The Progression of Peanut Allergies Determined through the Perceptions of Medical Professionals

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Submitted to:
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Introduction

When any foreign particle enters the human body it triggers the body's natural first line of defense, the immune system. There are two parts to this complex and vital system; the first consists mainly of organisms like the white blood cells. These cells attack and destroy pathogens that enter the body. The second part, formed by memory-T-cells, is responsible for being able to recognize the pathogen if it were to enter again. These cells must also identify which antibody effectively fought against the recognized organism. Together these two systems protect the body from disease by responding to bacterial, parasitical, and viral infections when they invade the human body, an action known as the antigen response or TH1 immune system. Toxins and parasites elicit a similar reaction known as the TH2 immune system. It is this second type of response that can also create an extremely dangerous condition, when it causes the body to have an allergic reaction.

For reasons unknown to today's researchers, on rare occasions the body's immune system will make a mistake and recognize a food protein or other common harmless molecule as foreign eliciting a TH2 response. The immune response begins at the first exposure but a severe reaction does not ensue. Instead the body forms specific antibodies and acquires a sensitivity recognizing this allergen as a threat to the body if it is again exposed to it at a later date. The next time these antibodies recognize the allergen the body's defense mechanism simply overreacts causing the allergic reaction (Accetta, 2004). In severe cases this overreaction escalates into anaphylactic shock, a fatal condition without immediate administration of epinephrine. Anaphylaxis is a holistic allergic reaction in which the allergen is spread quickly as it enters the bloodstream through inhalation or ingestion and carried throughout the body. Consequently the immune system responds by attacking every system including those that are imperative to life

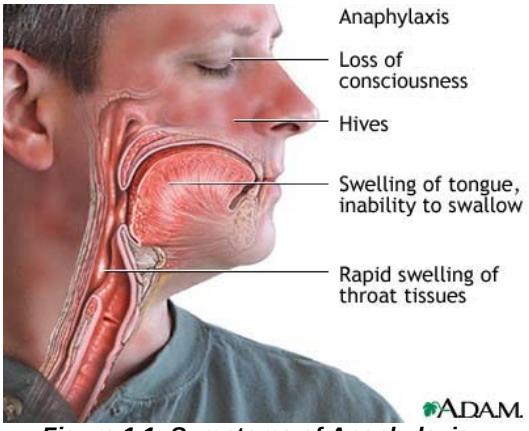

Figure 1.1: Symptoms of Anaphylaxis (Accetta, 2004)

(Browner, et al., 2002). Tissues throughout the entire body immediately release histamines and antibodies to fight against the allergen. One of the first systems to show signs of this attack is the respiratory system. Both the upper and the lower airways constrict as seen in Figure 1.1 and the patient cannot get oxygen to their lungs. The lips and tongue, as well as the trachea and the bronchioles swell resulting in wheezing, labored breathing, bronchospasms and dyspnea (Browner, et al., 2002). Hives and urticaria break out across the skin and cyanosis occurs due to the insufficient level of oxygen reaching the cells. The lack of adequate oxygen in the brain causes confusion and altered mental status. This may also cause gastrointestinal problems including abdominal pain, vomiting, and diarrhea. The labored breathing would naturally cause the blood vessels to constrict and keep the oxygenated blood in the core of the body to maintain the vital organs however, the histamines cause the blood vessels to dilate and increase the permeability of the capillaries (Accetta, 2004). This dramatically lowers the blood pressure and as fluid begins to leak out of the blood vessels into the surrounding tissues, the heart, which is already working overtime to get the oxygenated blood to the body, speeds up. The pulse becomes increasingly tachycardic until the heart is beating so fast that it is completely ineffective and cannot pump any blood out of the left ventricle. At this point the patient is entering into cardiac arrest and is showing signs of decompensated shock, an extremely dangerous situation. Although the administration of epinephrine, usually in the form of an Epi-pen, will immediately alleviate these life-threatening symptoms if given within a certain time constraint, there are still far too many fatalities each year as a direct result of this severe allergic reaction. In fact 30,000

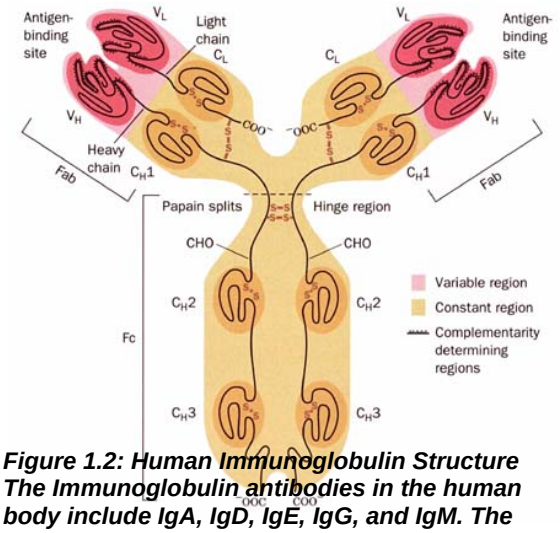

Figure 1.2: Human Immunoglobulin Structure The Immunoglobulin antibodies in the human body include IgA, IgD, IgE, IgG, and IgM. The antibody involved in allergic reactions is IgE (Carnegie Mellon Biochemistry 1, 2004)

trips to the emergency room and between 200 to 500 deaths are attributed to anaphylaxis each year; 80% of these reactions are experienced by patients with sensitivity to peanuts, egg or milk (The Food Allergy & Anaphylaxis Network, 2005).

Peanuts contain 200 milligrams of seven identified proteins that serve as allergens: Ara h1, Ara h2, Ara h3, Ara h4, Arah5, Ara h6 and Ara h7 proteins, specifically the Ara h2 protein (Ivanciuc, 2001). The immune system of a patient who has developed a sensitivity to peanuts, recognizes one or more of these proteins, which then crosslink the immunoglobulin E (IgE) antibodies. Millions of IgE antibodies, seen in Figure 1.2, circulate in the blood and bind to mast cells and basophils, when they are cross-linked the cell which they are attached is activated and large amounts of histamines, leukotrienes, prostaglandins, and tryptase are released into the blood stream, immediately causing the rapid onset of the severe reaction (Accetta, 2004). Most responses occur from ingestion, but in rare cases of hypersensitive individuals, touch or inhalation of allergens may produce the allergic response. As little as 50 micrograms of the protein in the peanut is enough to cause anaphylaxis in severe cases (The Food Allergy & Anaphylaxis Network, 2005). This extreme case where exposure to such a small trace of peanut, peanut oil or the scent of peanuts proves to be the most dangerous aspect of peanut allergies.

It is also the reason that the only available immunotherapeutic technique, complete and strict avoidance of the allergen, is not a sufficient method to decrease the number of cases of

anaphylaxis. Although peanut allergies affect all age groups, it is most frequently seen, along with all food allergies, in pediatrics due to the immaturity of their mucosal membranes causing an inability to tolerate the proteins present in these foods (About, Inc, 2005). Adherence to strict avoidance is near impossible in this age group. Poorly labeled food products, or even peanut-free foods that are produced on the same machinery as a peanut product can easily slip past even the most attentive person. In most cases of anaphylaxis that allergen was accidentally ingested without the patient's knowledge. It is estimated that 50% of the patients allergic to peanuts will accidentally ingest enough to cause a reaction in a 4-year period (American Academy of Allergy, Asthma & Immunology, 2005). Without a truly reliable method of avoiding anaphylaxis, people with an allergy to peanuts are always at a risk and their quality of life is greatly affected. Extensive research is underway to create a better approach to successfully preventing anaphylaxis and recently new methods of decreasing the severity or the frequency of these reactions have been introduced however none are cleared for clinical use.

One such approach is injection immunotherapy. Although not a completely new idea, injection immunotherapy has proven effective in desensitizing patients with an allergy to food. This approach works by subcutaneously injecting the patient with cross-reacting allergens to condition the body's immune system to recognize the allergen as harmless instead of as a threat. It also increases the number of Immunoglobulin G (IgG) antibodies that block the receptor sites for IgE, reducing the holistic overreaction if the body were again exposed to the allergen (Malloy & Sicherer, 2005). However 50% of the patients reportedly allergic to peanuts have also had allergic reactions to other tree-nuts and other legumes, the cross-reacting foods for peanuts (The Food Allergy & Anaphylaxis Network, 2005). Therefore there is a high risk that a severe

reaction will occur after the injection of the cross-reacting allergen, decreasing the number of patients willing to try it.

Peptide immunotherapy is another novel approach to decrease the fatalities resulting from peanut allergies. In peptide immunotherapy an enzyme is used to break down the protein that causes the allergic reaction into peptide fragments. Then the patients are subcutaneously injected with peptide fragments containing T-cell-reactive epitopes instead of whole protein molecules. (Fehringer, et al., 1999). The idea behind this approach relies on eliminating the central role T-cells play in recognizing the allergen, illustrated in Figure 1.3, by reducing the T-cell responses. In effect this injection would modify the body's way of recognizing the allergen and without recognition or instruction from the T-cells, the B cells would not produce the IgE antibodies and the body would not release the histamines, avoiding the systemic reaction. However, there is great diversity within T-cell peptide epitopes and it has become a problem selecting the proper epitope to produce the anticipated results and again testing is such a great risk when it could cause anaphylaxis.

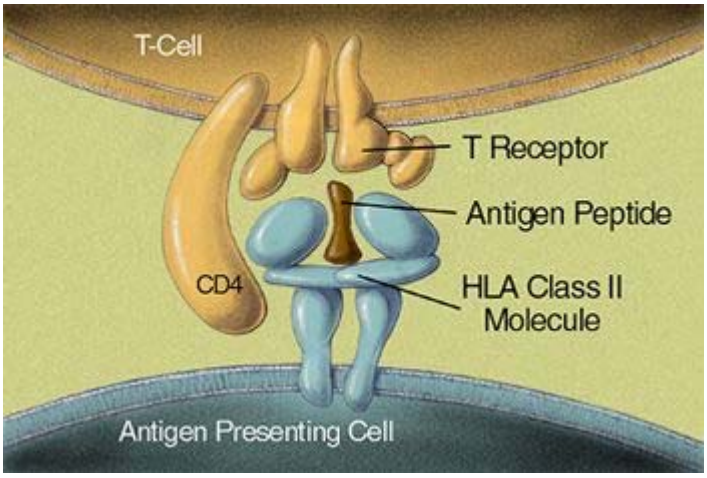

Figure 1.3: T-cell's role in Immune response to Allergen The goal of peptide immunotherapy is to eliminate the role of the T-cell to avoid production of IgE (Bathon, 2005)

DNA immunization is another novel therapy under research. This method also involves a subcutaneous injection of plasmid DNA encoding the allergenic protein. Studies have shown that an alteration to the gene sequence oligodeoxynucleotide (ISS-ODN) has decreased the severity of allergic reactions to peanuts in murine models. (Nguyen, et al., 2001). DNA immunization, if proven effective for humans could be a one time dose to solve a life-long issue. However, use of

this technique is still in the early stages of research and side effects of this injection would need to be researched further.

Another option is anti-IgE immunotherapy. Anti-IgE is a humanized mouse monoclonal IgG molecule which binds to the freely-circulating IgE molecules. This alteration renders the IgE incapable of binding to its receptor and it cannot stay attached to its cell as seen in Figure 1.4. The blood will then carry these floating antibodies out of the body as waste. The allergen will not cause the overreaction if the patient is exposed to it because the IgE would not be present to release the histamines (Sampson, 2006). This process is very expensive and because of the half-life of the injected antibody it requires frequent, most likely monthly administration of the Anti-IgE for life. However it could prove to be a very effective method of desensitizing a patient with a severe allergy to peanuts.

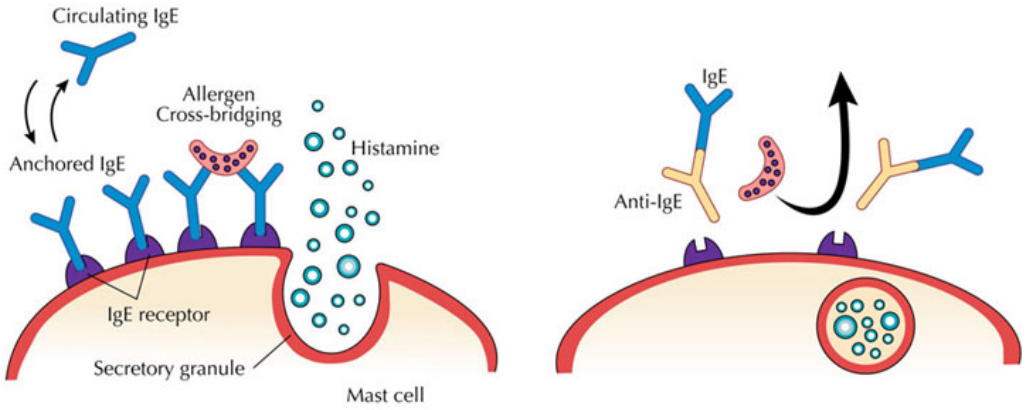

Figure 1.4: Anti-IgE Immunotherapy
The Injected IgG antibodies bind to the IgE made by the body and preven them from attaching to the basophils and mast cells, avoiding the allergic reaction.
(Lehrer & Wild, 2005)

There are also researchers studying less intrusive methods of preventing anaphylaxis. Many of these researchers focus on new ways to produce the peanut itself including molecular biological and genetic modification. Genetic engineering techniques combined with introducing single amino acid substitutes have proven to decrease the number of epitopes to which the IgE

antibody would bind (Bannon, et al., 1999). Although the patient would still be allergic to peanuts, following the process outlined in Figure 1.5 could potentially eliminate the risk of anaphylaxis and parents as well as children would not have to risk an emergency situation if they forgot to read the nutrition label. There are three basic methods of genetically modifying the

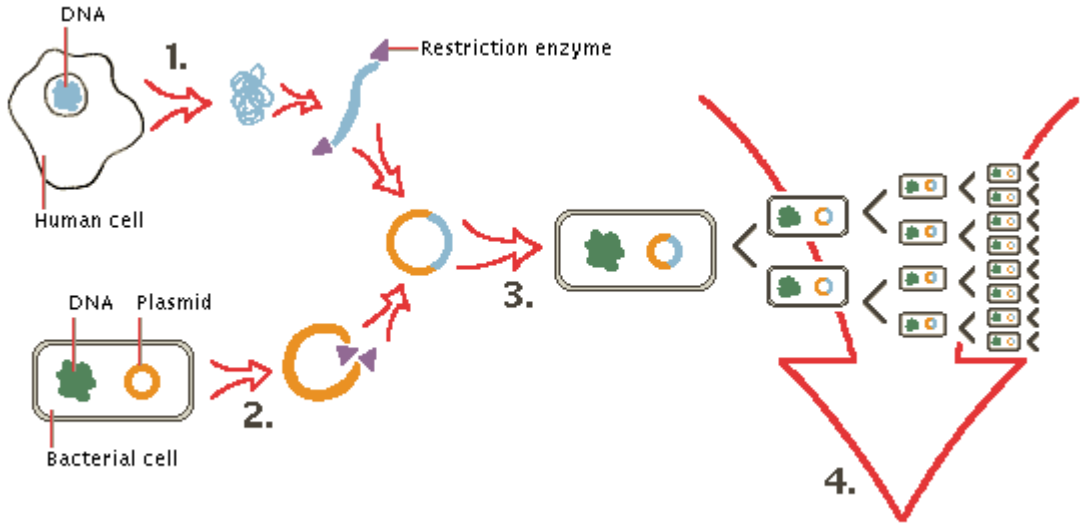

Figure 1.5: The general process of genetic modification (MSN Encarta, 2006

peanut to reduce the severity of the allergy. The first is to alter the IgE epitopes in the peanut so the anti-bodies would not recognize it as the allergen it had previously been exposed to. The second is to reduce the amount of allergenic concentration within the peanut. This would provide less protein to bind with the IgE antibodies and the severity of the reaction would decrease. However this method must be exercised with caution because the allergen is still present and it is reacting with the antibodies which will release the histamines and cause some reaction. The third method is to completely delete the DNA encoding of the allergic protein which, if done correctly, would produce the most satisfying results as there would be no way for the T-cell's to recognize the allergen if it was no longer present in the allergen (Sicherer, 2004). However, this would change the DNA of the peanut and it is almost impossible to verify whether or not the encoded allergen is in fact completely deleted.

Genetic alteration of the peanut is proving to be much harder than other food allergens because it contains so many allergenic proteins. However, it has been proven an effective method for rice. Researchers have also been able to successfully eliminate the allergen concentration in rice by using gene suppression (Lehrer & wild, 2005). New genes are introduced in the antisense direction, which bind with the messenger RNA traveling in the normal direction. This would then inhibit mRNA translation and consequently the production of the proteins. However this method could also prove ineffective for the peanut if the elimination of these proteins cause damage to the organism itself.

Some researchers believe that the cooking process contributes to the allergenic properties of the peanut especially due to area differences in the incidence of the peanut allergy. Although the United States does not consume the most peanuts, China and Korea far outweigh the US production and consumption of peanuts, it does have a much greater population of people with an allergy to it than these other countries (Food Allergy: An Overview, 2004). Yu and Ahmedna (2005) at North Carolina Agricultural and Technical State University developed a fermentation process that reduced the concentration of the Ara h1 and Ara h2 proteins by 70% in peanut flour. This process if refined could allow manufacturers to produce peanut products that are completely allergen free without loosing the healthy qualities of the peanut itself. This would greatly improve the quality of life for patients with an allergy because they would not always have to be on guard and could enjoy peanuts. The problem with this approach is the fact that many parents will not trust that the procedure has rid the peanut completely of the allergenic proteins and they may not want their children to consume the products to play it safe. This would defeat the purpose of having allergen-free peanut products. The other issue is that the fermentation process

has not been developed for all the manufacturing uses of peanuts, as of today it is successful only for peanut flour.

Peanut allergies may only affect 3%-6% of the general public; however the population of children with this deficiency has doubled in the last five years. More than 8% of children under 4 have an allergy to food and each year that number grows. More and more infants are born with this sensitivity already created and yet researchers have no way of explaining the surplus of children with allergies, especially an allergy to peanuts. Strict avoidance cannot be the only solution as it is too hard to maintain and adhere to when young children are not in the company of their parents or another adult who knows to look out for peanuts. Even with an adult present, they cannot predict where or how they will encounter peanuts and to what degree. Parents cannot protect their children from other people eating peanuts in their presence, especially if the scent alone can set off the systemic and fatal reaction. Traces of peanut are too easily passed on and a child could be exposed even if the person with them is not presently eating peanuts but has recently. It is a growing problem and although many options have been suggested to reduce the risk involved in simply eating a meal, it is unclear which of these are reliable and will truly be an improvement on the current situation. The practicing doctors are not recommending any of these techniques to their patients because of the great risk involved in testing and the high probability that they will not completely eliminate the allergenic properties of the peanut. However something must be done to lower the number of deaths caused by exposure to such small traces of the allergen. There is also the question of whether or not a peanut allergy can be outgrown as it is a distinct possibility that these children will have to avoid traces of peanuts for their entire lives. Research supports that an estimated 20% of children who grow up with an allergy to peanuts outgrow their allergy by adulthood (Yunginger, 2005). However, even the researchers

who believe in this statistic and the fact that an allergy can be outgrown do not ignore the chance of reoccurrence and when the stakes are so high how does a doctor risk telling a patient that he has indeed outgrown his allergy and he should eat peanuts.

Methods

The materials needed for this study include a naudio recording device, volunteers to be interviewed, and a computer with a program equivalent to Microsoft Excel.

This purpose of this study is to chart the medical perceptions of different specialists regarding the increased incidence of peanut allergic patients, the possibility of outgrowing the allergy, and the confidence in clinical use of the new immunotherapy techniques. This study will focus on the immunotherapy techniques currently in research that pertain directly to peanut allergies including peptide immunotherapy shots, anti-IgE immunotherapy injections, and DNA immunization as well as a less intrusive method: genetic modification of the peanut. It will also focus specifically on the opinions of allergists and general care pediatricians. This was done through the application of grounded theory qualitative analysis. Grounded theory qualitative analysis is a research method that seeks to construct theories in order to understand phenomena; however following this specific technique the theory needs to be grounded or rooted in observation. The theory must be developed inductively out of the collection of raw data and relies on the interpretation of the interrelationships of what the data says qualitatively. The first step in beginning grounded theory qualitative analysis is to obtain volunteers who are willing to participate in the interviews. A letter was sent, clearly outlining the purpose of the interview to a random sampling of 20 pediatricians and allergists in Connecticut. The letter asked for volunteers and only those who are willing to participate can be interviewed. Then each physician was personally contacted to ensure the volunteer fully understood the purpose of this study and

did not object to his or her participation. The semi-structured interviews were then held throughout the months of January and February 2006 with three allergists and two pediatricians following but not limited to a collection of 15 questions. The questions asked depended on the answers given and may have included follow up questions that are not on the prepared list. The interviews were all recorded, with the permission of the interviewee, with a Pearlcorder J300 Microcassette Audio Recorder. Then word by word the interviews were transcribed and prepared for open coding.

Questions for Semi-Structured Interviews

1. About what percentage of your patients have an allergy to peanuts and have you seen an increase in this number in the past ten years? Do you have any theories as to why there has been an increase in the number of children born with peanut allergies in the last decade?
2. How many of these patients have a severe allergy?
3. How often do you retest the level of severity of their allergy? How do you measure this?
4. How does having a peanut allergy affect a child's quality of life?
5. Is avoidance an acceptable technique to prevent anaphylaxis? How high is the risk that they will be exposed to traces of peanuts or peanut oils?
6. Why is an allergy to peanuts more prevalent and more severe than other tree nut allergies?
7. Do you believe patients can outgrow their allergies? Have any of your patients experienced this with an allergy to peanuts?
8. Is there a chance that the allergy could be spontaneously recovered in these patients and could they suddenly have another reaction to peanuts?

9. Are you familiar with some of the new immunotherapy options being researched?
10. Can an allergy be treated like a virus, in that a vaccine could potentially prevent it and could the body's sensitivity to the allergen be erased? What is your opinion of the effectiveness of using a pepsin-digested peanut extract in an allergen shot?
11. Would a vaccine based on the injection of genetically modified DNA of the allergen or Anti-IgE serum produce better results than a peptide-digest protein that contains T-cell epitopes but no IgE-binding epitopes?
12. Some researchers have proposed a possible fermentation process that removes specific Ara-h proteins from peanut flour, would this help to cut the number of cases of anaphylactic shock caused by peanuts? Is this, or other allergen-free peanut products, a realistic approach to reducing the fatal risk involved with peanut allergies?
13. Is the risk too high to trust or test these new immunotherapy techniques?
14. Could some of these techniques create a "false sense of security" by not being 100% reliable?
15. What is the best advice you can give to a patient with a peanut allergy?

The second step in grounded theory qualitative analysis is open coding. In this step the interview is reduced to identifying the abstract concepts. This is a simple step where the transcription of each interview is broken down sentence by sentence without making any prior assumptions about what the interviewee is saying. This was done using Microsoft Excel and the concepts where listed out in the order they appeared for each interview in a spreadsheet. Then these codes are axial coded where the concepts are categorized by how the open codes relate to each other: connecting the largely abstract concepts to deepen the theoretical framework. This

prepares the data for interpretation and the theory emerges from the results of this step. This was done by printing the list of open codes and separating them from who said it, what else they said, and which group of interviewees they fell under. However to hide the author of the open code each category was glued to an index card. The open codes drawn from allergists were placed on blank cards while those from pediatricians had lines on the back of the cards, hidden from view. They initials of the doctors were also written on the back of the index cards. The cards were then organized in piles based on their relationships. Codes that conveyed similar ideas were placed together. This is the step where the bias of the researcher knowingly enters the process as the relationships are purely subjective. As the piles begin to form, overall theories and category names emerge and these will become the axial codes. The codes were then returned to a Microsoft Excel spreadsheet to show both the axial code and the open codes that fall under that title. Then the authors of the open codes were displayed to formulate the theory.

Results

	3-5% have an allergy to peanuts	
	less than 3% of my patients are at risk for peanut-induced anaphylaxis	
a definite increase	a definite increase	
	definite increase	
	much more patients but still not a whole lot	
	all allergies have seen an increase but peanut is the biggest	KING
	increased incidence	LEE
	peanuts number one allergy in children	MILLER
	since 1997 there has been a 50% increase in incidence	CERSONSKY
most are mild allergies	mild allergies by history	GOLDENBACH
	no patients with severe reactions	
	present with atopic dermatitis	
	chief complaint is eczema	
	chronic skin rashes	
	different reaction than anaphylaxis	
every case is severe	every case is severe	
	assume even mild cases are at risk for anaphylaxis	
	always at risk, even during tests, allergists must be able to resuscitative	
	peanut is more fatal	
	tree nuts, peanuts and shellfish are the most severe and the least likely to outgrow	
	peanut allergies are life-threatening	
	equal severity to tree nut allergies	
increased awareness	increased awareness	
	more kids being tested	
	increased awareness more than increased incidence	
	increased cognizance	
	litigious environment creates fear of a severe reaction not really increased incidence of severe reaction	
	increased detection	

	increased awareness
	looking for it more and finding it more
increased incidence blown out of proportion	doing a lot of stuff for very few people
	blown out of proportion
	allergists see skewed population
	general practitioners see a different population and different severities
	see the mild cases
avoidance and awareness works	public schools are doing a fine job of prevention
	peanut free tables
	easy to avoid even in school setting
	strict food labels
	alertness to your allergy and the allergies of those around you is the best policy
	avoidance works, even with severe reactions
	avoidance is the only one technique right now
	avoidance works, but there are always accidents
allergies developed after birth-shift to TH2	develop allergies-not born with them
	proteins become "parasites"
	shift to TH2 immune response
	bodies are attacking serious bacteria and viruses now start attacking proteins and foods
	body sees proteins absorbed through unsealed GI tract as parasites
	18-24 months before GI tract seals off
	childhood immunization leads to lack of infection and shift to TH2
	hygiene hypothesis-clean environment stimulates immune system in allergenic direction
	bodies see unharmful proteins as an enemy
	don’t know why our immune systems made the switch

allergies progress	progression
	each subsequent reaction worsens
	severity increases with exposure
	not consistent, sometimes no reaction occurs
age factor	age factor
	frequent in children
	begins in childhood
	most kids are diagnosed by two years old
	peanuts number one allergy in children
	number of adults who test positive is much lower than the number of children
	younger children are at the greatest risk for accidental exposure
	peanut allergies are more common in children
	Adults have different reactions to peanuts
	the very young and the very old have different kinds of immune responses
	adults eat different diets than children
impact of diet changes	early introduction of peanut into diet
	diet may play a role but not as important as genetics
	diet changes could play a role in differences between 20 years ago and now
	peanut is in more foods
	peanut is used in everything
	correlation between allergy and abundance
	more exposure leads to more allergies
	peanuts and peanut butter have become a staple in American diet
	adults eat different diets than children
cooking brings out allergenic properties	cooking brings out allergenic proteins
	peanut seed is highly allergenic

	raw peanut is non allergenic
	US had higher rate because of cooking method
	oiled<fried<deep roasted
	tend to boil their peanuts in Asia
theories are just theories	theories are just theories
	not a lot of weight in theories
	theories are only as good as what you get out of them
	waiting for a theory that makes more sense
	breastfeeding/pregnant mother's avoiding peanuts (one theory) does not prevent the allergy
	not eating peanuts in until later in life foes not prevent the allergy from developing
	we don't know why that's why it's still in research
	no idea why there is an increase
genetic	peanut allergies have existed for a long time in history
	definitely genetic
	genetics play a big role
	there is a genetic component
	increased risk if first or second degree relatives are allergic
	should be aware of risk if relative is allergic but you are not necessarily allergic
	should not necessarily be tested if sibling/parent is allergic
	should be challenged in controlled environment
	high percentage for a sibling of someone who is peanut allergic to have a reaction on their first exposure
	we recommend that a mom who already has a child who is peanut allergic avoids peanuts during a pregnancy or beast feeding
	7% increase in chance of having allergy if a relative is peanut allergic
	2 things are needed to develop an allergy: exposure and genetic potential
environmental	exposure factors in society

	no allergies in third world countries
	in first world countries, babies encounter bacteria later/differently
	in third world countries they are still fighting off worms, malaria, TB
	baby is exposed to bacteria at birth through delivery that stimulates TH1 development
	before we were immunized we were fighting off infections and now that we have conquered those our bodies are attacking proteins
	definitely environmental
social stigmatism	social stigmatism
	peanut-free tables
	can't sit with friends at lunch
treatment depends on severity	does not refer all patients to allergists-depends on reaction
	treatment depends on the kind of reaction
can outgrow peanut allergy	documented cases of outgrowing the allergy to peanuts
	it is possible to outgrow the allergy
	outgrown because eosinophils die out or become dormant
	can outgrow
	enough of population does not outgrow the allergy
	20% outgrow allergy
	probably some outgrow it
	people do outgrow it
	it is possible but it is a minute number
	20% outgrow an allergy to peanuts. One in every five
skeptical of ability to outgrow allergy to peanuts	no patients who have outgrown it
	tree nuts, peanuts and shellfish are the most severe and the least likely to outgrow
	peanut allergy is persistent and you do not outgrow it
	after "outgrowing an allergy, continue to avoid peanuts
	conflicting reports about peanut allergy

possible to re-experience allergy after it is outgrown	it is possible for an allergy to resurface after it has been outgrown
	possible to recover an outgrown allergy
	small percentage loose their desensitization within 6 months
	testing is done for 2-3 years after having outgrown the allergy just in case
	in 8% of 20% an outgrown allergy resurfaces
eat more peanuts	continue eating peanuts to maintain desensitized state
	have to eat peanuts at least twice a week to maintain it
	building up immunity by eating more peanuts after outgrowing allergy
	if you do not eat peanuts after a negative RAST test your symptoms can reoccur
no re-experiencing allergy	once it is outgrown, it is gone forever
caution with anti IgE treatment	death involved with anti-IgE therapy
	studies stopped on Xolair
	never heard of Xolair
	anti-IgE results not that significant
	TNX was specific for peanuts and was stopped by FAN
	Xolair only after standard immunotherapy fails
	antibodies that attack your antibodies
	be careful of affecting future generations
	Xolair may be effective for peanuts
	one peanut to six-eight before anaphylaxis
	shots create a state of tolerance
	may cause false sense of security
	4-5 years before it is ready for clinical use
	Xolair is the most promising
	prevent accidental exposure but do not allow for the normal consumption of peanuts
Xolair frequency	requires life-long frequent injections
	once or twice a month

	it would have to be an ongoing process
	not like immunization, if you stop it will resurface
	antibodies have half-life and need monthly administration
Xolair is too expensive	each injection costs $600-$1000
	not covered by insurance
	very expensive
	low risk with these injections
	biggest problem is cost and insurance coverage
patients have no confidence in new treatments- too much risk- dangerous	most patients won't go for new immunotherapy techniques
problems with testing	peanut allergies are easily misdiagnosed
	food allergy testing does not tell you what you are allergic to
	can test negative and still have a reaction to peanuts
caution with DNA immunization but good idea	problem is a lot of genetic manipulation
	further down you can shut things off the better you are
	foods have more than one protein
	can desensitize one and sensitize to another protein with the same shot
	DNA immunization is the removal of the protein
	did it with milk and there was still enough protein to trigger reaction for many kids
	do it at the genetic level
	have to break it down into peptides and desensitize to those
	one dose treatment
	still in studies and not ready for clinical trials
	when injecting foods you have to worry about more age production as a side effect
never heard of DNA immunization	never heard of DNA immunization
fermentation is only worth it if 100% elimination can occur	must remove 100% or its useless

	can't test that 100% has been removed
	fermentation creates false sense of security
	not necessary to eat peanuts just avoid small traces in other products
	fermentation would be helpful if it was for peanut oil which is used in many products
	fermentation could work
	no reason for fermentation, it is not necessary for them to eat peanuts
	wouldn't use it or suggest it unless they can prove the allergenic protein has been completely eliminated
	fermentation would work if they can isolate the allergenic protein and remove it all
	reducing allergenic protein by 70% does not drop it below the threshold to prevent a reaction
	unless you can remove it 100% it doesn't make any difference
genetic modification of peanut	worked for cats -found specific genome that codes for allergenic protein
	can now produce non-allergenic cats
	have not yet found genome for peanuts that codes for allergenic proteins
lots of exciting research in the future	lots of exciting research lies in the future
	fascinated by these studies
	study with Chinese herbs
	food allergy herbal formula one
	peanut allergic mice could eat peanuts without a reaction for up to one month
	early data shows they have potent stimulation of immune system switching to antigen
	break it down into exactly what herbs are having the effect
	pollen genes injected into rice to stimulate pollen desensitization in Japan

	turn peanut from allergenic to antigenic
	study on vaccine that will fool immune system into thinking allergens are bacteria
	wrap allergen in bacteria specific code CPG
	attempted peanut desensitization protocol
	study with attenuated proteins
no confidence without human clinical trials	no confidence without human clinical trials
	not ready for clinical studies
	still in studies

Conclusions

As I triangulated the data to see if allergists and pediatricians shared opinions on different questions I found that they tended to agree that there was in fact an increased awareness of peanut allergies by parents, schools, and doctors which has led to increased number of patients tested for this allergy and an increased number who are diagnosed. They both agreed that the allergy to developed after birth due to environmental factors, genetics, and diet changes. With regards to the new immunotherapy techniques they agreed that age must be considered and play a large role in the development of these techniques as it is mostly children who will use them clinically. As of today they agreed that Xolair was too expensive for practical use and it should only be used with caution due to its dangerous side effects. DNA immunization should also be used with caution according to both groups of professionals. They also tended to agree that a fermentation process is only worth using clinically if it can be proven to eliminate 100% of the allergenic protein. However the most important concept that both groups of professionals agreed upon is that these new techniques must focus on preventing accidental exposure not allowing the patient to consume large amounts of peanuts and peanut products on a regular basis. These treatments would be combined with a less severe avoidance tacit to ensure the patients safety.

However they did not agree on every aspect. Allergists tended to be more optimistic concerning the immunotherapy techniques in research. They also wanted more than just avoidance because they see the severe patients for whom a peanut is fatal and felt that many opportunities existed in the future for these techniques. Whereas pediatricians tended to be more conservative believing that although there are accidents, most cases are mild and therefore avoidance works. They were less optimistic about intrusive procedures and tended to stick with what they see in their patients rather than in the new research. They also mentioned that they do refer their patients to allergists when their allergies are severe so they treat more mild cases. The allergists agreed that every case should be treated as severe or at risk for being severe. They also emphasized the importance of the progression of the allergy and the increased severity and degree to which it worsens as time progresses. With regard to the formation of the allergy allergists tended to believe that a child was at a greater risk for development if a first or second degree relative already had the allergy therefore emphasizing the genetic factors. They also shared the belief that 20% of patients simply outgrow a peanut allergy on their own however of this population 8% will loose this desensitization in 6 months. To prevent this loss, allergists suggested the consumption of more peanuts. Finally with regards to the immunotherapy techniques the allergists tended to have the most confidence and the greatest expectations for the potential of DNA immunization. The pediatricians on the other hand believed that most cases are mild by history and every case does not warrant the treatment that a severe case would need. They also held less confidence in the genetic factors of allergy development and believed that a patient does not necessarily need to be tested for peanut allergies if a relative has the sensitivity. They also tended to be skeptical on the ability to successfully outgrow the peanut allergy and discouraged the idea of eating more peanuts if it seems the allergy has been outgrown. However

with regards to immunotherapy the pediatricians believed that avoidance and awareness work even in the most severe cases. As such they fear that the suggested treatments may create a false sense of security and therefore hold no confidence in such treatments without documented success in human clinical trials. There were individuals who contrasted this theory on certain issues and individuals who stood alone with their opinions however; this is expected with the size of the volunteers interviewed.

If this study were to be repeated a larger sample would greatly improve the results. The five professionals interviewed are not enough to expand these results to a wide national level. As a result the conclusions drawn from these results are greatly limited and although they do represent the opinions of those interviewed they are not enough to be used effectively by the researchers working on the immunotherapy techniques in question. Also the results of this lab should be analyzed statistically to quantify the numbers who agree and disagree within their fields and cross-sectionally to provide the researchers with information that is more easily understood to allow them to devote more time to the technique in which clinical professionals hold in the highest regard with the greatest amount of anticipation and optimism.

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