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The Hidden Dangers of Soy Allergens

The huge rise in allergic reactions to soy is in line with the increasing use of soy products in processed foods during the 1990s, and should be regarded as a major public health concern.

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PO Box 30, Mapleton Qld 4560 Australia. editor@nexusmagazine.com
Telephone: +61 (0)7 5442 9280; Fax: +61 (0)7 5442 9381
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by Kaayla T. Daniel, PhD, CCN © 2004
From Chapter 23 of her book
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THE RISE IN SOY ALLERGIES

Soy is one of the top allergens—substances that cause allergic reactions. In the 1980s, Stuart Berger, MD, labelled soy one of the seven top allergens—one of the "sinister seven". At the time, most experts listed soy around tenth or eleventh—bad enough, but way behind peanuts, tree nuts, milk, eggs, shellfish, fin fish and wheat. Today, soy is widely accepted as one of the "big eight" that cause immediate hypersensitivity reactions.^{1–4}

Allergies are abnormal inflammatory responses of the immune system to dust, pollen, a food or some other substance. Those that involve an antibody called immunoglobulin E (IgE) occur immediately or within an hour. Reactions may include coughing, sneezing, runny nose, hives, diarrhoea, facial swelling, shortness of breath, a swollen tongue, difficulty swallowing, lowered blood pressure, excessive perspiration, fainting, anaphylactic shock or even death.^{4–9}

Delayed allergic responses to soy are less dramatic, but are even more common. These are caused by antibodies known as immunoglobulins A, G or M (IgA, IgG or IgM) and occur anywhere from two hours to days after the food is eaten. These have been linked to sleep disturbances, bedwetting, sinus and ear infections, crankiness, joint pain, chronic fatigue, gastrointestinal woes and other mysterious symptoms.^{4–9}

Food "intolerances", "sensitivities" and "idiosyncrasies" to soy are commonly called "food allergies", but differ from true allergies in that they are not caused by immune system reactions but by little-understood or unknown metabolic mechanisms.^{7–9} Strictly speaking, gas and bloating—common reactions to soy and other beans—are not true allergic responses.

However, they may serve as warnings of the possibility of a larger clinical picture involving allergen-related gastrointestinal damage.

PROFIT vs RISK

The soybean industry knows that some people experience severe allergic reactions to its products. In a recent petition to the US Food and Drug Administration (FDA), Protein Technologies International (PTI) identified "allergenicity" as one of the "most likely potential adverse effects associated with ingestion of large amounts of soy products". Yet PTI somehow concluded that "the data do not support that they would pose a substantial threat to the health of the US population".¹⁰

This statement is hardly reassuring to the many children and adults who suffer allergies to soy products. And it ignores a substantial body of evidence published during the 1990s showing that some of these people learn for the first time about their soy allergies after experiencing an unexpectedly severe or even life-threatening reaction.

Severe reactions to soy are rare compared to reactions to peanuts, tree nuts, fish and shellfish, but Swedish researchers recently concluded that "Soy has been underestimated as a cause of food anaphylaxis" (Foucard T., Malmheden Yman, I., *Allergy* 1999, 53(3):261-265).¹¹

A BAD HAMBURGER

The Swedes began looking into a possible soybean connection after a young girl suffered an asthma attack and died after eating a hamburger that contained only 2.2 per cent soy protein. A team of researchers collected data on all fatal and life-threatening reactions caused by food between 1993 and 1996 in Sweden, and found that the soy-in-the-hamburger case was not a fluke and that soy was indeed the culprit. They evaluated 61 cases of severe reactions to food, of which five were fatal, and found that peanut, soy and tree nuts caused 45 of the 61 reactions. Of the five deaths, four were attributed to soy. The four children who died from soy had known allergies to peanuts but not to soy. The amount of soy eaten ranged from one gram to 10 grams—typical of the low levels found when soy protein is used as a meat-extending additive in ready-made foods such as hamburgers, meatballs, spaghetti sauces, kebabs and sausages or as an extender in breads and pastries.

When soy is "hidden" in hamburgers and other "regular" foods, people often miss the soy connection. And allergic reactions to soy do not always occur immediately, making cause and effect even harder to establish. As reported in the Swedish study, no symptoms—or very mild symptoms—occurred for 30 to 90 minutes after the consumption of the food containing soy; then the children suffered fatal asthma attacks. All had been able to eat soy without any adverse reactions right up until the dinner that caused their deaths.

The Swedish study was not the first to report "fatal events" after eating soy. Food anaphylaxis is most often associated with reactions to peanuts, tree nuts, shellfish and occasionally fish or milk, but soy has its own rap sheet. Anaphylactic reactions to bread, pizzas or sausage extended with soy protein date back at least to 1961. Subsequent studies have confirmed that the risk may be rare but is very real.^{12–20}

The increasing amount of "hidden" soy in the food supply is undoubtedly responsible for triggering many allergic reactions not attributed to soy. French researchers who studied the frequency of anaphylactic shocks caused by foods reported that the food allergen remained unknown in 25 per cent of cases. They noted the prevalence of "hidden" and "masked" food allergens and stated that they saw "a strikingly increased prevalence of food-induced anaphylactic shock in 1995 compared to a previous study from 1982".²¹ This period coincided with a huge increase in the amount of soy protein added to processed foods. (In fact, the amount has continued to rise. Per capita consumption of soy protein increased from 0.78 g/day in 1998 to 2.23 g/day in 2002, according to industry estimates obtained by the Solae Company which, in March 2004, filed a petition seeking FDA approval of a health claim for soy protein and cancer reduction.^{21a})

None of these studies has attracted much media attention. Nor have health agencies issued

alerts. For example, Ingrid Malmheden Yman, PhD, of the Sweden National Food Administration and co-author of the study, wrote to the Ministry of Health in New Zealand at the request of an allergy sufferer. Two years before the article (first published in Swedish) came out in English, she informed the agency that children with severe allergy to peanut should avoid intake of soy protein. To be on the safe side, she further advised parents to make an effort to "avoid sensitisation" by limiting consumption of both peanuts and soybeans during the third trimester of pregnancy and during breastfeeding, and by avoiding the use of soy formula.²²

Controversy has raged since the 1920s as to whether or not babies could be sensitised to allergens while still in utero. In 1976, researchers learned that the foetus is capable of producing IgE antibodies against soy protein during early gestation, and newborns can be so sensitised through the breastmilk of the mother that they later react to foods they've "never eaten".^{23, 24} Families who need to take these precautions seriously include those with known peanut and/or soy allergies, vegetarians who would otherwise eat a lot of soy foods during pregnancy or breastfeeding, and parents considering the use of soy infant formula.

Because the numbers of children with allergies to peanuts are increasing, we can expect to see greater numbers of children and adults reacting severely to soy. Peanuts and soybeans are members of the same botanical family, the grain–legume type, and scientists have known for years that people allergic to one are often allergic to the other.

Other children at risk for an undetected but potentially life-threatening soy allergy include those with allergies to peas, lima beans or other beans, a diagnosis of asthma, rhinitis, eczema or dermatitis, or family members with a history of any of those diseases. Reactions to foods in the same botanical family can be cumulative, resulting in symptoms far more severe than either alone.^{25–32}

SOY'S ALLERGENIC PROTEINS

Scientists are not completely certain which components of soy cause allergic reactions. They have found at least 16 allergenic proteins, and some researchers pinpoint as many as 25 to 30. Laboratories report immune system responses to multiple fractions of the soy protein, with no particular fraction being the most consistently antigenic, i.e., capable of causing the production of an antibody.^{33–36}

Some of the most allergenic fractions appear to be the Kunitz and Bowman–Birk trypsin inhibitors. Food processors have tried in vain to deactivate these troublesome proteins completely without irreparably damaging the remainder of the soy protein (see chapter 12). Having failed to accomplish this, the soy industry has decided to promote these "antinutrients" as cancer preventers. To date, its proof remains slim, although cancer statistics might improve if enough people died from anaphylactic shock first.

Although extremely rare, death from allergic reaction to trypsin inhibitor has been a matter of public record since the *New England Journal of Medicine* carried a report in 1980.^{37, 38} The Kunitz trypsin inhibitor has been identified as one of three allergic components in soy lecithin—a soy product often considered hypoallergenic (i.e., it has diminished potential for causing an allergic reaction) because it is not supposed to include any soy protein, but invariably contains trace amounts.³⁹

Soybean lectin—another antinutrient now promoted as a disease preventer—has also been identified as an allergen.⁴⁰ Whenever there is a damaged intestinal lining or "leaky gut", soy lectins can easily pass into the bloodstream, triggering allergic reactions (see chapter 14). Indeed, this is very likely because both soy allergens and saponins (an antinutrient discussed in chapter 15) can damage the intestines.

Histamine toxicity can also resemble allergic reactions. In allergic persons, mast cells release histamine, causing a response that strongly resembles an allergic reaction to food. In cases of histamine toxicity, the histamine comes ready-made in the food. This is most often associated with reactions to cheese and fish, but soy sauce also contains high levels of histamine.

Researchers who have calculated the histamine content of foods consumed at a typical

oriental meal report that histamine intake may easily approach toxic levels.⁴¹

PROCESSING MATTERS

The way that the soybean is grown, harvested, processed, stored and prepared in the kitchen can affect its allergenicity. Raw soybeans are the most allergenic, while old-fashioned fermented products (miso, tempeh, natto, shoyu and tamari) are the least. Modern soy protein products processed by heat, pressure and chemical solvents lose some of their allergenicity, but not all. Partially hydrolysed proteins and soy sprouts, which are quickly or minimally processed, remain highly allergenic.^{42, 43}

The industry newsletter, *The Soy Connection*, states that highly refined oils and lecithin "are safe for the soy-allergic consumer".⁴⁴

Unfortunately, many allergic persons who have trusted such reassurances have ended up in the hospital. Highly susceptible people cannot use either safely. Adverse reactions to soy oils—taken either by mouth as food or via tube-feeding—range from the nuisance of sneezing to the life-threatening danger of anaphylactic shock.^{45–51}

If soy oil and lecithin were 100 per cent free of soy protein, they would not provoke allergic symptoms. Variable conditions and the quality control and processing methods used when the vegetable oil industry separates soybean protein from the oil make the presence of at least trace amounts of soy protein possible, even likely. Though healthier in many respects, the cold-pressed soy oils sold in health food stores can be deadly for the allergic consumer. They may contain as much as 100 times the amount of trace protein found in the highly refined soy oils sold in supermarkets.^{52, 53}

Soy protein is likely to appear in margarine. Above and beyond any stray protein that remains after the processing of the soy oil, soy protein isolates or concentrates are commonly used by food manufacturers to improve the texture or spreadability of these products. This occurs most often in low-fat or "low trans" products (see chapter 6).

PARENT WARNING!

HIDDEN SOY – HIDDEN SOY ALLERGIES

If your child is allergic to peanuts, you must eliminate all soy as well as all peanuts from your child's diet. Your child's life may depend upon it. Take care, even if your child has never reacted poorly to soy in the past. Some sensitive children have "hidden" soy allergies that manifest for the first time with a severe—even fatal—reaction to even the low levels of "hidden" soy commonly found in processed food products. Those at the highest risk suffer from asthma as well as peanut allergy. Other risk factors are other food allergies, a family history of peanut or soy allergies, a diagnosis of asthma, rhinitis or eczema, or a family history of these diseases.

(Source: Letter from Ingrid Malmheden Yman, PhD, Senior Chemist, Sweden National Food Administration, to the New Zealand Ministry of Health, 30 May 1997)

HIDDEN DANGER

People allergic to soy protein face constant danger. Hidden soy exists in thousands of everyday foods, cosmetics and industrial products such as inks, cardboards, paints, cars and mattresses. The four Swedish fatalities are only the best known of thousands of reported cases of people who experienced severe allergic reactions to soy after inadvertently eating

foods that contained soybean proteins.^{54–56}

Of 659 food products recalled by the FDA in 1999, 236 (36 per cent) were taken off the market because of undeclared allergens. The three factors responsible for the undeclared allergens were: omissions and errors on labels (51 per cent), cross contamination of manufacturing equipment (40 per cent), and errors made by suppliers of ingredients (five per cent). It wasn't inspectors, however, but ticked-off US consumers who fingered 56 per cent of the undeclared allergens.⁵⁷

During 2002, the Canadian Food Inspection Agency (CFIA), which takes soy allergies seriously, recalled bagels, doughnuts, rolls, pizza and other items containing undeclared soy protein.⁵⁸ Although agencies in many countries claim to be stepping up efforts to enforce labelling laws, enforcement is difficult even when officials make it a priority. The chief problem is that few methods reliably detect and quantify minute amounts of allergens in foods.⁵⁹ Even when soy-containing ingredients are accurately listed on food labels, consumers may easily miss the soy connection. A 2002 study of 91 parents of children allergic to peanuts, milk, egg, soy, and/or wheat revealed that most parents failed to identify allergenic food ingredients correctly, and that milk and soy presented the most problems. Only 22 per cent of the parents with soy allergies correctly identified soy protein in seven products. The researchers concluded, "These results strongly support the need for improved labelling with plain-English terminology and allergen warnings as well as the need for diligent education of patients reading labels".⁶⁰

THE MARGARINE CONNECTION

Allergies to pollen dust, dander and foods are on the increase wherever margarine replaces butter. That's the conclusion of Finnish researchers who found that children who developed allergies ate less butter and more margarine compared with children who did not develop allergies. Nearly all commercially marketed margarines are made with soy oil.

The study showed that children with eczema, dermatitis and other itchy skin conditions consumed an average of 8 grams of margarine for every 1,000 calories compared to 6 grams among children without allergies, and 9 grams of butter compared to 11 grams of butter or more among the children without the allergies.

Laboratory testing revealed that the allergic children had a higher ratio of polyunsaturated to saturated fat and a lower percentage of myristic acid (an indicator of saturated fat intake) than children without allergies. They also showed lower levels of the EPA/DHA polyunsaturated oils found in fish.

The inescapable conclusion: butter is better.

(Source: Dunder, T., Kuikka L. et al., "Diet, serum fatty acids and atopic diseases in childhood", Allerg 2001, 56 (5):425-428)

CLEARING THE AIR

Allergic reactions occur not only when soy is eaten but when soybean flour or dust is inhaled. Among epidemiologists, soybean dust is known as an "epidemic asthma agent". From 1981 to 1987, soy dust from grain silo unloading in the harbour of Barcelona, Spain, caused 26 epidemics of asthma, seriously jeopardising the health of 687 people and leading to 1,155

hospitalisations. No further epidemics occurred after filters were installed, but a minor outbreak in 1994 established the need for diligent monitoring of preventive measures.^{61, 62}

Reports of the epidemic in Barcelona led epidemiologists in New Orleans to investigate cases of epidemic asthma that occurred from 1957 to 1968 when more than 200 people sought treatment at Charity Hospital. Investigations of weather patterns and cargo data from the New Orleans harbour identified soy dust from ships carrying soybeans as the probable cause. No association was found between asthma epidemic days and the presence of wheat or corn on ships in the harbour. The researchers concluded, "The results of this analysis provide further evidence that ambient soy dust is very asthmogenic and that asthma morbidity in a community can be influenced by exposures in the ambient atmosphere".⁶³

The first report of "occupational asthma" appeared in the Journal of Allergy in 1934. W. W. Duke described six persons whose asthma was triggered by dust from a nearby soybean mill and predicted that soy could become a major cause of allergy in the future.⁶⁴ Today it is well established that soybean dust is an occupational hazard of working in bakeries, animal feed factories, food processing plants, and health food stores and co-ops with bulk bins. Dust explosions are a safety hazard at soybean processing plants.^{64–68}

Most victims develop their "occupational asthma" over a period of time. In one well-documented case, a 43-year-old woman spent six years working at a food processing plant, in which soybean flour was used as a meat extender, before she developed asthma. Symptoms of sneezing, coughing and wheezing would begin within minutes of exposure to soy flour and resolve two hours after the exposure ceased.⁶⁹

Rare reactions to soy have also occurred in asthmatic patients using inhalers with bronchodilators containing soy-derived excipients. Bronchospasms with laryngospasms and cutaneous rash have occurred even in patients who were otherwise not affected by soy allergy.⁷⁰

FORMULA FOR DISASTER: AROUND THE WORLD WITH SOY ALLERGIES

Allergic reactions occur to soy formula in children all over the world, particularly those affected by other allergies:

- Victoria, Australia – Soy milk allergies in 47 per cent of 97 children with cow's milk allergies;
- Berlin, Germany – Soybean allergies in 16 per cent of children with atopic dermatitis;
- Bonn, Germany – Soybean allergies in 10 per cent of children with suspected food allergy;
- Milan, Italy – Soybean allergies in 17 per cent of children with food intolerance; soybean allergies in 21 per cent of 704 atopic children;
- Rome, Italy – Soy allergies found in 22 per cent of 371 children with food allergy;
- Malmö, Sweden – Soybean allergies in 35 per cent of infants with cow's milk allergies;
- San Diego, USA – Soybean allergies found in 25 per cent of infants sensitive to cow's milk;
- Bangkok, Thailand – Soybean allergies in 17 per cent of children sensitive to cow's milk;
- Thailand – Soy allergies in 4 per cent of 100 asthmatic children;
- New Haven, CT, USA – Soy and milk allergies found in 62 per cent and soy and gluten allergies found in 35 per cent of infants and children with multiple gastrointestinal allergies;
- Ohio, USA – Sensitivity to soy formula found in 5 per cent of 148 children with respiratory allergies.

(Source: Literature review on Dr Matthias Besler's website, <http://www.food-allergens.de.contents-2000.html>; for full citations, see endnotes 110–121)

FUDGING STATISTICS ON SOY INFANT FORMULA

For years, the soy industry billed soy formula as "hypoallergenic". Herman Frederic Meyer, MD, of the Department of Pediatrics, Northwestern University Medical School, Chicago, categorised soy formulas as "hypoallergic preparations" in his 1961 textbook, *Infant Foods and Feeding Practice*, and named Mull Soy, Sobee, Soyalac and Soyola products as good examples.⁷¹

Over the years, the soy industry has promoted this and similar misinformation in advertising, labels and educational literature by ignoring relevant studies in favour of largely irrelevant studies based on guinea pigs.^{72, 73}

As late as 1989, John Erdman, PhD, a researcher honoured in 2001 by the soy industry for his "outstanding contributions to increasing understanding and awareness of the health benefits of soy foods and soybean constituents", claimed "hypoallergenicity" for soy in the *American Journal of Clinical Nutrition*. A subsequent Letter to the Editor corrected his misinformation.^{74,75}

The soy industry today has shifted from claiming hypoallergenicity for soy to minimising its extent. That has been fairly easy, for no one seems to know quite how many sufferers there are. Estimates are rough at best because diagnoses of allergy include anything from parental complaints of spitting, fussiness, colic and vomiting to laboratory provings using RAST and ELISA tests, to clinical challenges and elimination diets.

Because the tests are not completely reliable and anecdotal evidence tends to be taken lightly, many cases are not counted. The figures cited most often delineate 0.3 to 7.5 per cent of the population as allergic to cow's milk and 0.5 to 1.1 per cent as allergic to soy. However, evidence suggests that soy protein is at least as antigenic as milk protein, especially when gastrointestinal complaints and delayed hypersensitivity (non-IgE) reactions are taken into account.^{76–81}

On the soy industry website "Soy and Human Health", Clare Hasler, PhD, of the University of Illinois Urbana, Champaign, picks the low 0.5 per cent figure and claims that soy protein is rated 11th among foods in terms of allergenicity.⁸²

This may have been true in the 1970s (her source is dated 1979), but soy is widely acknowledged as one of the "big eight" today.

Indeed, one prominent researcher puts soy in the "top six" and another in the "top four" foods causing hypersensitivity reactions in children.^{83, 84}

Soy formula is a far from optimal solution for bottle-fed infants who are allergic to dairy formulas. The plant oestrogens in soy can interfere with proper development of the infant's thyroid, brain and reproductive systems. Soy formula also falls short as a solution to cow's milk allergy (see chapter 22 and elsewhere in this article).

Symptoms such as diarrhoea, bloating, vomiting and skin rashes sometimes go away when infants are switched from dairy formula to soy, but the relief is usually only temporary. In many infants, the symptoms return with a vengeance within a week or two.

As Dr Stefano Guandalini, of the Department of Pediatrics, University of Chicago, writes, "A significant number of children with cow's milk protein intolerance develop soy protein intolerance when soy milk is used in dietary management".⁸⁵

Interestingly enough, researchers recently detected and identified a soy protein component that cross-reacts with caseins from cow's milk.⁸⁶ Cross reactions occur when foods are chemically related to each other.

Adverse reactions caused by soybean formulas occur in at least 14 to 35 per cent of infants

allergic to cow's milk, according to Dr Matthias Besler of Hamburg, Germany, and the international team of allergy specialists who help him with the informative website, <http://www.food-allergens.de/contents-2000.html>.⁸⁷

Dr Guandalini's helpful website, <http://www.emedicine.com/ped/topic2128.htm>, reports the results of an unpublished study of 2,108 infants and toddlers in Italy, of which 53 per cent of the babies under three months old who had reacted poorly to dairy formula also reacted to soy formula. Although experts generally attribute this high level of reactivity to the immature—hence vulnerable—digestive tract of infants, this study showed that 35 per cent of the children over one year old who were allergic to cow's milk protein also developed an allergy to soy protein. In all, 47 per cent had to discontinue the soy formula.⁸⁸

Infants who are allergic to dairy formulas are allergic to soy formulas so often that researchers have begun advising paediatricians to stop recommending soy and start prescribing hypoallergenic hydrolysed casein or whey formulas.

A study of 216 infants at high risk for developing allergies revealed comparable levels of eczema and asthma whether they were drinking cow's milk formula or the more "hypoallergenic" soy formula.

Upon conclusion of the study, the message was clear: only "exclusive breastfeeding or feeding with a partial whey hydrolysate formula is associated with the lower incidence of atopic disease and food allergy. This is a cost-effective approach to the prevention of allergic disease in children".⁸⁹

No one can make a good argument that soy formula is hypoallergenic, but many still say that its soy proteins may be less sensitising than cow's milk proteins. When babies develop soy intolerance, the blame tends to go to earlier damage done to the intestines by cow's milk protein.⁹⁰

This has led some physicians to recommend starting infants off from birth on soy formula. This does not stop a tendency to develop food allergies. As C. D. May, of the Department of Pediatrics, National Jewish Hospital and Research Center, Denver, put it, "Feeding a soy product from birth for 112 days did not prevent a brisk antibody response to cow milk introduced subsequently, comparable to or greater than the antibody response seen when cow milk products were fed from birth".⁹¹

BOWELLED OVER

People diagnosed with "allergic colitis" suffer from bloody diarrhoea, ulcerations and tissue damage, particularly to the sigmoid area of the descending colon. The leading cause in infants is cow's milk allergy, but 47 to 60 per cent of those infants react the same way to soy formula. Curiously, inflammatory changes in the mucus lining of the intestines appear even in infants who seem to be tolerating soy: no diarrhoea, no hives, no blood in the stool or other obvious allergic signs. One study showed that clinical reactions occurred in 16 per cent of the children on soy formula, but that histological and enzymological intestinal damage occurred in an additional 38 per cent of the children. This second group showed damage to the intestinal cells and tissues as viewed under a microscope and through blood tests, indicating increased levels of xylose (an indigestible sugar used to diagnose "leaky gut" and other intestinal disorders). The researchers also found depleted levels of sucrase, lactase, maltase and alkaline phosphatase—evidence that the infants' digestive capacity was compromised, their stress levels were increased and immune systems challenged.⁹²

Most gastrointestinal problems connected to soy formula involve non-IgE delayed immune reactions.⁹³ However, local IgE reactions may contribute to these problems by triggering the formation of immune complexes that alter the permeability of the gut mucosa. As C. Carini, the lead author in an *Annals of Allergy* study published in 1987, wrote, "The resultant delayed onset symptoms could be viewed as a form of serum sickness with few or many target organs affected".⁹⁴

The baby's small intestine is at special risk. Scanning electron microscopy and biopsies have revealed severe damage to the small intestine, including flattening and wasting away of the

projections (known as villi) and cellular overgrowth of the pits (known as crypts). Allergic reaction may not be the sole cause here, as the observed destruction dovetails with that caused by soy antinutrients known as lectins and saponins, with the lectins possibly doing double duty as allergic proteins (see chapters 14 and 15). Villi are the projections clustered over the entire mucous surface of the small intestine where nutrient absorption takes place. Flattening and atrophy of the villi lead to malnutrition and failure to thrive, with a clinical picture very similar to that found in children and adults afflicted with coeliac disease.^{95–97}

Coeliac disease is a serious malabsorption syndrome most commonly associated with gluten (a protein fraction found in wheat and some other grains) and dairy intolerance. Few people know that there is also a connection with soy. Some adults with coeliac disease experience diarrhoea, headache, nausea and flatulence even on a gluten-free diet when they eat a tiny amount of soy. And a study of 98 infants and children with multiple gastrointestinal allergies revealed that 62 per cent had both soy and milk allergies and 35 per cent both soy and gluten.^{98, 99}

OUTGROWING SOY ALLERGIES

Allergy specialists say that "most" young children "outgrow" their sensitivities.¹⁰⁰ This makes sense—to a point. If infants develop soy allergies because of immature digestive tracts and immune systems, the risk of developing a soy allergy would decrease with age and many children would outgrow their soy allergies. Yet other studies—even by the same authors—reveal that only a minority of subjects outgrows them.

One study showed that only 26 per cent of children suffering from soy, egg, milk, wheat and peanut allergies lost their hypersensitivity after one year. While peanut—soy's even more allergenic relative—may have skewed those results, another study found that only two out of eight infants outgrew soy allergies after 25 months.^{101–103}

And many children who "successfully" outgrow food allergies develop respiratory allergies. A study of 322 children showed that only six per cent still experienced food sensitivity after five years, but 40 per cent of those children "grew into" respiratory allergies. This was true for milk, egg, chocolate, soy and cereals, in that order.¹⁰⁴ Yet this study is often cited as proof that most children "successfully" outgrow their allergies.

Children are more likely to outgrow allergies to cow's milk or soy than allergies to peanuts, fish or shrimp, but will continue to react to them if they eat these foods often enough. And treatment of these allergies requires total exclusion of the offending food. Soy-induced enterocolitis, for example, will resolve after six months to two years of strictly avoiding soy.¹⁰⁵ As families of allergic youngsters know, keeping soy off the dinner table and out of the meals and snacks provided at daycare centres and schools can be challenging. Even in non-vegetarian families, soy is ubiquitous in the processed food supply. As a result, sensitisation to soy has increased, is not necessarily outgrown, and can either re-emerge or develop later in life.

FRANKENSOY'S MONSTER

Soy allergies may also be on the rise because of genetically modified (GM) soybeans. The York Nutritional Laboratories in the UK, one of Europe's leading laboratories specialising in food sensitivity, found a 50 per cent increase in soy allergies in 1998, the very year in which genetically engineered beans were introduced to the world market. York's researchers noted that one of the 16 proteins in soybeans most likely to cause allergic reactions was found in concentrations higher by 30 per cent or more in Monsanto's GM soybeans. The York researchers sent their findings to British Health Secretary Frank Dobson, urging the government to act on the information and impose an instant ban on GM food, pending further safety tests being conducted. Dr Michael Antonion, a molecular pathologist at Guy's Hospital in central London, observed: "This is a very interesting if slightly worrying development. It points to the fact that far more work is needed to assess their safety. At the moment, no allergy tests are carried out before GM foods are marketed and that also needs to be looked

at."106, 107

People allergic to GM soybeans may not even be allergic to soy. The culprit can be foreign proteins introduced into the soybean. People allergic to Brazil nuts but not to soy have shown allergies to GM soybeans in which Brazil nut proteins were inserted to increase the level of methionine and improve the overall amino acid profile of soy.¹⁰⁸

Scientists say that such problems can be prevented by doing IgE-binding studies, by accounting for physicochemical characteristics of proteins and referring to known allergen databases. That might have identified the Brazil nut problem, but there is no way to assess the risk of de novo sensitisation, which happens when experiments generate new allergens.¹⁰⁹ ∞

READER'S SURVIVAL GUIDE:

KICKING SOY OUT OF YOUR LIFE

Those who are allergic to soy must exclude all soy from their diets. This can be a challenge. Soy lurks in nearly everything these days, even in products where we would not reasonably expect it. In the USA, it's in Bumblebee canned tuna, Chef Boyardee Ravioli, Hershey's chocolate, many of the Baskin Robbins 31 flavours, McDonalds and other fast-food burgers, some Pizza Hut pizzas, many luncheon meats, most breads, muffins, doughnuts, lemonade mixes, hot chocolate, some baby foods, and tens of thousands of other popular products.

If you absolutely must keep soy out of your life or that of your children, memorise the following:

- Soy goes by many aliases. Food processors are less likely to list the three-letter word "soy" than a technical term such as "textured vegetable protein (TVP)", "textured plant protein", "hydrolysed vegetable protein (HVP)", "vegetable protein concentrate", "vegetable oil" or "MSG (monosodium glutamate)". Ingredient lists also include words such as "lecithin", "vegetable oil", "vegetable broth", "bouillon", "natural flavour" or "mono-diglyceride" that do not necessarily, but are likely to, come from soy.
- Food labels and ingredient lists change. Check them every single time. Manufacturers can switch the ingredients used in food products without warning. Allergic consumers need to check the labels every time they make a purchase and ask about ingredients every time they eat at a restaurant or purchase food at a deli. To make things easier, many allergic people carry cards listing foods on their "no" lists.
- Products may be mislabelled or contain undeclared soy. The only solution here is to hope and pray, and make your own food from scratch using known ingredients.
- Cross-contamination occurs. Improperly cleaned pans, plates, utensils and cutting boards at restaurant or delis, bins at health food stores or vats at the factory can contaminate food with traces of soy. All it takes is a bit of old soy oil or soy protein residue to trigger severe reactions in people who are highly susceptible.
- Soy may be in the package as well as its contents. Soy protein isolate used in the manufacture of paperboard boxes can flake off and migrate into food. In the future, some foods may be shrink-wrapped in an edible soy-based plastic.
- Soy can be breathed in as well as eaten. Expect soy dust in some bakeries and shipyards, and in the bulk bin aisle of your health food store.
- Soy may be in your pills. Vitamins, over-the-counter drugs and prescriptions may contain an unwanted dose of soy. Beware of pills with soy oil bases, vitamin E derived from soy oil, and soy components such as isoflavones. The inhaler Atrovent is just one of many pharmaceutical products containing unexpected soy.
- Soy is the latest thing in just about everything. Soy inks, paints, plastics, carpets, mattresses, cars, etc. are just a few of the industrial products that may be green for the environment but deadly for highly allergic persons.
- Kiss with care. Finally, someone who is exquisitely sensitive to soy could die from contact with the lips of someone who has just eaten soy. Unlikely as this might seem, it has happened with peanuts, soy's even more allergenic relative. ∞

About the Author:

Kaayla T. Daniel, PhD, CCN, is the author of *The Whole Soy Story: The Dark Side of America's Favorite Health Food* (NewTrends Publishing, 2004). She is a board-certified clinical nutritionist and a health educator who teaches classes and workshops on disease prevention, optimum health and maximum longevity. Dr Daniel can be reached through her website, <http://www.wholesoystory.com>.

Endnotes:

1. Berger, Stuart. Dr. Berger's Immune Power Diet (NY, New American Library, 1986).
2. FAO Food Allergies Report of the Technical Consultation of the Food and Agricultural Organization of the United Nations, Rome, November 13-14, 1995.
3. Bousquet J, Bjorksten B et al. Scientific criteria and selection of allergenic foods for labelling. *Allergy*, 1998, 53 (Suppl 47) 3-21.
4. Wraith DG, Young GVD, 1979 In: *The Mast Cell: Its Role in Health and Disease*. (London, Piman Medical, 1979).
5. Bush RK, Hefle SL. Food allergens. *Crit Rev Food Sci Nutr*, 1996, 36, S119-S163.
6. Mekori YA. Introduction to allergic disease. *Crit Rev Food Sci Nutr*, 1996, 36S, S1-S18.
7. Saulo, AA. Food allergy and other food sensitivities, Food Safety and Technology, University of Hawaii Honolulu, HI, Cooperative Extension Service, Dec. 2002.
8. Taylor SL. Allergic and sensitivity reactions to food components. *Nutritional Toxicology*, Vol 2, John N. Hatchcock, ed. (NY, Academic Press, 1982).
9. Lemke, RJ, Raylor S. Allergic reactions and food intolerances. In Frank N. Kotsonis, Maureen Mackey, eds *Nutritional Toxicology*,. (Taylor and Francis, 2nd edition, 2001) 117-137.
10. PTI petition
11. Foucard T, Malmheden-Yman I. A study on severe food reactions in Sweden – is soy protein an underestimated cause of food anaphylaxis. *Allergy*, 1999, 53, 3, 261-265.
12. Mortimer EZ. Anaphylaxis following ingestion of soybean. *Pediatr*, 1961, 58, 90-92.
13. Bock SA, Munoz-Furlong A, Sampson HA. Fatalities due to anaphylactic reaction to foods. *J. Aller Clin Immunol*, 2001, 107, 1, 191-193.
14. Sampson HA. Food anaphylaxis, *Br Med Bull*, 2000, 56, 4, 925-935.
15. Yunginger JW,, Nelson DR et al. Laboratory investigation of deaths due to anaphylaxis, *Forensic Science*, 1991, 36, 857-865.
16. Senne GE, Crivellaro M, et al. Pizza: an unsuspected source of soybean allergen exposure. *Allergy*, 1998, 53, 11, 1106-1107.
17. Vidal C, Perez-Carral C, Chomon B, Unsuspected sources of soybean exposure. *Ann Allergy Asthma Immunol*, 1997, 79,4, 350-352.
18. Tamarcaz P, Hauser C, Eigenmann PA. Soy anaphylaxis. *Allergy*, 2001, 56, 8, 792.
19. Moroz LA, Yang WH. Kunitz soybean trypsin-inhibitor: a specific allergen in food anaphylaxis *N Engl J Med*, 1980, 302, 1126-1128.
20. David TJ. Anaphylactic shock during elimination diets for severe atopic eczema. *Arch Dis Child*, 1984, 59, 983-986.
21. Monereet-Vautrin DA, Kanny G. Food-induced anaphylaxis. A new French multicenter study. *Bull Acad Natl Med*, 1995, 179, 1, 161-172, 173-177 and 178-184.
- 21a. Noted in appendix II of a petition to the FDA, filed in March 2004, by the Solae Company, which is seeking approval of a health claim for soy protein and cancer reduction. The petitioners write that they used "industry estimates of increased sales of soy-based ingredients from 1998 to 2002 to determine the soy protein intake after authorisation for the Soy Protein and CHD (coronary heart disease) Health Claim".
22. Letter from Ingrid Malmheden Yman, Ph.D., senior chemist Sweden National Food Administration, Chemistry Division Livsmedels Verket. to Ministry of Health in New Zealand, May 30, 1997. (Released under Official Information Act.)
23. Perlman, Frank "Allergens" in Irvin Liener, ed. *Toxic Constituents of Plant Foodstuffs* (NY,

Academic Press, 1980).

24. Kuroume T, Oguri M et al. Milk sensitivity and soybean sensitivity in the production of eczematous manifestations in breast-fed infants with particular reference to intrauterine sensitization. *Ann Allergy*, 1976, 37, 41-46.
25. Sampson HA. Managing peanut allergy, *Brit Med J.*, 1996, 312, 1050.
26. Burks AW, Williams LW et al. Allergenicity of peanut and soybean extracts altered by chemical or thermal denaturation in patients with atopic dermatitis and positive food challenges. *J. Allergy Clin Immunol*, 1992, 90, (6 pt 1) 889-897.
27. Eigenmann, PA, Burks, AW, et al. Identification of unique peanut and soy allergens in sera absorbed with cross-reacting antibodies. *J. Allergy Clin Immunol*, 1996, 98, 5 pt 1, 969-978.
28. Burks AW, Cockrell G et al. Identification of peanut agglutinin and soybean trypsin inhibitor as minor legume allergens. *Int Arch Allergy Immunol*, 1994, 105, 2, 143-149.
29. Giampietro PG, Ragno V et al. Soy hypersensitivity in children with food allergy. *Ann Allergy*, 1992, 69, 2, 143-146.
30. Beardslee TA, Zeece MG et al. Soybean glycinin G1 acidic chain shares IgE epitopes with peanut allergen Ara H 3. *Int Arch Allergy Immunol*, 2000, 123, 4, 299-307.
31. Pereira MJ, Iver MT et al. The allergenic significance of legumes. *Allerol Immunopathol (Madr)* 2002, 30, 6, 346-353.
32. Perlman.
33. Sampson HA and McCaskill CM. Food hypersensitivity and atopic dermatitis: evaluation of 113 patients, *J Pediatr* , 1985, 107, 669.
34. Burks AW, Brooks JR, Sampson HA. Allergenicity of major component proteins of soybean determined by enzyme-linked immunosorbent assay (ELISA) and immunoblotting in children with atopic dermatitis and positive soy challenges. *J. Allergy Clin Immunol*, 1988, 81, 111135-1142.
35. Ogawa T, Bando N et al. Investigation of the Ig-binding proteins in soybeans by immunoblotting with the sera of the soybean-sensitive patients with atopic dermatitis. *J. Nutr Sci Vitaminol Tokyo*, 1991, 37, 6, 555-565.
36. Lalles JP, Peltre G. Biochemical features of grain legume allergies in humans and animals. *Nutr Rev*, 1996, 54, 101-107.
37. Burks AW, Cockrell G et al. Identification of peanut agglutinin and soybean trypsin inhibitor as minor legume allergens. *Int Arch Allergy Immunol*, 1994, 105, 2, 143-149.
38. Moroz LA, Yang WH. Kunitz soybean trypsin-inhibitor: a specific allergen in food anaphylaxis *NEJM*, 1980, 302, 1126-1128.
39. Gu X, Beardslee T et al. Identification of IgE-binding proteins in soy lecithin. *Int Arch Allergy Immunol*, 2001, 126, 3, 218-225.
40. Barnett D, Howden ME. Lectins and the radioallergosorbent test. *J. Allergy Clin Immunol*, 1987, 80, 4, 558-561.
41. Chin KW, Garriga MM, Metcalfe DD. The histamine content of oriental foods. *Food Chem Toxicol*, 1989, 27, 5, 283-287.
42. Herian AM, Taylor ST, Bush RK. Allergenic reactivity of various soybean products as determined by RAST inhibition. *Food Science*, 1993, 58, 385-388.
43. Franck P, Moneret Vautrin DA et al. The allergenicity of soybean-based products is modified by food technologies. *Int Arch Allergy Immunol*, 2002, 128, 3, 212-219.
44. Soybean oil made safe in processing. *The Soy Connection*, Spring 2003, 11,2,1. .
45. Bush RK, Taylor SL et al. Soybean oil is not allergenic to soybean-sensitive individuals. *J Allergy Clin Immunol*, 1985, 76, 2 pt 1, 242-245.
46. Awazuhara H, Kawai H et al. Antigenicity of the proteins in soy lecithin and soy oil in soybean allergy. *Clin Exp Allergy*, 1998, 28, 12, 1559-1564.
47. Gu X, Beardslee T et al. Identification of IgE-binding proteins in soy lecithin. *Int Arch Allergy Immunol*, 2001, 126, 3, 218-235.
48. Errahali Y, Morisset M et al. Allergen in soy oils. *Allergy*, 2002, 57, 7, 42, 648-649.
49. Moneret-Vuatrin DA, Morisset M et al. Unusual soy oil allergy. *Allergy*, 2002, 57, 3, 266-

267.

50. Buchman AI, Ament ME. Comparative hypersensitivity to intravenous lipid emulsions, JPEN J Parenter Enteral Nutr, 1991, 15, 3, 345-346.

51. Weidmann B, Lepique C, et al. Hypersensitivity reactions to parenteral lipid solution. Support Care Cancer, 1997, 5, 6, 504-505.

52. Fremont S, Errahali Y et al. Mini Review: What about the allergenicity of vegetable oils? Internet Symposium on Food Allergens, 2002, 4, 2, 111-118.

53. Crevel RW, Kerkhoff MA, Koning MM. Allergenicity of refined vegetable oils. Food Chem Toxicol, 2000, 38, 4, 385-393.

54. Vidal C, Perez-Carral C, Chomon B. Unsuspected sources of soybean exposure. Ann Allergy Asthma Immunol, 1997, 79, 4, 350-352.

55. Taylor SL, Hefle SL. Ingredient issues associated with allergenic foods. Curr Aller Clin Immunol, 2001, 14, 12-18.

56. Foucard.

57. Vierk K, Falci K et al. Recalls of foods containing undeclared allergens reported to the US Food and Drug Administration, fiscal year 1999. J Allergy Clin Immunol, 2002, 109, 6, 1022-1026.

58. Allergy Alert notices published on the website www.inspection.gc.ca.

59. Besler Matthias and Kasel Udo, Wichmann, Gerhard. Review: Determination of Hidden allergens in Foods by Immunoassays. Internet Symposium on Food Allergens, 2002, 4, 1, 118. www.food-allergens.de.

60. Joshi P, Mofidi S, Sicherer SH. Interpretation of commercial food ingredient labels by parents of food-allergic children. J Allergy Clin Immunol, 2002, 109, 6, 1019-1021.

61. Aceves M, Grimalt JO, et al. Identification of soybean dust as an epidemic asthma agent in urban areas by molecular marker and RAST analysis of aerosols. J. Allergy Clin Immunol 1991, 88, 124-134.

62. Pont F, Gispert X et al. An epidemic of asthma caused by soybean in L'Hospitalet de Llobregat (Barcelona). Arch Bronconeumol, 1997, 33,9, 453-456. Medline abstract. Article in Spanish. .

63. White MC, Etzel RA et al. Reexamination of epidemic asthma in New Orleans, Louisiana, in relation to the presence of soy at the harbor. Am J. Epidemiol, 1997, 1, 145, 5, 432-438.

64. Duke WW. Soybean as a possible important source of allergy. J. Allergy, 1934, 5,300-303.

65. Baur X, Pau M et al, Characterization of soybean allergens causing sensitization of occupationally exposed bakers' allergy. Allergy, 1996, 51, 5, 326-330.

66. Baur X, Degens PO, Sandeer I. Bakers asthma: still among the most frequent occupational respiratory disorders. J. Allergy Clin Immunol, 1998, 102, (6 pt 1) 984-997.

67. Lavaud F, Perdu D et al. Baker's asthma related to soybean lecithin exposure. Allergy, 1994, 49, 3, 159-162.

68. Woerfel, JB Extraction. In David R. Erickson, ed. Practical Handbook of Soybean Processing and Utilization. (Champaign, IL, AOCS Press, 1995) 90.

69. Bush RK, Schroeckenstein DC, et al. Soybean flour asthma: detection of allergens. J. Allergy Clin Immunol, 1988, 82, 25-35.

70. Facchini G, Antonicelli I et al. Paradoxical bronchospasm and cutaneous rash after metered-dose inhaled bronchodilators. Monaldi Arch Chest Dis, 1996, 51, 3, 201-203.

71. Meyer, Herman Frederic, Infant Foods and Feeding Practice (Springfield, IL, Charles C. Thomas, 1961).

72. Eastham EJ. Soy protein allergy. In Food Intolerance in Infancy: Allergology, Immunology and Gastroenterology. Robert n. Hamburger, ed. (NY, Raven Press, 1989), 227. .

73. Guandalini S, Nocerino A. Soy protein intolerance. www.emedicine.com/ped/topic2128.htm

74. Erdman JW Jr, Fordyce EJ. Soy products and the human diet. Am J. Clin Nutr, 1989, 49, 5, 725-737.

75. Witherly SA Soy formulas are not hypoallergenic. Comment on Am J. Clin Nutr 1989, 49,

- 5, 725-737. *Am. J Clin Nutr*, 1990, 51, 4, 705-706.
76. Businco L, Bruno G, Giampietro PG. Soy protein for the prevention and treatment of children with cow-milk allergy. *Am J. Clin Nutr*, 1998, 68 (6 Suppl), 1447-1452S.
77. Guandalini.
78. Sampson HA. Food allergy *Curr Opin Immunol*, 1990, 2, 542-547.
79. Eastham EJ, Lichanco T et al. Antigenicity of infant formulas: role of immature intestine on protein permeability. *J. Pediatr*, 1978, 93, 4, 561-564.
80. Zeiger RS, Sampson HA et al. Soy allergy in infants and children with IgE-associated cow's milk allergy. *J. Pediatr*, 1999, 134, 614-622.
81. Halpin, TC, Byrne WJ, Ament ME. Colitis, persistent diarrhoea, and soy protein intolerances. *J Pediatr*, 1977, 91, 404-407.
82. Hasler, Clare. Information provided on the website "Soy and Human Health: Ask an Expert." <http://web.aces.uiuc.edu/faq>.
83. Burks AW, Williams LW et al. Allergenicity of peanut and soybean extracts altered by chemical or thermal denaturation in patients with atopic dermatitis and positive food challenges. *J. Allergy Clin Immunol*, 1992, 90 (6 pt 1), 889-897.
84. Besler, Matthias Allergen Data Collection: Soybean (Glycine max), Internet Symposium on Food Allergens 1999, 1, 2, 51-79. www.food-allergens.de.
85. Guandalini, Stefano and Nocerino, Agostino. Soy protein intolerance (updated June 17, 2002) www.emedicine.com/ped/topic2128.htm.
86. Rozenfeld P, Docena GH, et al. Detection and identification of a soy protein component that cross-reacts with caseins from cow's milk. *Clin Exp Immunol*, 2002, 130, 1, 49-58. .
87. Besler, M, Helm RM, Ogawa T. Allergen Data collection update: soybean (glycine max) Internet Symposium on Food Allergens, 2000, 2 (Suppl 3) 435.
88. Guandalini.
89. Chandra RK. Five-year follow-up of high-risk infants with family history of allergy who were exclusively breast fed or fed partial whey hydrolysate, soy, and conventional cow's milk formula. *J. Pediatr Gastroenterol Nutr*, 1997, 24, 4, 380-388.
90. American Academy of Pediatrics, Committee on Nutrition, Soy protein-based formulas: recommendations for use in infant feeding (RE9806) Policy Statement, *Pediatrics*, 1998, 101, 1, 148-153.
91. May CD, Fomon SJ, Remigio L. Immunologic consequences of feeding infants with cow milk and soy products. *Acta Pediatr Scand*, 1982, 71, 43-51.
92. Iyngkaran N, Yadav M, Looi LM. Effect of soy protein on the small bowel mucosa of young infants recovering from acute gastroenteritis. *J. Pediatr Gastroenterol Nutr*, 1988, 7, 1, 68-75.
93. Guandalini.
94. Carini C, Brostoff J, Wraith DG. IgE complexes in food allergy, *Ann Allergy*, 1987, 59, 2, 110-117.
95. Ament ME, Rubin CE. Soy protein – another cause of the flat intestinal lesion. *Gastroenterol*, 1972, 62, 2, 227-234.
96. Poley JR, Klein AW. Scanning electron microscopy of soy protein-induced damage of small bowel mucosa in infants. *J. Pediatr Gastroenterol Nutr*, 1983, 2, 2, 271-287.
97. Perkkio M, Savilahti E, Kuitunen P. Morphometric and immunohistochemical study of jejunal biopsies from children with intestinal soy allergy. *Eur J Pediatr*, 1981, 137, 1, 63-69.
98. Falkner-Hogg KB, Selby WS, Loblay RH. Dietary analysis in symptomatic patients with celiac disease on a gluten-free diet: the role of trace amounts of gluten and non-gluten intolerances. *Scand J. Gastroenterol*, 1999, 34, 8, 784-789.
99. Gryboski, Kokoshis.
100. Sampson HA, Food allergy, *J. Allergy Clin Immunol*, 2003, 111 (2 suppl), S540-547.
101. Sicherer SH, Sampson HA. Food hypersensitivity and atopic dermatitis: pathophysiology, epidemiology, diagnosis and management. *Allergy Clin Immunol*, 1999, 104, 3, (3 pt 2) S114-122.
102. Sampson HA, Scanlon SM, Natural history of food hypersensitivity in children with atopic

dermatitis, *Pediatrics*, 1989, 115,1, 23-27.

103. Sicherer SH, Eigenmann PA, Sampson HA. Clinical features of food protein-induced enterocolitis syndrome. *J. Pediatr*, 1998, 133,2, 222-219.

104. Ogle KA, Bullock JD. Children with allergic rhinitis and/or bronchial asthma treated with elimination diet: a five-year follow up. *Ann Allergy*, 1980, 44, 5, 273.

105. Sicherer SJ, Eigenmann PA, Sampson HA. Clinical features of food protein-induced enterocolitis syndrome. *Pediatr*, 1998, 133, 2, 214-219.

106. Townsend, Mark, Why soya is a hidden destroyer. *Daily Express (London)*, March 2001, 12.

107. Keeler, Barbara. A nation of lab rats. *Sierra Club Magazine*, July/August 2001 45.

108. Nordlee JA, Taylor SL et al, Identification of a Brazil-nut allergen in transgenic soybeans. *NEJM*, 1996, 334, 11, 688-692.

109. Lack G. Clinical risk assessment of GM foods, *Toxicol Lett*, 2002, 28, 127, 1-3, 337-340.

110. Wilson NW, Hamburger RN, Allergy to cow's milk in the first year of life and its prevention. *Ann Allergy*, 1988, 61, 5, 323—327.

111. Harikul S, Haruehasavasin Y et al. Cow milk protein allergy during the first year of life: a 12 year experience at the children's hospital, Bangkok, *Asian Pac J Allergy Immunol*, 1995, 13, 2, 107-111.

112. Jakobsson I, Lindberg T. A prospective study of cow's milk protein intolerance in Swedish infants, *Acta Paediatr Scand*, 1979, 68, 853-859.

113. Bishop JM, Hill DJ, Hosking CS. Natural history of cow milk allergy: clinical outcome. *J. Pediatr*, 1990, 116, 6, 862-867.

114. Niggemann B, Sielaff B et al. Outcome of double-blind, placebo-controlled food challenge tests in 107 children with atopic dermatitis, 1999, *Clin Exp Allergy*, 29, 1, 91-96.

115. Mistereck A, Lange CE, Sennekamp J. Soja – a frequent food allergen, *Allergologic*, 1992, 15, 30-46.

116. Bardare M, Magnolfi C, Zani G. Soy sensitivity: personal observation on 71 children with food intolerance. *Allerg Immunol Paris*, 1988, 20, 2, 63-66.

117. Giampietro PG, Ragno V et al. Soy hypersensitivity in children with food allergens. *Allergy*, 1992, 69, 2, 143-146.

118. Bruno G, Cantini A et al. Natural history of IgE antibodies in children at risk for atopy. *Ann Allergy Asthma Immunol*, 1995, 74, 5, 431-436.

119. Kongpanichkul A, Vichyanond P, Tuchinda M. Allergen skin test reactivities among asthmatic Thai children, *Med Assoc Thai*, 1997, 80, 2, 69-75.

120. Gryboski JD, Kocoshis S. Immunoglobulin deficiency in gastrointestinal allergies, *Clin Gastroenterol*, 1980, 2, 1, 71-76.

121. Ogle KA, Bullock JD, Children with allergic rhinitis and/or bronchial asthma treated with elimination diet: a five-year follow up. *Ann Allergy*, 1980, 44, 27-38.

NEXUS ARTICLES, BOOKS, SUBS, ADS & VIDEOS