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Understanding Peanut Allergy

An Overview of Medical and Lifestyle Concerns

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One of the many joys of parenting is introducing new foods to your baby. When my son was about a year old, I gave him a taste of peanut butter on a cracker. Within minutes, I noticed a pink rash around his mouth. I wasn't terribly alarmed at first, but after seeking advice from our pediatrician, I took my son to see an allergist. There, skin prick testing revealed that he had a severe, potentially life-threatening peanut allergy. Thus began our family's journey into a world of examining food labels, monitoring every bit of food that went into his mouth, and educating my son and others about his allergy. I have since learned that life with a peanut allergy has many implications beyond the affected person and family.¹

Background

Peanuts (*Arachis hypogaea*) are considered a healthy, nutritious snack. Americans love them, consuming approximately 2.4 billion pounds — roughly 11 pounds per person — each year.² More than 90% of U.S. children have tasted peanuts by their second birthday.³ Peanuts, peanut butter, peanut oils and other forms of peanut are found in candy, baked goods, ice cream and frozen yogurt, as well as numerous other foods. (For example, peanuts are frequently used as sauce thickeners in Mexican and Asian cuisines.) Peanut oil (sometimes called arachis oil) is used in lotions and creams and even in some infant formulas.⁴

More than 1.5 million U.S. residents, mostly children, now report an allergy to peanuts. Peanuts are one of the leading causes of food-induced anaphylactic reactions in the United States, killing an estimated 100 people each year.³

Peanuts are not the same as other nuts because peanuts are actually legumes. Almonds, cashews, walnuts and the like are tree nuts. Even so, people with peanut allergy should avoid tree nuts because peanuts and tree nuts are often processed on the same equipment, increasing the risk of cross-contamination.⁵ A significant number of people initially have only peanut allergy but subsequently develop an allergy to tree nuts.⁶ Researchers are not certain why this happens, although studies suggest that an allergy to both tree nuts and peanuts is perhaps attributable to a person's predisposition to atopy, rather than to any similarity in allergenic proteins.⁷ Children are the most likely population to have peanut allergy. And unlike other food allergies (such as to milk or egg), which are usually outgrown, peanut allergy is a lifelong allergy in most instances.³

Increased Incidence Worldwide

The increasing incidence of peanut allergy in the United States cannot be explained simply by the ubiquitous presence of peanuts in our food. Rather, researchers have noted that peanut allergy is an allergy of developed countries and may reflect a rise in allergic and atopic diseases (such as asthma and eczema) in general, particularly over the last 2 decades.³ Yet another fascinating observation is that peanut allergy is quite rare in China, where peanuts are consumed in similar quantities to the United States. In China, peanuts are usually boiled or fried. In the United States, peanuts are typically eaten after dry roasting, and the roasting process appears to intensify the allergenic potential of peanuts.⁸

Nuts and Bolts

The food we eat is not intended to incite a response from our immune system. A food allergy inappropriately triggers the immune system, producing undesirable and sometimes dangerous effects on the body. The fundamental mechanism that seems to activate this inappropriate immune response is an interaction between an antigen (or allergen) and an antibody and is referred to as atopic hypersensitivity or type I hypersensitivity.⁹ This hypersensitivity is dramatic, rapid (sometimes within minutes), and in the worst-case scenario, life threatening. Symptoms of a hypersensitivity reaction vary in severity but may include tingling of the tongue, hives (urticaria), cutaneous erythema and pruritis, and sometimes nausea, abdominal cramps and dizziness. Of grave concern are symptoms of voice hoarseness, swelling or tightness in the throat (laryngeal edema), stridor, wheezing, drooling, tachycardia and hypotension. These symptoms signify life-threatening anaphylaxis.¹⁰ (A simple way to categorize non-life-threatening anaphylaxis from life-threatening anaphylaxis is to determine whether the symptoms involve only the skin or extend beyond the skin, especially if the symptoms affect the respiratory system or a drop in blood pressure.¹¹)

Immunoglobulin E (IgE) is the primary antibody involved in the mediation of a type I hypersensitivity.⁹ IgE antibodies are different from other antibodies (IgM, IgG and IgA) because they are primarily cell-bound rather than circulating in the blood.¹⁰ Also located throughout the body — especially in close proximity to blood vessels and in the respiratory and gastrointestinal tracts — are mast cells. These are literally covered with IgE receptors, and they play an integral role in type I hypersensitivity reactions.⁹ (IgE and mast cells are also implicated in asthma and eczema, which may explain to some degree why so many people with asthma and eczema also have food allergies.)

People usually inherit the ability to form IgE antibodies against food allergens.¹ These Y-shaped IgE antibodies attach themselves to mast cells (as well as basophils), sometimes in vast numbers. When a passing allergen bridges (or "cross links") two IgE antibody molecules on the mast cell surface, these cells release powerful chemical mediators such as histamine — a major player in producing the acute symptoms of allergic reactions.¹² Histamine causes increased vascular permeability, vasodilation, bronchial constriction with wheezing, and increased gut permeability. Mast cells are also involved in the synthesis of prostaglandins, leukotrienes and cytokines. These newly synthesized prostaglandins, leukotrienes and cytokines are released several hours after the initial episode and may be implicated in producing biphasic (refractory) allergic reactions.⁹

The dramatic onset and intensity of allergic symptoms to food are due to the extensive exposure to an allergen as a result of ingestion. Exposure to food allergens through the digestive tract causes localized symptoms and leads to increased intestinal permeability as well.¹³ This in turn allows for the passage of large intact allergenic proteins. The three major peanut proteins (Ara h 1, Ara h 2 and Ara h 3) are large, seed-storage proteins that are rather resistant to digestion.¹⁴

Early Onset

Due to the immaturity of the immune system at birth, as well as a naturally increased permeability of the gut (designed to digest large milk proteins found in breast milk), food allergies are more likely to develop during the first few years of life.^{3,4} Researchers have also found that many children with peanut allergy develop a sensitivity reaction the first time they ingest a peanut, which hints at a previous exposure. One hypothesis suggests that peanut proteins ingested by a pregnant woman can sensitize her fetus in utero.¹⁵ Studies show that fetuses are capable of producing an allergic reaction starting in the second trimester. Some research suggests that antigens from the mother may cross the placenta, while other studies propose that fetuses can swallow IgE from amniotic fluid.¹⁶

Another idea gaining some credence is that a breastfed baby is sensitized via breast milk in mothers who eat peanuts during lactation. This was demonstrated in a Canadian study that tested 23 lactating women by feeding them peanut products. Both of the two major peanut allergens, Ara h 1 and Ara h 2, were identified in the breast milk of 11 of the 23 participants.¹⁷ Similarly, infants may be sensitized to peanuts by infant milk formulas that contain peanut protein.⁴

Controversy still surrounds many of these ideas, but most experts think it is logical to instruct women with a family history of food allergies, asthma or eczema to stay away from peanut products while pregnant or nursing. Furthermore, children of families with a history of atopy should not have peanuts until age 3 years.³ Breastfeeding is still recommended as the best way to prevent the development of food allergies in an infant.¹⁸

Living With Peanut Allergy

Peanut allergy is a frightening diagnosis, but with proper vigilance and education, the patient can live safely and without too many limitations. Patients with peanut allergy visit emergency departments for treatment of allergic reactions an average of every 3 to 5 years — primarily due to inadvertent exposure to "hidden" peanut in foods or cross contamination.³ Peanut allergy is especially worrisome to parents of children who are allergic. They often wonder if there is a way to predict the intensity of allergic attacks.¹⁹ The answer is, unfortunately, that there is no way to foresee this. Especially disconcerting are reports of patients with peanut allergy reacting to touching peanuts or inhaling peanut "dust." A sizeable percentage of children with food allergies also have asthma, and asthma appears to be a notable risk factor for severe reactions.^{2,20}

Today, treatment is focused on teaching patients and their families how to avoid accidental ingestion of peanuts and how to recognize symptoms of an allergic reaction. This means reading labels of all foods — even foods that have safely been consumed in the past, because food manufacturers change ingredients without notice. Children can be taught to ask adults to check ingredients for them, and they can also learn to identify strategies for avoiding exposure to unsafe foods. Children should also be taught how and when to tell a grown-up that they might be having an allergic reaction. Many candies contain "traces of peanuts" (such as plain M&M's) and should be avoided. Foods that have been prepared in bakeries, cafeterias and restaurants (where labels are not available) are danger zones due to the risk of cross contamination.³ A knife used to spread peanut butter on a sandwich may next be spreading cream cheese on an allergic child's bagel. Living with peanut allergy means questioning restaurant staff about ingredients and how food is prepared. Other high-risk situations include buffets, candy stores and ice cream parlors, as well as foods made in other people's homes.³ Children have died after eating cookies made by neighbors or friends.²¹

Peanut oil is another common concern. The heat-distilled version does not contain peanut protein, but cold-pressed peanut oils do. Because this area can be confusing, most patients with peanut allergy should avoid peanut oils altogether.³

When traveling, people with peanut allergy should contact the customer service desk of the airline — not the reservation line — and request that peanuts not be served on the flight. Many airlines will substitute another snack. However, no airline is able to control passengers who may bring their own peanut-containing snacks on board. The tray table and armrests should be wiped down. Injectable epinephrine should be readily accessible in carry-on luggage (usually not a problem with a prescription label and explanatory letter from a health care provider) and the flight crew immediately notified if symptoms of an allergic reaction emerge.²²

A number of issues arise when a peanut-allergic child attends day care or school. Parents should notify the school or day care about the child's allergy and provide a clear, written emergency plan with medical instructions and medications as directed by a health care provider.²³ Parents should provide a photograph of the child with the emergency plan. They also need to enlist the help of the child's teacher, school principal, cafeteria staff and school nurse in managing peanut allergy and developing strategies for minimizing risky situations.

Special attention should be paid to situations that may interrupt the usual school routine, such as field trips and substitute teachers. Some school lunchrooms have peanut-free tables or zones to reduce the risk of accidental skin contact with the omnipresent peanut butter sandwich. The school-age child should be taught not to trade food with others and not to eat anything with unknown ingredients. Finally, parents need to work with the school to ensure that staff members are trained to give epinephrine. Parents should also find out the school's policy on medications and be sure that the child and the school staff, from teachers to lunchroom aides, know what to do if a reaction occurs.²⁴ In one study of children and adolescents who died from food-induced anaphylaxis, treatment with epinephrine was delayed for more than 1 hour. However, the prognosis is much better when signs and symptoms are recognized early and treatment is aggressive.²⁵

Medical Treatment

When an allergic reaction does occur, the first line of attack is with epinephrine. Epinephrine possesses three major actions needed for countering the effects of anaphylaxis: It constricts blood vessels, prevents or reverses bronchial constriction, and helps prevent or reverse hypotension. Epinephrine is ordinarily safe but may produce side effects such as tachycardia, shakiness or headache.²⁶ Every person diagnosed with peanut allergy should carry self-injectable epinephrine, commonly sold by prescription under the brand name EpiPen. Children under 33 kg should have the EpiPen Jr. with them at all times. It may be wise to have several EpiPens, especially for children (to keep one at home, with the babysitter or at school) or patients who live more than 20 minutes from a hospital. EpiPen is available in twin packs. Epinephrine is a short-acting medication and repeat injection may be required.²⁵

Epinephrine should be injected into the outer aspect of the thigh and can be administered through clothing in an emergency. Whenever epinephrine is given, it is imperative that the patient be taken to the emergency department for further evaluation and monitoring. In some cases, anaphylactic symptoms may return (biphasic or refractory reaction) and can be more severe than the initial reaction. For this reason, patients should be closely monitored for a minimum of 4 hours.³ Oxygen support may be needed and nebulized beta₂ agonists such as albuterol 0.5% solution may be used to reverse bronchospasm. Treatment of hypotension with intravenous fluids, as well as corticosteroids to prevent biphasic anaphylaxis, may also be required.²⁵

Patients with peanut allergy should wear a medical alert bracelet or necklace and carry adequate doses of liquid oral antihistamine, such as diphenhydramine. Educate patients that oral antihistamines should not be used as a substitute for epinephrine. Additionally, diphenhydramine and other antihistamines should not be taken to pretreat in case of possible allergic reaction. Although antihistamines are helpful agents in the

treatment of anaphylaxis, especially in terms of symptom relief, they do not have any life-saving properties.²⁷

The patient with peanut allergy may have fears and concerns about self-administering epinephrine. A training pen is available with the EpiPen Twin Pack. The patient should practice with the training pen until the procedure becomes second nature.²⁸

Another note about medications involves ipratropium (Atrovent, Combivent), a bronchodilator available as a metered-dose inhaler. This contains an emulsifier, which can cause allergic reactions in patients with peanut allergy and therefore is contraindicated.²⁹

Warning Labels

The food industry, consumer groups and the U.S. government are working to increase public awareness of food allergens through improved labeling.² Much of the equipment used in the food industry was constructed before people were aware of the perils of unintentional inclusion of allergens in foods. Some equipment is used to process more than one type of food and may have inaccessible nooks and crannies where ingredients such as peanut can linger after a production run. These allergens can contaminate a subsequent production run of another food product.

To safeguard the allergic consumer, many companies use warning statements such as "may contain" or "processed on the same equipment." People with food allergies, however, must understand that if they were to try such a product and did not experience a reaction, this does not mean that the product is always safe for consumption.

Another warning has made its way onto food products: "processed in the same facility as peanuts." This means that the allergen is used in a product on a different production line. It is difficult to estimate the amount of risk suggested by this statement. The Food and Drug Administration has thus far not offered precise instructions about how warning statements should be used and how they should be worded, so the peanut-allergic consumer must always be alert.⁵

More recently, Congress passed the Food Allergen Labeling and Consumer Protection Act (FALCPA) and President Bush signed it into law.³⁰ It requires food manufacturers to identify in common language the presence of any of the eight major food allergens: milk, eggs, peanut, tree nut, fish, shellfish, wheat and soy. The act also requires the federal government to improve the collection of food allergy data and appoint a panel of experts who would report to Congress on issues related to food allergy. The scheduled date of implementation is January 2006.

Emergency Services

Another area of concern surrounds emergency medical services. If someone with a peanut allergy experiences a severe reaction, will emergency medical technicians (EMTs) arriving on the scene be able to administer epinephrine? In the majority of states, only paramedics (EMTs with the highest level of training) are permitted to administer epinephrine, whereas basic EMTs are only allowed to assist a patient in administering his or her own epinephrine auto-injector. This is worrisome because a patient experiencing an anaphylactic reaction may not even have epinephrine in his or her possession. Only a dozen or so states allow all levels of EMTs to carry and administer epinephrine.³¹

Clearly this is an area that needs further attention so that there are no delays in care for patients

experiencing anaphylaxis. Patients with food allergy should contact their state emergency medical services (EMS) office and inquire whether EMTs are authorized to carry and administer epinephrine. (If they are not, an emergency plan will need to be formulated with the patient's health care provider.)

Patients may ask whether they can "register" their food allergy in advance with the EMS office so that responding EMTs are better prepared in an emergency. During an emergency, patients should notify the 911 dispatcher of their diagnosis and that they need an ambulance that carries epinephrine.³²

For anyone diagnosed with peanut allergy (or any food allergy), an indispensable resource and ally is the Food Allergy and Anaphylaxis Network (<http://www.foodallergy.org/>). This organization publishes newsletters containing information about the latest research, articles by leading allergy specialists, legislation updates and many practical tips for food-allergic patients and their families. The network also works with the food industry and e-mails regular alerts to members about potentially allergenic foods or previously undisclosed ingredients in foods.

Future Strategies

In 2002, the Food and Drug Administration approved fast-track testing for a drug called TNX-901 that may weaken allergic reactions to peanuts. In 2003, however, the drug's development ceased as a result of legal wrangling among several pharmaceutical companies. On the horizon is a potential new indication for omalizumab (Xolair) — an asthma medication that works similarly to TNX-901. Omalizumab, manufactured by Novartis, blocks immunoglobulin E and is approved for the treatment of persistent asthma. Testing is under way to evaluate the drug's safety and effectiveness for peanut allergy.³³ Meanwhile, researchers — including some in the peanut industry — are also working to find ways to eliminate the allergenic proteins in peanuts.³⁴

Peanut allergy is generally considered to be lifelong, however, some research suggests that this may not be a hard-and-fast rule. One study found that about 20% of children who experience an allergic reaction to peanuts in the first 1 or 2 years of life outgrow their allergy. The children studied were found to have low levels of peanut-specific IgE.⁸

Controversy remains over the prevention of peanut allergy. For health care providers who care for pregnant women, an investigation into family history of allergies, asthma and eczema should be included in every antenatal assessment.⁴ While hard evidence is lacking, it nevertheless is sensible for women with a significant family history to avoid peanuts during pregnancy and lactation.

The benefits of exclusive breastfeeding (for at least 6 months) in the prevention of allergy should also be explained, and peanuts should not be introduced to a child before age 3.^{3,15}

For people diagnosed with peanut allergy, the key to well-being is education. Studies have demonstrated that people with food allergy live with greater daily anxiety and emotional stress than those who have asthma.³³ For this reason, all people with peanut allergy should be aware of high-risk situations and how to prepare for them. They should know the signs and symptoms of anaphylaxis and when to seek emergency treatment.³

People who are allergic to peanuts must constantly educate others about their diagnosis. Using these strategies, they can co-exist safely with the rest of the world.

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Lactose Intolerance: A Sensitivity, Not an Allergy

Between 30 million and 50 million U.S. residents have lactose intolerance, meaning they are not able to digest significant amounts of lactose, the predominant sugar in milk.

"Lactose-intolerant people do not produce enough of the enzyme lactase in the small intestine to help break the milk sugar down into absorbable glucose and galactose," says Nancy Spaulding-Albright, RD, a nutritionist and registered dietitian at the HealthSouth Sunrise Rehabilitation Hospital in Sunrise, Fla. Lactose that is not absorbed by the small bowel passes into the colon and is converted to short-chain fatty acids and hydrogen gas by the bacterial flora.

Lactose intolerance is not dangerous but can cause discomfort, with symptoms including nausea, gas, abdominal cramps, diarrhea and bloating. These symptoms begin about 30 minutes to 2 hours after eating or drinking foods that contain lactose.

"The severity of symptoms will depend on the amount of lactose consumed and the extent of the person's lactase enzyme deficiency," Spaulding-Albright says.

Some risk factors make people more prone to lactose intolerance. The first is age; many lactose-intolerant adults have some degree of intolerance by age 20. Ethnicity is another risk factor: Lactose intolerance is more common among African Americans, Asian Americans and American Indians. Finally, infants born prematurely at 28 weeks' to 32 weeks' gestation may have reduced levels of lactase, since this enzyme increases in the fetus late in the third trimester.

Not an Allergy

Lactose intolerance should not be confused with cow's milk allergy. Cow's milk allergy, which is a common allergy in children, occurs when a person is allergic to a protein in cow's milk. Symptoms of cow's milk allergy may include rash, shortness of breath, swelling of the face and mouth area, persistent crying, weight loss, vomiting and diarrhea.

"It is important to differentiate between a milk protein allergy and a lactase deficiency, since it will make a big difference in how the diet will have to be altered," Spaulding-Albright says.

Enjoying Eating

People who are lactose intolerant can still enjoy their diet by following some simple rules:

Drink milk with other foods, rather than by itself. This slows the digestive process, reducing the chance of experiencing intolerance.

Experiment. Not all dairy products contain the same amount of lactose. Some hard cheeses, such as Swiss or cheddar, have small amounts of lactose and may cause no symptoms. Cultured milk products, such as yogurt, may be tolerated because the bacterial cultures that are used to make yogurt produce some lactase.

Eat and drink lactose-reduced or lactose-free products.

Use lactase enzyme tablets or lactase enzyme drops.

People with severe lactose intolerance must avoid prepared foods with added lactose. Look for words on

the ingredient list that indicate lactose, such as whey, milk byproducts and dry milk solids.

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Resources

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