality of the food about industrial as well as nutritional aspects, and with improved diversity if grown in buffer zones. This will help to improve food safety, health and nutritional status and thereby the living standards. A robust surveillance system to identify, assess and monitor the potential adverse effects of GM foods before approval and long-term monitoring will ensure that they are utilized properly to achieve their best of benefits.

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Past events since last publication

SLMNA Monthly Council Meetings

SLMNA monthly council meeting for May was held on the 2nd of May 2023 at the Medical Nutrition Unit of the National Hospital of Sri Lanka, Colombo as a hybrid event through the Zoom platform.

SLMNA monthly council meeting for June was held on the 6th of June 2023 at the Medical Nutrition Unit of the National Hospital of Sri Lanka, Colombo as a physical meeting.

Past events since last publication

SLMNA Monthly clinical Meetings

SLMNA monthly clinical meeting lecture by Prof. Rohan Siriwardana on “Liver transplantation and nutrition considerations” was held on 15th of May 2023 at OPD Auditorium, CNTH.

Past events since last publication

SLMNA Monthly clinical Meetings

SLMNA monthly clinical meeting lecture for the month of June, by Prof. Nadeeja Wijayathunga on “Unhealthy lean – the missed lean with obesity” was held on 27th of June 2023 at Old Auditorium, LRH.

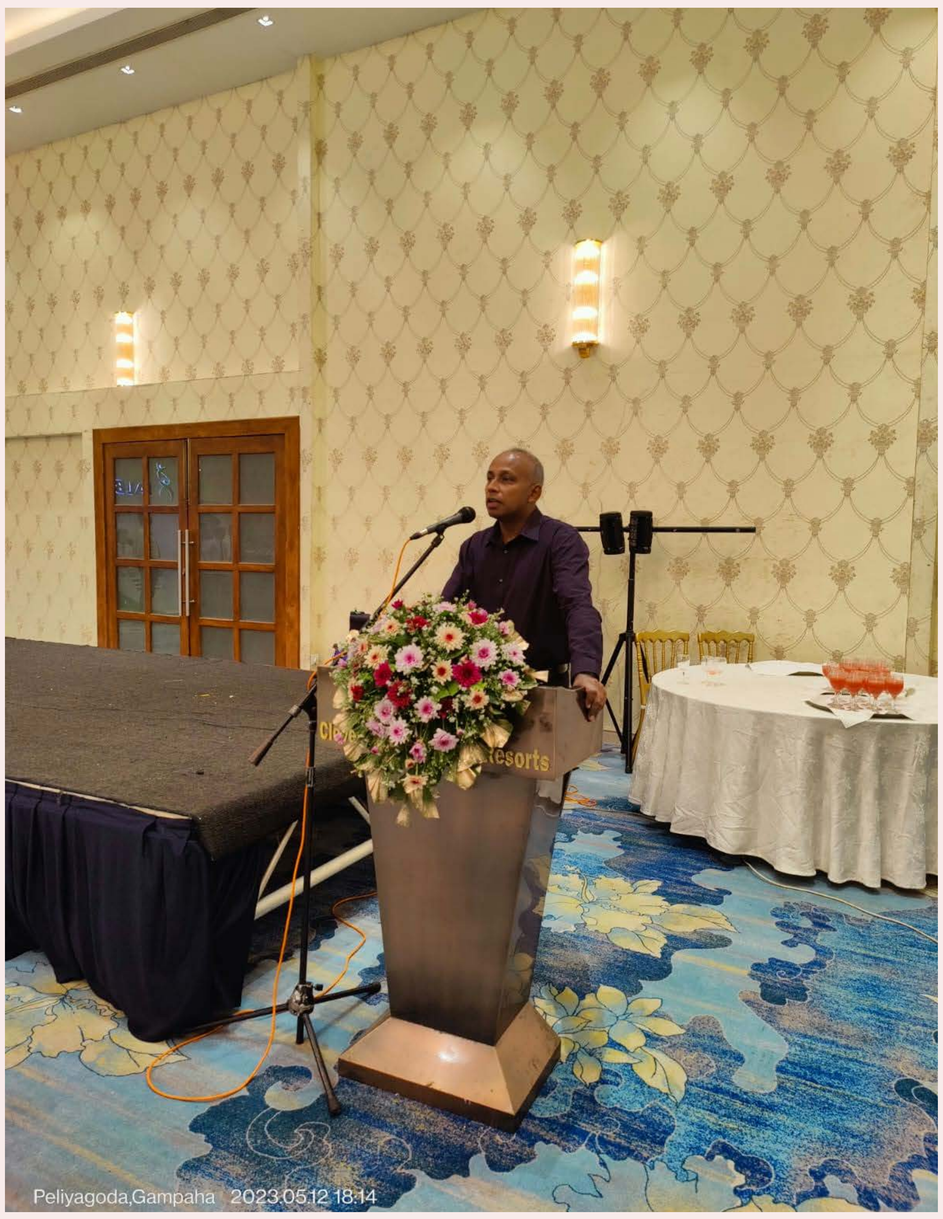
Past events since last publication

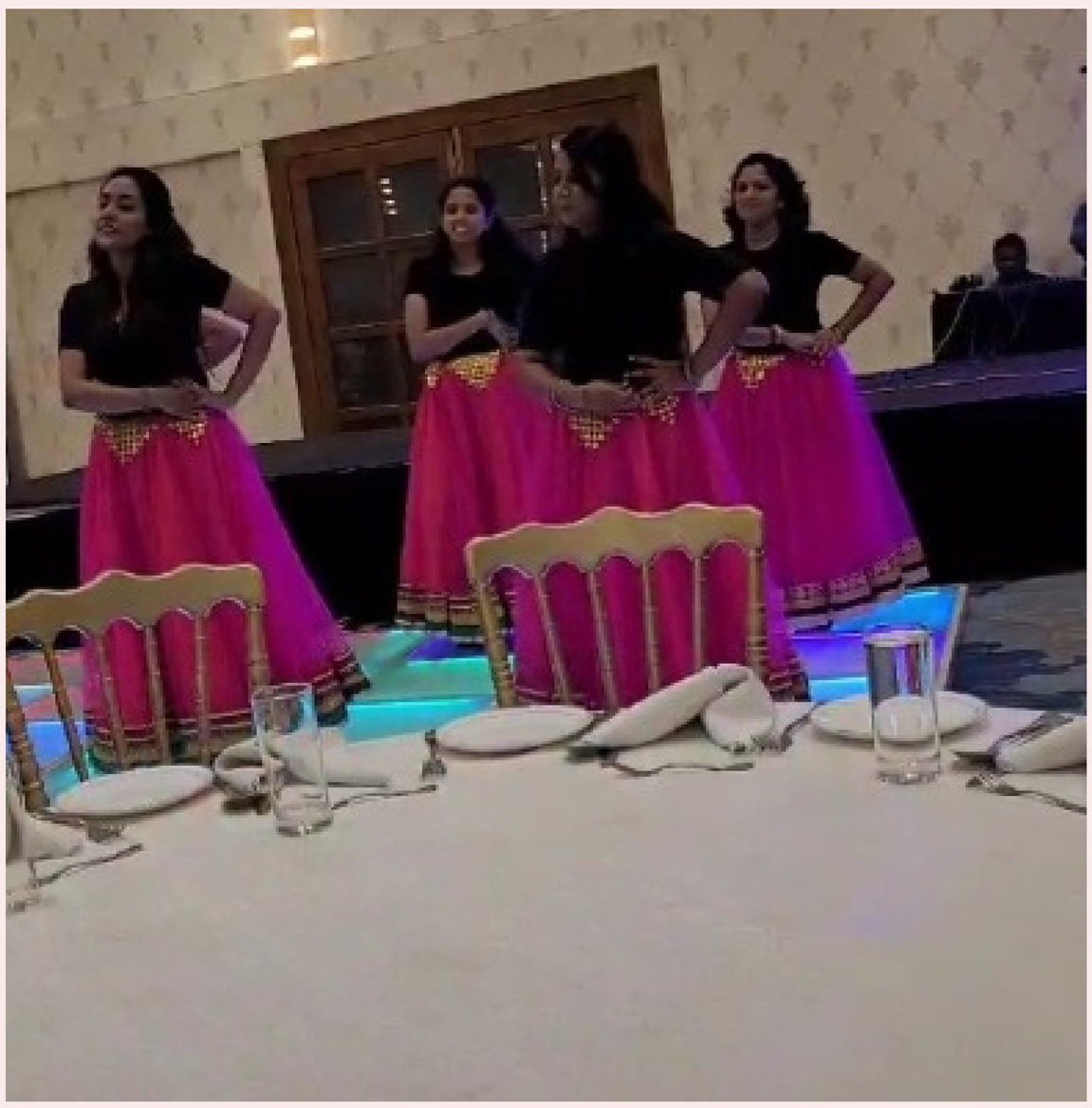
SLMNA bimonthly clinical Meetings (International)

SLMNA bimonthly clinical meeting lecture by Consultant Gastroenterologist Prof. Sheldon Cooper on “Type 1 and 2 intestinal failure: An overview from a Birmingham UK perspective” was held on 23rd of June 2023 through the Zoom platform.

Past events since last publication

Market Fair 2023





Market fair 2023 organized by SLMNA was held on the 12th of May 2023 at Clover Banquets and Resorts, Gonawala, Kelaniya.

Past events since last publication

LLL Course 2023 (Life Long Learning)

ESPEN, LLL Course 2023 was held on the 24th and 25th of May 2023 at Aldo Castellani Auditorium of Medical Research Institute which was organized by SLMNA and SLCNP.

Past events since last publication

Workshop on Nutrition-related disorders

SLMNA in collaboration with SLCNP and Kandy Society of Medicine conducted a workshop on "Nutrition-related disorders" on Wednesday 21st June 2023 at the PMCK Auditorium, National Hospital Kandy

Upcoming events

Workshop on Sports Nutrition

Workshop on Sports Nutrition organized by SLCNP and SLMNA will be held on the 2nd of July from 8.30 am to 4.30 am at Solis Hotel, Sri Jayawardanapura, Kotte.

Upcoming Events

MCQ discussion programme for doctors awaiting MSc Human Nutrition will be held on the first four Sundays of July.

MCQ DISCUSSION
MSc in Human Nutrition
Selection Examination 2023

Organized by, Sri Lanka Medical Nutrition Association

02/07/2023	BASIC NUTRITION	CONDUCTED VIA ZOOM
09/07/2023	NUTRITION IN LIFECYCLE	
16/07/2023	CLINICAL NUTRITION PUBLIC HEALTH NUTRITION	
23/07/2023	EPIDEMIOLOGY & STATISTICS CLINICAL NUTRITION	CONDUCTED ONSITE VENUE - NEUROTRAUMA AUDITORIUM, NHSL - COLOMBO

Registration - on or before 30th June 2023
https://forms.gle/7Ttxg5WDj8YQ99sc7

Course fee - For all 4 days - Rs.7500/=
Per session - Rs. 2500/=

Payments - Sri Lanka Medical Nutrition Association
Bank - BOC Regent street branch
Acc no . 0077108452
Reference - MCQ 2023, Your name

For inquiries,
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Dr. Maya 071 532 2391

Upcoming Events

SLMNA bimonthly clinical meeting lecture

SLMNA bimonthly clinical meeting lecture by a foreign speaker Dr Prapimporn Chattranukulchai, Consultant in Clinical Nutrition, Thailand on “Nutrition Management in Bariatric Surgery” will be held on 18th of July 2023 through Zoom platform.

8th Annual Academic sessions

The 8th Annual Academic Sessions of SLMNA will be held on the 25th and 26th of August 2023 at the main ballroom, Waters Edge.

STAY CONNECTED WITH

SLMNA

Sri Lanka Medical Nutrition Association,
Email-slmna2015@gmail.com