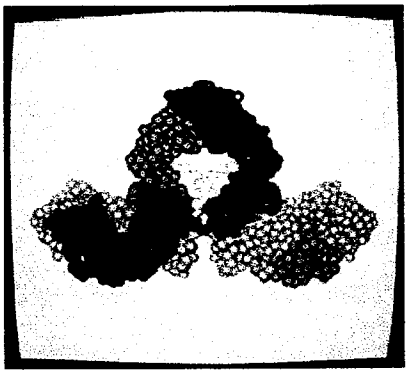
Allergic Reaction

An allergic reaction is an exaggerated immune system response to things that are harmless to most people. All foods contain some antigens (i.e., substances the body perceives as harmful) and your body regulates their dispersal and eventual elimination. In the case of peanut allergic individuals, the immune system overreacts to the antigens in peanuts, producing a potentially fatal reaction.

The Allergic Reaction to Peanuts



Immunoglobulin, photo by Dr. Richard Feldmann

When someone with a peanut allergy eats peanuts, their T cells overreact to the antigens and stimulate excessive production of immunoglobulin. Immunoglobulin, in turn, stimulates the production of symptom-causing chemicals, primarily histamines which cause swelling. An allergic reaction ensues. The reaction has a wide variance in severity, but peanut allergy reactions tend toward the severe.

Peanut Allergy Symptoms

Peanut allergy causes various degrees of inflammation, itching and indigestion. Inflammation, or swelling, is the greatest concern as it can lead to blockage of the air passages and circulatory collapse, i.e. anaphylaxis. Reactions can be immediate (within seconds) or delayed for several hours. Susceptible individuals can be affected by only a few milligrams of peanut protein. Approximately 75% of peanut-allergic children will experience a reaction the first time that they eat peanuts.

Signs and symptoms of peanut allergy may include:

- Skin reactions such as urticaria (hives), redness or edema (swelling)
- Itching or tingling in or around the mouth and throat
- Digestive problems such as diarrhea, stomach cramps, nausea or vomiting
- Tightening of the chest
- Shortness of breath or wheezing
- Runny or stuffy nose

- Anaphylaxis, a whole-body allergic reaction that can result in suffocation and a sudden drop in blood pressure

Anaphylaxis / Anaphylactic Shock

An anaphylactic reaction must be treated with epinephrine immediately; ongoing observation is required as the reaction may recur after initial therapy.

FOOD ALLERGY QUESTIONS

Please click on the section below to learn more about the NPB's Peanut and Food Allergy Research and Education Initiatives.

Overview | Research & Education Projects | Food Allergy Questions | Helpful Links

Below are answers to some frequently asked questions about food allergy. This FAQ has been developed by The National Peanut Board (NPB) with guidance from its Scientific Advisory Council, which includes some of the world's leading food allergy researchers as well as with input from the Food Allergy & Anaphylaxis Network (FAAN).

What is a food allergy?
Food allergy is a specific reaction of the body's immune system to a food or food proteins.

What are the most common food allergens?
In Western Hemisphere countries, experts attribute 90 percent of all food-allergic reactions to eight foods: cow's milk, egg, soy, wheat, peanut, tree nut (e.g., almonds, walnuts, and pecans), fish and crustacean shellfish. Sesame seed also seems to be an increasingly important cause of food allergy in some parts of the world. Experts do not know why some foods cause more allergy than others. Very frequently, patients with pollen allergies have mild cross-reactions to fresh fruits, such as apples, peaches, cherries and to raw vegetables, such as carrots and celery.

How many people have a food allergy?
Studies show that a true food allergy affects about 4 percent of the U.S. adult population and about 4 to 6 percent of children. Many young children outgrow their food allergies overtime. Reduced levels of serum IgE over time may indicate reduced levels of reaction or an outgrowing of peanut allergy. Experts do not k now why the prevalence of food allergy differs in different parts of the world. Additionally, experts do not know why peanut and some other food allergies are on the rise.

What are common allergic reactions to food?
The most common manifestations of allergic reactions to foods may involve the skin (causing rash, hives, itching or swelling), respiratory tract (wheezing, cough, chest tightness, shortness of breath, sneezing, runny nose), cardiovascular system (dizziness, lightheadedness, loss of consciousness, chest pain) and gastro-intestinal tract (including stomach cramps, nausea, vomiting, and diarrhea). Experts do not know why some people have mild reactions and others have life threatening reactions.

What are the most serious allergic reactions to food?
The most serious allergic reactions to food are those that involve the respiratory or cardiovascular systems.

What is Anaphylaxis?
Anaphylaxis is the systemic manifestation of allergy – when an allergic reaction affects the body as a whole and not just locally. In other words, some patients have hives just in the area of contact with the food allergen, such as the lips and mouth, while other patients have hives over their entire body, regardless of the route of exposure. It is this latter systemic total body reaction that is termed anaphylaxis. The severity of anaphylaxis can be graded mild, moderate, or severe. ***Anaphylaxis is a potentially life threatening allergic reaction.***

Is there a way to prevent a food allergy reaction?
Currently, the only way to prevent a food allergy reaction is by strict avoidance of the food.

Who is at risk for developing severe food allergy reactions?
Individuals with peanut or tree nut allergy and those with asthma appear to be at highest risk for severe food allergy reactions.

How do I know if I have a food allergy?
Experts recommend individuals visiting a board certified allergist for proper diagnosis of food allergy, and that at all times they carry a written food allergy management plan from their doctor and any prescribed medications for handling an allergic reaction. For information about finding an allergist in your area, visit the American Academy of Allergy, Asthma and Immunology (AAAAI) website at www.aaaai.org or the American College of Asthma, Allergy and Immunology website at www.acaai.org. It is not correct that it is easy to tell if someone has a food allergy just by looking at them.

What may cause other reactions to food?
Other reactions to foods may be due to food tolerance (e.g., lactose intolerance) rather than food allergy. These reactions do not involve the immune system.

Can a tiny amount of food cause a severe allergic reaction?
Tiny amounts of a food can cause severe allergic reactions. Additionally, experts have not yet defined the smallest amount of food allergen that can be safely consumed by an allergic individual, and it is not correct that just "one little bite" of an allergy-causing food will not hurt you.

Do you have to eat the food to have an allergic reaction?
Some people do not have to eat the food to have an allergic reaction; breathing or touching the food to which they are allergic can cause a reaction.

Is it true that if you administer a shot of epinephrine during a food allergic reaction, you can forgo further treatment?
It is not correct that if you administer a shot of epinephrine during a food allergic reaction, you can forgo further treatment. It is also not correct that you should try to "tough out" a reaction.

Who is at risk for developing a food allergy?
Anyone can acquire a food allergy at any time in life. If there is a family history of any allergy, asthma, or atopic dermatitis a child is more likely to develop food allergy. If an immediate family member has a peanut allergy, the child is at an increased risk for developing peanut allergy. However, experts do not know why certain individuals develop food allergies while others do not.

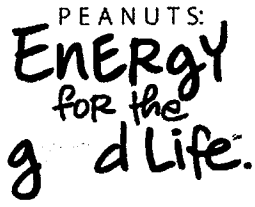
Can you outgrow a food allergy?
Eighty-five percent of children diagnosed with milk, soy, wheat, and/or egg allergy lose their sensitivity to the food between three to five years of age. Up to 20 percent of children will outgrow their peanut allergy (particularly those who had mild reactions early in life); however, experts do not know why certain individuals outgrow food allergies while others do not.

Is there a link between consuming certain allergenic foods during pregnancy and the onset of food allergy in the child?
Experts do not know whether there is a link between consumption of certain allergenic foods during pregnancy and the onset of food allergy in the child. Substances from the foods such as peanut are passed from the breastfeeding mother's diet into her breast milk; the effect on the breastfeeding infant is still unknown.

How many people have a peanut allergy?
Recent population based studies in the United States, UK, and Canada estimate that approximately 0.6 – 1.5% of the U.S. population has a peanut allergy.

Why are peanut allergies on the rise?
The rise in peanut allergies most likely parallels the rise in all allergic diseases in children. There are numerous theories to explain the increase; however, the theory that seems to have the most support from laboratory and clinical studies is the "Hygiene Hypothesis."

What is the Hygiene Hypothesis?
The Hygiene Hypothesis states that the more hygienic a society is, the more allergic they are as well. Studies suggest that the immune system in early infancy is primed to recognize and fight infections. In the absence of infections, the immune system begins to target innocuous items in the child's diet and environment.



Do 150 people die of peanut allergic reactions ever year?
It is not true that 150 people die of peanut allergic reactions every year. Approximately, 150 people die of *all food allergic reactions* every year.

Does peanut oil elicit an allergic reaction?
If refined peanut oil is used properly and is not reused after cooking peanuts, it seems to be safe for most people with peanut allergy; crude oil, however, represents a risk. Cold pressed, expelled or extruded peanut oil is NOT safe for peanut allergic individuals.

Where can I learn more about food allergy?
Education is the key to preventing and managing food allergies. For more information visit the Food Allergy & Anaphylaxis Network (FAAN) Website at www.foodallergy.org.

Still Have Questions?
If you have specific questions regarding food allergy or would like us to facilitate a meeting with one of the Scientific Advisory Council Members, please contact the National Peanut Board at 678-424-5750.

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Asthma and Allergy Foundation of America

PEANUT ALLERGY

Peanut (legume) Allergy can be a life-long allergy affecting approximately 2% of the population. Peanut allergy is the most common cause of death due to foods. Three things characterize peanut hypersensitivity:

- Reactions can be extremely violent and life threatening with just a little exposure to the allergen.
- This allergy likely to persist throughout life.
- It is often associated with other non-legume allergies (tree nuts, or certain seeds for example) and seed allergy. Peanut and tree nut allergic reactions coexist in one third of peanut allergic patients.

The most commonly reported symptoms seen with this kind of allergy include: **atopic dermatitis (eczema)**, **urticaria (hives)**, **asthma**, **anaphylactic shock**, digestive symptoms.

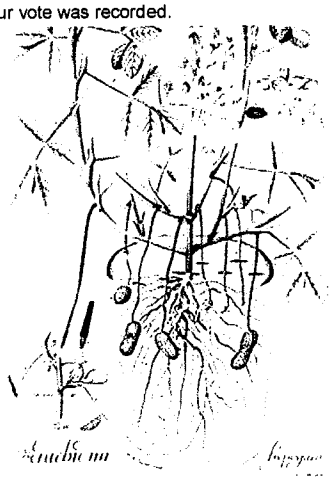
Common places you will find peanuts, peanut oils or trace amounts of peanut include:

- Peanut, groundnut, arachis
- Peanut butter
- Baked goods - pastry, biscuits, cookies, crackers, health bread
- Asian foods - Thai, Chinese & Indonesian dishes
- Vegetarian foods
- Cold pressed (crude) peanut oil
- Muesli and other cereals
- Ice creams
- Mixed Nuts, marzipan
- Soups
- Natural flavoring
- Egg rolls
- Health foods – nutrition and energy bars and other sweets
- Sauces

As with most allergies, avoidance is key. Make sure to read all labels for foods, medicines, cosmetics, creams and ointments that may contain any type or amount of peanut. A history of allergic reactions shortly after exposure to peanuts might suggest an allergy. However, this should be confirmed with a skin prick test or RAST. Talk to your doctor about a complete diagnosis.

What is a Peanut Allergy?

Your vote was recorded.



Peanut allergy is a severe, usually rapid, reaction to the ingestion of peanuts. Symptoms **range from atopic dermatitis (hives, eczema, etc.) and digestional discomfort to** anaphylaxis, **a potentially fatal constriction of the airways and swelling of the throat. Though these symptoms are similar to those of other food allergies, peanut allergy symptoms tend to be rather severe and account for the majority of fatal or near fatal anaphylactic reactions in the U.S. (Bock, Munoz-Furlong, & Sampson, 2001; Sampson, 2002).**

For reasons that are unknown, a peanut-allergic person produces massive amounts of histamines as soon as the body starts to digest the ingested nuts. In severe cases, treatment **must be administered at once to prevent a fatality. Although peanuts are a ground nut and a peanut allergy is different from a tree nut allergy, there are similarities. In fact, many peanut allergy sufferers also have tree nut allergies. For many, a peanut allergy is a lifelong problem; approximately 20% of infants with peanut allergy outgrow the allergy.**

The reaction usually happens shortly after a food is eaten and in some extremely sensitive individuals, ingestion of even trace amounts of peanut can stimulate a reaction. It is important for parents to be aware **of the difference, which is often a matter of severity, between a** peanut allergy reaction **and reactions to other food allergies. Food allergies are extremely prevalent, affecting between 4-8% of children, but most are not as dangerous as a peanut allergy, which affects approximately 1% of children. A peanut allergy is more common in people who have other atopic conditions, like eczema, asthma or hay fever, or who have immediate family with these conditions.**

Allergic food reactions, particularly peanut allergy, are on the rise, according to The Food Allergy & Anaphylaxis Network. Peanut allergy causes an estimated 15,000 emergency room visits each year and nearly 100 deaths. Peanuts, along with milk, eggs, tree nuts (walnuts, almonds and pecans, for example), fish, shellfish, soy and wheat account for 90 percent of all allergic reactions in the United States. Food allergy-induced reactions are estimated to account for tens of thousands of allergic reactions each year and 30,000 emergency room visits.

As mentioned above, what distinguishes a peanut allergy is the severity of the reaction. In fact, studies by Scott H. Sicherer, M.D., associate professor of pediatrics at the Mount Sinai School of Medicine and a researcher in the Jaffe Food Allergy Institute, suggest that 80% of people with a peanut allergy have had a reaction that involves a breathing problem or that affected multiple areas of their body. He further estimates that 100 to 150 people in the USA die each year from peanut allergies.

Allergy Asthma information association

Allergy/Asthma Information Association

Living With Allergies & Asthma

by Nick Pothier, age 12, Picton, ON

My name is Nick Pothier. I am 12 years old and I have anaphylactic allergies to tree nuts and peanuts.When I was 2½ years old, I had some of my dad's cashews and had my first anaphylactic reaction. My mom said when I got to the hospital I was hardly breathing and covered in hives.

Before I started school things went well and only safe foods were allowed in my house. When I started school, my parents were nervous. We went into the school about a week before and talked to my teacher about my allergies. My teacher seemed to understand and notes were sent home with all the other kids on the first day. We did this every year and things went pretty well for me. Occasionally, someone would bring a peanut butter sandwich to school but would be sent to the office to eat it. As I moved into the higher grades however, the long notes that were sent home on the first day seemed to get smaller and in grade 6 the kids were reminded about my allergy and asked to "bear this in mind" when bringing their lunches.

In grade 6 it seemed that everyday somebody brought in a peanut butter sandwich or a nutty snack. Once walnut cookies were given to my class as a treat and I had to wait in the hall! As this behaviour continued, the children who brought nuts had to eat in the hall, but they still brought nuts. I was confused and wondered, "Why are children bringing in peanut and nuts to school, even though they know I'm allergic to them?"

At the end of the school year, I decided to do a study exploring how often peanuts and nuts were brought into school and how much my class really knows about anaphylaxis. My hypothesis was that the kids don't understand why they should change their lunch and snacks for my allergy because they don't know what anaphylaxis really is.

I designed my study based on several variables. I wondered how the students received their information. Did they receive it from their teacher, principal, parents or friends? How do they get the food for their lunches? Do they pack it themselves or do their parents pack it for them? I needed to find out who I needed to teach!

My questionnaire was done on the very last day of school. I found out that 67% of my class brought in peanut butter sandwiches at least once this year! As well 52% brought in foods containing nuts with 10% bringing them in one or more times a week! Also, 76% of my class didn't know what anaphylaxis was! I also found that I needed to work not only on the student, but on my teacher, the parents and my principal as well. From my study results, I decided my class needed to learn two things: How to pack a healthy peanut/nut free lunch (67% packed their own lunch), and how severe anaphylaxis really is. Plus, I also saw an opportunity for the principal and teachers to help in this effort as the students identified their existing source of knowledge about these allergies as being their parents, doctor, and friends.

Over the summer, before grade 7, I designed a couple of teaching packages. I needed information so I e-mailed Monika Gibson from the AAIA for help. She was very helpful and supportive of my project, providing me with a new CD-rom and pamphlets. The first package I designed was on peanut/nut free foods and the second on anaphylaxis.

A week before school started, Mom and I met with my principal and teacher to

discuss my problem and teaching plans. They were agreeable that I may teach package 1 on the first day of school and package 2 as a health lesson at the end of September. We provided the information that Monika Gibson sent from the AAIA to my principal to teach the teachers about anaphylaxis. I also lent my EpiPen trainer to the school so the teachers could practice.

In my peanut/nut free teaching package, I made a board game to help teach my class some common foods that are safe and some that are not. I also made a pamphlet that gives healthy peanut/nut free lunch and snack ideas. I made a "peanut/nut free food pyramid" display and put up "peanut/nut free" signs on my classroom door. I wrote a contract with my principal's help and approval, that my teacher, each student and their parent(s), had to sign stating that they would not bring in peanuts or nuts to the classroom.

My anaphylactic teaching package used different ways to explain what anaphylaxis is. I made another game with true and false anaphylactic questions. I made an anaphylactic signs and symptoms poster for my classroom. I showed my class a short DVD (Taking Control), and handed out an Anaphylaxis pamphlet (both by AAIA). I also did an EpiPen demonstration into a plastic bottle and let my class use my EpiPen trainer to practice. My mom came and told my class about my reaction and then we had an open discussion and questions. My principal, teacher and educational assistant were all present.

Both of my presentations went well. It seems my class didn't realize how severe "anaphylaxis" really was. My plan is to re-test my class in December with the same questionnaire I gave them last year. I also want to test another class in my school to see if the information that was given to the principal and other teachers has passed on to other students. I plan on using this study for my 2006 science fair project. If my teaching methods prove to be successful, maybe they could be used once Sabrina's Law comes into effect Jan 2006, and possibly help save a life.

from Allergy & Asthma News, Issue 4 2005

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Peanut Allergy

Peanut allergy is one of the most common food allergies. Unfortunately, it also is one of the most dangerous, since peanuts tend to cause particularly severe reactions (anaphylaxis). Some people are very sensitive and have reactions from eating trace amounts of peanut. Non-ingestion contact (touching peanuts or inhaling airborne peanut allergens, such as dust from the shells) is less likely to trigger a severe reaction.

Peanut allergies seem to be on the rise in children. In the United States, the number of children with peanut allergy doubled between 1997 and 2002. Subsequent studies in the United Kingdom and Canada also showed a high prevalence of peanut allergy in schoolchildren. Unlike egg and cow's milk allergies, which most children outgrow, peanut allergies tend to be life-long. Recent studies, however, indicate that approximately 20% of peanut-allergic children do eventually outgrow their allergy.

The peanut (*Arachis hypogaea*) is not really a nut, but a kind of legume. It is related to other beans, such as peas, lentils, and soybeans. People with peanut allergy are not necessarily allergic to other legumes (even soy, another of the "big eight" food allergens), so be sure to speak with your doctor before assuming that you have to avoid these protein-rich foods. A person with a peanut allergy may also be allergic to tree nuts (almonds, walnuts, hazelnuts, cashews, etc.). In fact, some 30-40% of people who have peanut allergy also are allergic to tree nuts. Not surprisingly, allergists usually tell their peanut-allergic patients to avoid tree nuts.

Researchers have isolated three major peanut allergens. They are trying to learn why peanuts cause such severe reactions and why the number of people who suffer from peanut allergy is increasing. Investigators also are trying to develop therapies that would prevent anaphylaxis in people with peanut allergies.

How to Avoid Peanuts*
The federal Food Allergen Labeling and Consumer Protection Act (FALCPA) requires that any packaged food product that contains peanuts as an ingredient must list the word "Peanut" on the label. **Please be sure to read all product labels carefully before purchasing and consuming any item.** Remember, also, that ingredients change from time to time, so check labels every time you shop. If you are still not sure whether or not a product contains peanuts, call the manufacturer. Always take extra precaution when dining in restaurants or eating foods prepared by others. If you are in doubt about any product or dish, don't eat it.

- The following ingredients indicate the presence of peanut protein: Beer nuts, ground nuts, mixed nuts, and peanut (including peanut flour and peanut butter).
- Peanut protein is found in Arachis oil, and in cold pressed, expressed, expelled, and extruded peanut oils. Highly processed peanut oil has been shown to be safe for the vast majority of people individuals allergic to peanut. As the degree of processing of commercial peanut oil may be difficult to determine, avoidance is prudent.
- Nu-Nuts® and other artificial flavored nuts contain peanut protein.
- Ethnic restaurants (such as Chinese, African, Indonesian, Thai, and Vietnamese), bakeries, and ice cream parlors are considered high-risk for individuals with peanut allergy due to the common use of peanut and the risk of cross contamination—*even if you order a peanut-free item.*
- Peanut abutter and/or peanut flour have been used in chili and spaghetti sauce as thickeners. Always ask if peanut was in the recipe.
- Many candies and chocolates contain peanut or run the risk of cross contact with peanut protein.
- Lupine or lupin is a legume that may cause an allergic reaction in those with peanut allergy. Lupine is used in this country in many gluten-free and high-protein products. In many European countries, particularly Italy and France, lupine flour and/or peanut flour may be mixed with wheat flour in baked goods.
- Many tree nuts are processed with peanuts and therefore may contain trace amounts of peanut protein. Extreme caution is advised.

** FAI wishes to thank the Jaffe Food Allergy Institute at Mount Sinai School of Medicine (New York, NY) for providing the allergen avoidance information in this article.*

Food Allergy Initiative

Robert F. Kennedy, Jr., Announces New FAI Advocacy Steering Committee

On May 14, during Food Allergy Awareness Week, Robert F. Kennedy, Jr., member of the Board of Directors of the Food Allergy Initiative (FAI), announced the formation of FAI's Advocacy Steering Committee. The committee's objectives are to help build a strong nationwide presence for the food allergy community, and to actively seek to increase food allergy research. Scientists believe that with proper funding, a cure can be found in less than a decade.

The new steering committee comprises 16 leading parent advocates nationwide who confront the daily dangers of raising children with severe food allergies.

"FAI is tremendously honored and grateful to have such an esteemed group of parents who are willing to join our effort to find a cure," said Kennedy. "These parents are proven advocates and support group leaders in their local communities. We are thrilled to add their energy and expertise to our advocacy program."

Steering committee members include:

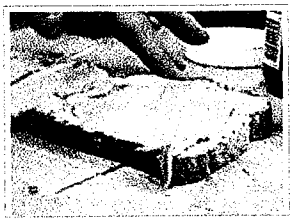
- *Gina Clowes*, Chair – AllergyMoms; Cranberry Township, PA
- *Denise Bunning* – Mothers of Children Having Allergies; Lake Forest, IL
- *Nicole Smith* – Allergic Child; Colorado Springs, CO
- *Sue Wagner & Carol D'Agnese* – San Diego Food Allergy; San Diego, CA
- *Rhonda Riggott Stevens*– Education & Advocacy Solutions; Durham, CT
- *Debbie Hogan* – Parents of Children with Food Allergies; Tampa, FL
- *Maria Acebal* – Safe at School Partners, Bethesda, MD
- *Nona Narvaez* – Anaphylaxis and Food Allergy Association of Minnesota; St. Paul, MN
- *Barbara Calluori*– Food Allergy and Anaphylaxis Coalition of New Jersey; Nutley, NJ
- *Sari Canell* – Food Allergy Educational Alliance; Scarsdale, NY
- *Chris Hardy* – Parents of Allergic Kids; Charlotte, NC
- *MaryKay Hill* – Vermont Food Allergy Organization; Shelburne, VT
- *Sally Porter* – Food Allergy Initiative Northwest; Sammamish, WA
- *Meg Goss & Sheree Godwin* – Food Allergy Association of Wisconsin; Madison, WI

"I am very pleased to take part in FAI's new steering committee," said Committee Chair Gina Clowes. "For 11 years FAI has led the way in funding research to find a cure to this life-threatening disease. Nothing is more important to me and millions of other parents who wish they could take their children to restaurants, birthday parties and school cafeterias without living in constant fear of exposure to potentially deadly allergens like peanuts,tree nuts, milk, eggs and wheat."

"My fellow committee members are the best and brightest advocates from all over the country," Clowes continued. "Every day they are out in their communities making a difference for families with food allergies. As a group, we will devote our attention, resources and expertise toward making sure that researchers have the resources to find a cure."

Food Allergy Initiative

Health



Teenager with peanut allergy dies after a kiss

Updated Sat. Nov. 26 2005 4:53 PM ET

CTV.ca News Staff

A Quebec teenager with a peanut allergy has died after kissing her boyfriend who had eaten a peanut butter sandwich hours earlier.

Fifteen-year-old Christina Desforges died Monday. She went into anaphylactic shock and in spite of being given an adrenalin shot, could not be revived.

Desforges lived 250 km north of Quebec City in Saguenay.

The official cause of the teen's death has not yet been released.

Pediatric allergist Karen Sigman told CTV's Tania Krywiak if peanuts are still on the tongue or the lips, they can still cause a reaction.

Sigman says teenagers with allergies have to let their friends know.

"If they're going to be dating somebody that they have to tell the people they're close to that they're allergic to make sure the people they're with aren't in contact with those nuts or peanuts," Sigman said.

Pediatric allergist Karen Sigman says if peanuts are still on the tongue or the lips, they can still cause a reaction.

Parents of children with nut and peanut allergies have the added pressure of constantly watching what their offspring are eating.

Terri Elituv, mother of 12-year-old Jake Elituv, told CTV News they always watch out for snacks that include peanuts, or traces of the legume.

"Everything is just sort of fraught with this underlying tension, you're anxious about what he's going to have, what he could touch," she said.

Elituv's other concern is what happens when her son becomes more independent in his teen years -- and might not share his allergy concerns with friends at parties.

Desforges' parents are planning a memorial service Saturday.

Sara Shannon's Journey with Sabrina's Law

By Gwen Smith

She has known a parent's greatest grief: Sara Shannon lost her daughter Sabrina to anaphylaxis in the 13-year-old's first year of high school. But out of tragedy, hope has been born: Ontario passed Sabrina's Law in 2005, which requires schools to have anaphylaxis policies, to reduce allergen exposure and to train all staff in the use of an auto-injector.

Sara and her former husband, Mike Shannon, lent Sabrina's name and her indomitable spirit to that legislation. On that terrible last day of September 30, 2003, Sara had made this promise to her daughter: she would do everything possible to prevent another child from dying of anaphylaxis. That promise has become her mission.

Not content with Sabrina's Law just for Ontario kids, Sara is promoting similar legislation in other provinces and across the United States. She has transformed herself from a down-to-earth woman from little Pembroke, Ont. – a person who was shy before a microphone – to a passionate advocate who speaks from the heart.

Sara has crisscrossed North America, making innumerable friends among allergy support groups as she spreads the message of why schools need anaphylaxis policies that are enshrined in law. Otherwise, she feels, another tragedy like Sabrina's is waiting to happen. In February, she traveled to Pennsylvania to meet with allergy mothers from across America and to watch the signing of a law that finally gives children there the right to carry epinephrine auto-injectors at school.

In 2006, she appeared on TV in Seattle to raise awareness of the risks of anaphylaxis and to fire up a local allergy support group about the possibility of school legislation; she's written to premiers and to U.S. senators, appealing to them as parents; she's seen the support group NASK light up Niagara Falls in Sabrina's honour; she's been a keynote speaker at a cross-border roundtable on food allergies and she is currently helping Texas parents to lobby their legislature for a Sabrina's Law. The Food Allergy Initiative, an organization that gives out millions in allergy research grants, picked Sara to receive the prestigious Daniel Patrick Moynihan award for public service at its New York gala last December. Presenting was Robert F. Kennedy Jr., the father of a food-allergic child.

"It's so important that we get a Sabrina's Law passed in another province or state; these children need to be protected."

While appreciative and honoured, Sara adds that "balls are wonderful, but we've still got to make this a law, we've got to make it real." She berates herself that she's not doing enough: "It's

so important that we get a Sabrina's Law passed in another province or state; these children need to be protected. If I could do this full-time, I would go full force."

But Sara is always doing more than she admits. She is working with two Winnipeg documentary makers to bring "Sabrina's Law," the film, to Canadian television in the fall. She has her sights on British Columbia and Alberta as the provinces she would most like to have adopt an anaphylaxis law. "If we could just get another of the big provinces on board ...." she says. She hopes to make a trip to Vancouver and to Seattle in May.

Asked what has affected her the most through her journey, Sara answers that it's the dedicated parents in the allergy community and, of course, their kids. "I'll never forget being at a conference in Toronto and this little girl came up and gently touched my arm. She said to me, 'thank you'. Our children are so important, that's what touches me the most."

First published in Allergic Living *magazine, Spring 2007 (c) Copyright AGW Publishing Inc.*
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Understanding the molecular basis for food-allergic reactions

Eight foods account for 90percent of all reactions in the USA: milk, eggs, peanuts, tree nuts such as walnuts and pistachios, wheat, soy, fish, and shellfish such as lobster and shrimp.

Food-allergic reactions result in over 30000 visits to casualty departments every year, with between 150and 200people dying annually in the country from anaphylactic shock.

So what are the hot topics of research interest? The latest announcement from the Food Allergy and Anaphylaxis Network (FAAN) gives a good idea. This non-profit organisation works for the 11 million Americans with food allergies and has just selected the first five scientific research studies for its newly established research grants programme.

The studies cover the breadth of food allergy research. For example, a pilot study at Duke University is to test oral immunotherapy in patients allergic to peanuts. The aim here is to create a new treatment that lowers the risk of anaphylactic reaction and changes the peanut-specific immune response.

An investigation at the University of Cincinnati medical centre will try and determine why food allergens cause some people to develop life-threatening systemic anaphylaxis while others develop gastrointestinal symptoms that are painful and disabling, but not life-threatening.

At Virginia Commonwealth University, scientists hope to develop a novel system to test different compounds that will recognise peanut-specific allergens and aturn-off' the cells that play a major role in an allergic reaction.

Meanwhile an investigation at Cincinnati's children's hospital medical centre into eosinophilic oesophagitis, a type of immunoglobulin (Ig) G-mediated allergy, should lead to a better understand of the condition and gather insight into diagnosis and treatment for this type of food allergy.

The last project is being run by the Mayo Clinic and follows up an earlier population-based study on the epidemiology of anaphylaxis in Olmsted County. This data will then be used to estimate nationwide statistics.

More than US$700000 was awarded in the inaugural round of research grants, much of it raised by FAAN members.

"In the past 10 years, scientists have learned significantly more about food allergies. Just 10years ago, it was believed that only one per cent of the American population was food allergic. Through sound scientific research, we now know that four per cent or 1-in-25 Americans have food allergies," explained Anne Mu□oz-Furlong, FAAN's founder and ceo.

Also in the USA, the Food Allergy Research and Resource Programme (FARRP) is developing assays to detect allergenic food residues that might contaminate other foods. Currently, FARRP's research is focused on immunoassays □ specifically, enzyme-linked immunosorbent assays (Elisas).

In the FARRP Elisa format, antisera are developed using crude extracts of allergenic foods or specific proteins from allergenic foods as the antigens.

IgG antibodies against certain proteins in the crude extracts are produced. While the IgG antibodies may

be directed at proteins that are not allergens, FARRP believes that the detection of any protein or group of protein from the allergenic food signifies the presence of the allergenic proteins.

So the FARRP Elisas detect residues of allergenic foods rather than food allergens. Nevertheless, the organisation says that these Elisas are quite useful for detecting allergenic food residues arising from such food industry practices as using shared processing equipment or using rework.

The organisation already has Elisas available for the most commonly-allergenic foods in the USA, including almond, egg, milk, peanut, whey and walnut. A kit for experimental purposes is available for soy, while Elisas for cashew, clam, hazelnut, pecan, sesame and shrimp and currently under development.

Why is an allergen an allergen?

In Europe, one of the most interesting research projects is focusing on the unpredictable distribution of allergens in plants. For example, being allergic to birch pollen can predispose a person to allergy from distantly related plant foods such as celery, apple or soy.

Most allergens are proteins and newly published research identifies 129plant allergens in just four main protein families.

"Knowing what makes a protein more likely to become an allergen could make it easier for manufacturers to identify potential allergens in novel foods and ingredients, preventing them from reaching the consumer," said Clare Mills, head of the allergy research team at the UK's Institute of Food Research (IFR).

Proteins are constructed from amino acids, and previous research has focused on analysing the sequence of amino acids to identify potential allergens. However, this can lead to false predictions. Sequence data alone does not reveal how amino acids interact to construct proteins. The interaction of amino acids creates proteins folded into particular shapes. The new research by a team of scientists considered both amino acid sequence and structural similarities between surface features of plant proteins using a 3D computer model(Fig.1).

"By modelling surface features of proteins from a range of flowering plants, we were able to explain why cross-reactions can occur between species that otherwise seem dissimilar," said Mills. "This is especially important to help us understand why people with allergy to birch pollen can suffer related allergies to fresh fruits and vegetables."

Flowering plants first appeared over 100million years ago during the late Jurassic period, the age of the dinosaurs. They became the most dominant plant on Earth and today include all our food plants. Very early in their evolution there was a split into two major groups. Some plant protein structures changed and some stayed the same, or were conserved.

"We found that even a single conserved region on the surface structure of a protein can cause cross-reactivity," said Heimo Breiteneder of the Medical University of Vienna.

Scientists had already observed that although humans consume an enormous diversity of plant foods, just a few foods account for the majority of food allergies. However, their relatedness remained unclear. For the first time, the distribution of plant food allergens has been measured according to protein families.

The scientists found that 129 allergens could be classified into just 20out of 3849 possible protein families, with just four super families accounting for more than 65percent of food allergens.

"We are only now in a position to begin to understand what makes an allergen an allergen," added Breiteneder.

And that opens a whole new area of work. For example, whilst peanuts are a major allergen, their close botanical brothers peas pose little threat. And although peanuts and tree nuts are not related □ peanuts are classified as legumes □ cross-reactions occur. This remains a mystery, but is under investigation at IFR.

The research, published in the Journal of Allergy and Clinical Immunology, was funded through the Biotechnology and Biological Sciences Research Council (BBSRC) competitive strategic grant to IFR and Rothamsted Research with additional support from the EU.