
**Dr. David Stukus:** Hello, and welcome to "Conversations from the World of Allergy", a podcast produced by the American Academy of Allergy, Asthma & Immunology. I'm your host, Dave Stukus. I'm a board-certified allergist and immunologist, and serve as a social media and medical editor for the academy. Our podcast series will use different formats to interview thought leaders from the world of allergy and immunology. This podcast is not intended to provide any individual medical advice to our listeners. We do hope that our conversations provide evidence-based information. Any questions pertaining to one's own health should always be discussed with their personal physician. The Find an Allergist http://allergist.aaaai.org/find/ search engine on the Academy website is a useful tool to locate a listing of board-certified allergists in your area. Finally, use of this audio program is subject to the American Academy of Allergy, Asthma & Immunology terms of use agreement which you can find at http://www.AAAAI.org. Today's edition of our Conversations from the World of Allergy Podcast series is produced with the general public, patients and healthcare professionals in mind. We are thrilled to welcome Dr. David Fleischer who is an Associate Professor of Pediatrics at Children's Hospital of Colorado and the University of Colorado's School of Medicine where he serves as the Associate Section Head and Director of the Allergy and Immunology Center. Dr. Fleischer is the current Chair of the Adverse Reactions to Foods Committee of the Academy and is an accomplished research with over 70 peer review publications. Dr. Fleischer's research interests focus on food allergies and improving our understanding of diagnostic and therapeutic approaches to these conditions. Dr. Fleischer, thank you so much for taking the time to join us today and welcome to the show.

**David M. Fleischer, MD:** Thank you Dave and thank you for that very kind introduction.

**David Stukus, MD:** Well let's get into it, so today we're going to talk about food allergy and food allergen immunotherapy. And we have a wide audience listening who come from all different backgrounds, so can you start just by defining what a food allergy is to help set the stage for our conversation?

**David M. Fleischer, MD:** Sure. So any reaction to a food we kind of say is an adverse food reaction within those adverse food reactions, if it involves the immune system so if it's immune mediated then it can be possibly a food allergy. When you talk about food allergy then breaking that down it can be what we call IgE-mediated versus non-IgE-mediated where the IgE antibodies are the ones that can potentially cause severe reactions such as anaphylaxis, symptoms can be anything from hives, swelling or angioedema, difficulty breathing and there's the typical foods that cause those. And then the non IgE-mediated reactions can be severe as well, in some case what we call food protein-induced enterocolitis syndrome where you can get severe diarrhea and vomiting and become dehydrated but some of the other non-IgE-mediated reactions, they're usually not life threatening as compared to IgE-mediated reaction. I think another point is that many think they have food allergies when in fact the number that truly have food allergies diagnosed are much less so there's other reactions to foods for example intolerances, the classic one is lactose intolerance where you don't have the sugar to break down, or the

enzyme to break down the sugar in dairy products therefore you can get gas and bloating and diarrhea but you're not allergic to the protein, the dairy proteins that are in that, so you could take a lactaid milk that has the lactose removed from it but it still has the milk protein in it and do fine whereas if you gave for example the lactaid milk to a cow's milk allergy IgE or non-IgE, they could have a reaction to that because there's still the protein that's in there.

**David Stukus, MD:** So it sounds like there's some subtle nuances in some of the wording that we use here and for the purposes of today's conversation, just so our listeners are aware, we're really going to be talking about IgE-mediated food allergy reactions. Now you mentioned before about people thinking they may have food allergies when they don't, can you tell us approximately how many people have food allergies or what percentage of the population and what are the most common causes?

**David M. Fleischer, MD:** Sure, I think just to preface what we think of the prevalence in the United States most of the prevalence studies have been based on not food challenged based to actually definitively prove you have food allergies, so they're often based on telephone questionnaires. So true prevalence based on food challenges is done in other countries such as Australia haven't been done in the U.S. so these are our best estimates based on these kind of surrogates for those things. Usually I think the percent now is somewhere close to eight to ten percent of children have food allergy, it's probably about a half that in the adult world have food allergy, at least we're talking again IgE-mediated allergy. There was actually just a paper that came out from Northwestern with Dr. Gupta looking at adults questionnaires, I think there were 40,000 responses in there, the prevalence is even higher, about ten percent, so about 20 something million having it. So I think again, there's probably some range of true IgE-mediated food allergy within there where we think about 15 million people probably have it based on some studies, so that could be one in thirteen children could have it within that range. So the most common food allergy when we're talking IgE again are milk, egg and peanut are probably the big three now, there are other ones such as soy and wheat, tree nuts, fish and shellfish that are also very common but not as common as probably milk, egg and peanut especially in the youngest children. In adults, the most common ones are going to be the ones that aren't usually outgrown which will be the peanuts, tree nuts, fish and shellfish.

**David Stukus, MD:** Now you and I both see patients every day that either feel they have a food allergy or are misdiagnosed with having a food allergy when they don't actually have one, so can you walk us through our approach to how we currently diagnose food allergies?

**David M. Fleischer, MD:** Sure. The most important thing as it is likely within any kind of diagnosis we're trying to make is the clinical history. So when you're talking about IgE-mediated allergy, you need to have a clinical history that's consistent with what we would call an IgE-mediated reaction or process. So getting that clinical history clearly from a family or a patient is going to be key, so the onset of when the symptoms happen, so usually with IgE-mediated reactions, those symptoms happen usually within the first few minutes, 30 minutes but can happen up to two hours after ingesting the food. And then the typical symptoms that are associated with IgE-mediated reaction so hives or urticaria, swelling, what we call angioedema, any kind of respiratory, congestion, runny nose, coughing, wheezing, vomiting, but again the timing needs to be typical of that. Even though I've mentioned kind of the top eight food allergens,

really any food could potentially cause an IgE-mediated reaction. Again, it's getting that good clinical history of basically the symptoms and when things happened around that reaction. Oftentimes we'll also ask, "Have you eaten that food again, since then?" because sometimes, kids especially when they get viral infections can hives and they have eaten a food which within two hours may have been what we think is a major allergen, had a reaction but if they've eaten it again or eaten it many times before, it may not be the case. If you have a history that's clinically relevant possibly to an IgE-mediated reaction then we as allergists have testing that we can do to confirm that. So you have skin tests that we do, there are blood tests we can also do that can be done by other providers as well, but again, I mean the key point is you don't want to be doing a broad range of tests without a good clinical history of what food or foods you've identified as possibly causing that reaction.

**David Stukus, MD:** So in other words, if somebody's eating a food and they're not having those immediate onset reproducible symptoms is there really any reason to test for IgE food allergy in most of those patients?

**David M. Fleischer, MD:** No, and I think that's where we get into trouble and have gotten in trouble in the past, if you're looking at for example, let's say there are times when we see patients that come to us with abdominal pain after they eat to go screening for those things and do a panel of skin tests or blood tests could get you some positive results but without a good clinical history, taking those foods out is not recommended and that's where if someone comes to us and have had positive tests, we'll often go back through the history and/or do testing or more likely do a food challenge where that's the definitive test of whether they relationship are allergic to that food or not under observation to see if they don't react.

**David Stukus, MD:** Great. Now we know that a food allergy diagnosis, it's really a big deal because it's a life changing diagnosis. Can you describe for our listeners what a typical day is like for somebody with food allergies and some of the challenges involved with avoiding ingestion?

**David M. Fleischer, MD:** Sure. I think food allergy and you and I both have done a lot of research in this, I think is one of the hardest allergic diseases to manage, I think myself growing up with asthma and seasonal allergies and these days both my kids have seasonal allergies and are on allergy shots and have asthma, I'll try to put it in perspective from where I see it. So my son, my youngest son has allergy shots and he had an anaphylactic reaction about two years ago. I still remember that feeling I had in my gut when I got that phone call that he had a reaction because I have treated thousands of patients for anaphylaxis and knowing it was my son having that, try to put yourself in the shoes of someone, a parent or a patient that has food allergy, that constant fear of having anaphylaxis almost 24 hours a day except for maybe the child or the patient is sleeping when they're not eating something within two to three hours, I don't think we can really understand that until we've put ourselves in the shoes of those patients and families, the quality of life of patients that have food allergy can be quite low, having to read labels, constantly worrying about again reactions, there's bullying that can happen with these children which we know is more common that we thought based on studies that have been done. Another thing is when you go to a restaurant, now you get asked more about, "Does your-- do you have any food allergies?" but constantly not being able to consider going out to restaurants because of worry, going to a family's house to sleepovers there's just a lot of things you have to really think about as a patient with food allergy to

prepare yourself to not have an actual ingestion again such as reading labels, having epinephrine available all the time antihistamines. So it really has a huge impact on the quality of life whereas putting it back into perspective with asthma and seasonal allergies, most of those things are pretty easy if you take your medications and medications don't take a lot of time to take with those diseases, you'll be fine, but again it's that constant fear of having an accidental exposure that could cause a life threatening reaction I think that really makes it difficult for patients and families and other relatives of those patients and friends that have food allergies.

**David Stukus, MD:** I think you did a great job of really describing quite well of how this encompasses every aspect of their life. Now is there any hope, do people ever outgrow their food allergies on their own or develop tolerance over time?

**David M. Fleischer, MD:** It depends on the food allergen, so previous studies looking at milk and egg, maybe 20 years ago would say that most outgrew it by five years of age or so but then some more data came out out of Johns Hopkins saying looking at milk and egg, many patients may not have outgrown it until they're closer to 10 and 12 years of age. Again, you have to look at the different studies and the base of the population that was referred to say a tertiary center which maybe had more severe allergies. But I'd say in general most patients outgrow milk and egg, the age depends on certain factors but there are certainly patients with milk and egg allergy that go into adulthood with that, but I'd say the majority do outgrow it, by what year I think can be debated. Only about 20 to 25 percent of patients outgrow peanut allergy, so the vast majority go onto it in adulthood and about ten percent outgrow tree nut allergies, so again, the vast majority go into adulthood with those. Fish and shellfish, we don't have a very good natural history data with but again most go into adulthood with those allergies. Soy and wheat are probably the least of those top eight allergens and usually those are outgrown but we certainly have patients, I'm sure you and I that have wheat allergy that's IgE-mediated that still have it into their teenage and adult years. I haven't really seen soy go into adulthood per se. But there are some patients that will outgrow it for sure and there's different things that we can maybe help accelerate that outgrowing for example with milk and egg, if they can tolerate baked milk and baked egg, that may accelerate them outgrowing it sooner. So again, it depends on the food primarily.

**David Stukus, MD:** I've heard you say a few times now already in our conversation about really how individualized this diagnosis is based upon the history and the food and things along those lines. Let's go back to something you mentioned just before because there's a lot of people listening that may not understand how severe a food allergy reaction can be or those who have food allergies may not understand what to look for. So can you describe for us what a severe reaction would look like for somebody with a food allergy and also some indications of when epinephrine should be used?

**David M. Fleischer, MD:** Sure. So when you're talking about a severe reaction, I think you're most likely talking about anaphylaxis which is again, a serious allergic reaction that's usually very quick in onset and unfortunately can lead to death. The key treatment for anaphylaxis is prompt use of epinephrine and when we talk about with our patients going over action plans and when to use epinephrine there are some general things again, I think it depends on provider may be different, patient may be different, what you may say but for example if you have just a few hives or a localized say lip swelling or eye swelling,

most would say epinephrine is not needed. If you have generalized hives that break out suddenly to me that is showing a systemic reaction so even if there's no other symptom, I would consider using epinephrine. Any respiratory especially lower respiratory symptoms such as coughing or wheezing is epinephrine, patients that vomit more than once or even I'd say have abdominal pain, vomit and continue to have severe abdominal pain, epinephrine we'll often use. There's some questions about if you have two organ systems then some plans will say use epinephrine. I think the key point that I try to tell parents and patients is if you think your child or you think you need epinephrine, give it, don't wait to talk to a medical provider or someone, if you think you need it, give it. There are probably only a few circumstances that it's dangerous to give epinephrine so often we'll say to parents, it's better to give it than not to give it honestly. So again, there are some nuances there with different patients and things but again, I think when we talk about poor outcomes and fatalities, there often is a role of epinephrine either not being available, they don't have it on them or it wasn't used quickly enough, so I think epinephrine really is important and carrying epinephrine is very important, not just an antihistamine because antihistamines may be able to be used for some minor symptoms but you can't wait for antihistamines to work if you're having anaphylaxis.

**David Stukus, MD:** So you really hammered home the importance of using epinephrine if you feel that you need it or even for those who aren't sure, can you just tell us what is epinephrine and why do we use it as the first line treatment for anaphylaxis?

**David M. Fleischer, MD:** So epinephrine is simply a more common term could be adrenaline, it's just the onset of epinephrine is within seconds to minutes. I think when, as you've probably seen in some of the studies we're doing, we'll talk about later, using immunotherapy most of those patients have reactions because we know they're allergic and we're doing a challenge to see how much they can tolerate. When you see the parents and the patients that use the epinephrine oftentimes they'll say they're surprised how quickly it worked and it really didn't hurt that bad to use it and we feel much more comfortable now, even the patients giving themselves epinephrine sometimes in these studies is pretty impressive to see but it rapidly helps reverse some of the symptoms and signs that you'll see of anaphylaxis, the onset again is very quick but the half life meaning how quickly it goes away can be quite quick as well, so it's important if you've used epinephrine to seek medical care to make sure that the reaction doesn't come back or there's a later reaction. But I think the nature of the medication and adrenaline it just, it works very quickly and helps reverse and hopefully stop the release of other mediators and things that can cause anaphylaxis.

**David Stukus, MD:** Now we talked before about the quality of life issues that surround living with a food allergy and you just did a great job of explaining how severe a food allergy reaction can be. Can you talk about some of the social consequences of living with food allergies?

**David M. Fleischer, MD:** Here you're referring to just in general what it's like, I mean I think again quality of life is so negatively impacted by food allergy, there's not usually a two, three hour period where any of us don't eat anything in their lives again except when they're sleeping. So there's constant, and food is such an integral part of what we do to survive in social situations, so it can be very difficult for families and patients to go out to say dinner or to any restaurant, social situations like going to parties and birthday parties, things we take for granted can be very worrisome just because of possible cross contamination

and hidden ingredients. School, just going to school can be difficult because again, when you're talking about milk and egg and some of these major allergens like soy and wheat, they're ubiquitous in foods, so it's hard to avoid those sometimes. Again bullying can be something at school that we see, it's unfortunate but we certainly see that food allergy as well, but it's not easy, as you know, just going through our daily routine if you have to worry about constantly what you possibly could cause a reaction so this is huge impacts on social situations and quality of life.

**David Stukus, MD:** That being said, do you find that there is a path that people with food allergies can follow so they can successfully navigate these challenges and live a happy life?

**David M. Fleischer, MD:** I do, I think the way I try to put it in perspective is we want some healthy level of anxiety, we want people to be cautious, we don't want them to be cavalier about things and just take for granted, "Well, I haven't had a reaction in this amount of time so I should be okay, I'm not going to carry my epinephrine because I've never had a severe reaction." So I think there are ways to do it and part of that is education about what things you need to avoid, how to avoid those things so dieticians play a key role in our center here in educating patients and families on how to read labels, what things may sound safe but may actually have hidden say dairy and egg in them. More importantly what things that you need to get in your diet to make up for the things you are avoiding such as calcium and vitamin D if you're avoiding dairy and things. So I think there are ways to do a balanced effective avoidance carrying epinephrine, going over action plans. I think if there's too much anxiety and we certainly see that not just from the patients but from parents and families then trying to seek out some psychosocial support which we're fortunate to have at our center and other centers around the country have because again, we want patients and families to be able to live their lives as normally as they can. Again, try to put yourself in the shoes of someone with food allergy, and it's much harder to do than some other diseases.

**David Stukus, MD:** Now you mentioned before about some of the more common causes of food allergy but can you touch upon why does it seem like every story we read about whether it's online or social media or in articles that the focus is really on peanut allergies, are they more severe compared to other foods and why do we see this disproportion of focus?

**David M. Fleischer, MD:** I think there's several reasons, I think when you look at peanut allergies, certainly they seem to be more responsible for more severe reactions and it is one of those higher risk food allergens that puts you at risk for a possible fatal reaction, other things that make you at higher risk for having asthma and poorly controlled asthma as well. Another thing is that peanut allergy again is not usually outgrown so if only 20, 25 percent outgrow it, you're going to see more and more patients go into adolescence and adults and not outgrow it and then when you look at adolescents and adults, those are higher risk kind of age groups where those teenagers and young adults tend to take more risk taking behaviors and not just with food allergy but obviously other things but those combination of all those factors likely plays a role. The other point is I think the press unfortunately does focus a lot on peanut allergy and as you know when younger kids in preschool, milk and egg are much more common to cause reactions and anaphylaxis and there are deaths that happen from other foods besides peanuts so I think it's a combination of all those different factors but certainly peanut is one known to have potentially more severe life threatening reactions.

**David Stukus, MD:** Well we spent some talking about the scope of food allergies and the importance of avoidance in treating reactions when they occur, for the last part of our discussion today, I'd like to switch gears a little bit. Over the past decade or so, there have been multiple research studies looking at ways to potentially treat food allergies. For our listeners, can you describe these approaches and how they differ from one another?

**David M. Fleischer, MD:** Sure, so you're talking obviously about food immunotherapy which is the basic premise is like allergy shots for environment allergens, you're exposing patients to the food allergens that they're allergic to in small doses and usually increasing doses depending on the therapy. There are three main types of immunotherapy that have been talked about or been researched in the last 10, 20 years like you said, so I'll talk about each one of them individually a little bit. So the one that's been probably studied the most and used now clinically in private practice is oral immunotherapy, with oral immunotherapy or OIT you're obviously eating those foods, you start with usually a very small does, maybe a half a milligram of protein on a what we call initial escalation day, you usually try to get to about three milligrams and then every two weeks, you come back to an office with medical provider, it should be an allergist that's overseeing the ingestion of those foods every two weeks and then usually getting to a maintenance dose that can be anywhere from say 300 milligrams or about one peanut if we're putting it in that perspective to up to gram doses although most people now are using lower doses to decrease the amount of time it takes to get to a maintenance dose. With oral immunotherapy because you're ingesting and eating those foods, there are more side effects usually, more significant side effects that can be more moderate to severe compared to the other therapies I'll talk about so anaphylaxis can happen with any of these therapies but dropout rate from oral immunotherapy is about 15 to 20 percent and most commonly due to GI side effects because you can induce what's called an inflammation in the esophagus called eosinophilic esophagitis possibly. There are also some also some restrictions on OIT as far as not being able to do physical activity with a three hour period of taking a dose or not taking that dose within two hours of going to bed. There are also some reactions that can happen out of the blue if a patient gets sick with the flu or other viral infection and suddenly have a reaction where they've not tolerated it before. So as far as efficacy, how well it works, because you're doing higher doses, about a peanut a day for example you're going to have more what we call efficacy, it's going to work a little better, a little faster but again you have to balance that with the side effects and the safety of the product compared to some of the other ones. The second one is sublingual immunotherapy which is what it sounds like, you're putting drops of liquid under the tongue, those doses are usually maintenance doses of three to five, maybe seven milligrams total so much less than the OIT doses. Most of the side effects there are going to be in the mouth so most all patients get itching in the mouth but that usually gets better over time, more severe reactions can happen but not as common as an OIT. And the dosing again is usually every two weeks getting to a maintenance dose and there's some controversy where that needs to be done in an office or at home but sublingual hasn't been studied as much commercially with products. The efficacy of it is probably in between the oral immunotherapy and the patch and it really depends on the age when that started so two main studies looking at peanut, one was an older population of adolescents and adults, it didn't work as well as the ones that started at a younger age, so age may be a factor. The last one is what we call epicutaneous immunotherapy or EPIT which is again what it sounds, is a company that makes a patch right now that's being investigated for peanut and for milk, peanuts made it through the farthest into phase III like the oral immunotherapy company. The product is a fixed dose unlike the other two so

there's no up-dosing, the patch is put on at least in the clinical trials at the center for three hours then over the next two weeks, built up to taking it, putting it on for 24 hours a day. The most common side effects because it's applied to the skin are going to be skin reactions and most patients get those, some can be severe but the safety of it seems to be much higher than the sublingual or the OIT because you're not ingesting any kind of food product. However, because it's a fixed dose and it's a much smaller dose, to put it into perspective it's 250 micrograms for peanut, that's about 1/1000s of a peanut so for example in a three year study of using the patch every day compared to taking 300 milligrams a day, that if you sum up 250 micrograms daily for 24 hours for three years, it's less than one peanut, it's less than 300 milligrams of peanut protein total for those three years. Because of the lower dose, it's going to take a little more time to work so you have to balance any of these therapies with how quickly you want them to work, what side effects you're willing to endure and then the convenience of those therapies and having to come into a physician's office for sublingual and OIT versus the patch where it's a fixed dose. So again, I think there are some good options here and the OIT and the peanut patch are the closes to hopefully FDA approval some time later this year so we should have those things, some products FDA approved for use soon.

**David Stukus, MD:** That's a wonderful overview and thank you for really describing the differences between these approaches and some of the benefits and limitations. Now at this time when we're speaking, it's early 2019 and you had mentioned that there may be some FDA approval for some of these products but where do we stand now in regards to the readiness and widespread use of food immunotherapy?

**David M. Fleischer, MD:** So you're asking a tough question and I think right now the only immunotherapy that's really been studied and used in prior practice is oral immunotherapy for foods, sublingual is still being investigated and there are some other products I think coming out related to that. But the oral immunotherapy has been used in private practice groups so private allergists in addition to the studies that are being done at clinical academic centers, that's the closest to being used I think. There are other centers, academic centers that are doing it as well and we've discussed at our center when we want to do that. I think the hard part for me when I look at the therapies, there's a lot of things we just don't know, long term, how long the patients have to be on the therapy, what happens if you stop it. When you look at the trials that have been done and the practice groups that have been doing it, there's not a lot of data compared to using allergy shots where you've got millions of patients that have used it. So while I'm excited that these therapies are there and there are options, oral immunotherapy at certain centers across the country, for us it's how do you for example charge patients for that. We want the proper codes to be billing these patients and there are many patients unfortunately paying out of pocket, large sums of money to get this done and if you can't afford that is it fair to have those therapies not available for everyone and that's one of the reasons we have not decided to start therapy yet until we can make it available for everyone. However, we're not in a rush to put everything single patient on therapy. I know many families have been waiting for these therapies for many years but I think we have to be careful, there may be patients that ongoing avoidance is the best choice. For example, adolescents and adults that have been avoiding peanuts for years, many years or decades to take something every single day, it may be easier for them to just continue to avoid those foods and carry epinephrine than be compliant with a therapy that you have to take every single day and that's the case with any of these products right now is if you have to have constant exposure to the allergen, if you stop the therapy then

your whatever benefit or desensitization that you've gained could go away. So again, while I'm excited about these therapies I think we have to have really good conversations with the patients and the parents and the families about what their goals are, can we achieve those goals, can we answer some of the questions that they want before starting a therapy at this time.

**David Stukus, MD:** Well, you know, you hit upon it again, it sounds like that this really is such a highly individualized and nuanced diagnosis to live with, with so many different variables that go into the diagnosis and management and now with the evolving field of food immunotherapy.

**David M. Fleischer, MD:** I mean it's not for everyone, I think and it's not for every practice to do it either, I think you really have to be prepared to answer a lot of questions and phone calls, your office prepared to bringing in a lot of patients every couple of weeks potentially for OIT to be able to do the food challenges because at some point you have to show if the therapy is working and we know many allergists don't do even just the clinical challenges when we're seeing if patients outgrow it. So there's a lot of things that we're working on and working on some guidance with the college, American College and American Academy for our providers and parents and families about how to use these therapies. And I think an important point to is these are not to be done at home by yourself, so you should not be exposing your child to small amounts of increasing whatever food protein at home, these are dangerous things that can happen, anaphylactic reactions do happen with these treatments and they really need to be managed with someone who's experienced with food allergy.

**David Stukus, MD:** Oh thank you for mentioning that and I'll clarify for our listeners that what Dr. Fleischer is referring to is anybody with a known or existing food allergy that they should not be doing this at home, this is very different than our recommendations to feed allergenic foods to infants and other people.

**David M. Fleischer, MD:** Correct, that's early introduction of and trying to prevent food allergies such as with peanut is very different than treating a patient with known peanut or other food allergy.

**David Stukus, MD:** Now you mentioned guidance which I think is going to be crucial moving forward, what do you think is the most important thing for patients and providers that they need to understand in regard to food immunotherapy?

**David M. Fleischer, MD:** I think that everyone needs to know what they're getting into, again being clear with whatever treatment we're talking about, OIT, oral, sublingual or epicutaneous, what are the risks and benefits of doing any of those therapies or not doing any therapy at all, what are the advantages and disadvantages when it comes to convenience of doing the therapy, again, balancing it with safety and efficacy. So when we enter patients into our clinical trials, we're very upfront and clear about exactly what using the therapy means, how you have to be compliant with it, what tests you're going to need to get done to see if it's working, food challenges at some point to see if it's working and that you're still going to have to carry epinephrine, you're still going to have to have antihistamines available, you're still going to have to read labels for products, this is just more when they're going for approval from the FDA, it's four desensitization meaning that being on the therapy you can eat more of whatever food you're allergic to

after being on a therapy for a certain amount of time, it's not a cure, it's not to get rid of the food allergy, at least at this point. Again, we don't know the long term outcomes of these therapies, can some patients outgrow it or become truly tolerant with these therapies, yes, I think they can. For me when I look at the therapies I see them at least for milk and egg and possibly peanut, we know they work better the younger the patients are, so if we can start patients when they're diagnosed with a food allergy, so as you mentioned with peanut allergy, if you fail introduction early, can we put those patients on therapy early and have them outgrow, maybe by four to six years of age compared to adolescents and adults with peanut allergy that have longstanding allergy, they may never outgrow it and avoidance may be the choice. But again, it's clear conversations about what the goals are, making sure they align with the provider, the patient and the family because sometimes the patients don't want to do the therapies, the parents want that protection level but the kids aren't going to be compliant with it for example when they go away to college after being on therapy so there's a lot to discuss but it still means also that you've got to have the same precaution and concern about avoiding foods and reading labels and having epinephrine. It is kind of an insurance policy hopefully but again, you can't-- you shouldn't be increasing your risk just because you're on a therapy.

**David Stukus, MD:** Now I'm going to take advantage of having somebody with your expertise in both seeing patients with food allergy and all of your extensive clinical research in this realm. So if you could get your crystal ball out for us, what major changes or paradigm shifts do you foresee or would like to see in the field of food allergy over the next 20 or even 30 years?

**David M. Fleischer, MD:** Nice easy question.

**David Stukus, MD:** <laughs>

**David M. Fleischer, MD:** I think to start with treatment, I think when we look back, you and I are not that different in age, when we look back to our training, I don't think we thought that there would be treatments available and they're really on the cusp of having two FDA approved products. There will be more immunotherapy products coming as well, going into investigation, I think this is just the first wave and I think it's very exciting but when what I've seen and I can't talk about all those but what I'm seeing, there's a lot of pretty cool things and things that may work better and things that may treat multiple foods at once and things like that that are coming down the pipe per se, so I think the next 20 or 30 years for treatment is going to be very exciting. We're going to have to obviously study these different products and we're going to have to collect the patients that go on these clinically because again, these products may be approved with smaller numbers than what we're used to so we're going to need a lot of longitudinal overtime data to determine how these therapies really work. But I think right now is a very exciting time when we talk about treatment per se. I think the other part that I've been involved with is the prevention side of things so early introduction to peanut will certainly hopefully decrease some cases of peanut allergy from developing but there's so many things that we have not looked at so one of our investigators at our center here is looking at not post natal but actually prenatal and in utero factors that may, so when moms are pregnant what maternal factors can we see that may prevent some of food allergies. We don't really know exactly why patient develop them or why they outgrow them so the amount of research that hopefully will go into prevention in figuring out what those factors are I think will be very exciting over the

next 20, 30 years as well. But I think it's a fun time for you and me and other investigators at this point because there's so much more that we need to learn with respect to food allergy that we've certainly gotten very far in the last 30, 40 years but the next 20, 30 years I think are going to be very exciting and keep us very busy and fun with trying to help patients with food allergy, not preventing cases but also treating them.

**David Stukus, MD:** Well myself and everybody listening sure hopes that you're on the right track there and I'm sure we are heading that direction. I look forward to having you back on the podcast in 20 years where I can ask you the same question and look back and see what your response was now and reflect a little bit, so thank you for that.

**David M. Fleischer, MD:** Put stuff in a time capsule and see where we're going.

**David Stukus, MD:** There you go. Well Dr. Fleischer, thank you again for taking the time to be with us today, I could talk to you for three hours or three days regarding these fascinating concepts that you introduced and the discussion that we had, this really was a great conversation.

**David M. Fleischer, MD:** I appreciate that, it is fun talking about this, food allergy is a passion that we both have and I think the impact that we can make, that you're making and we're all making in this field is enormous.

**David Stukus, MD:** And your passion comes through so thank you. Before we depart, is there anything else you'd like to add?

**David M. Fleischer, MD:** No again, I think when it comes to food allergy, if you really think your child or patient has had something going back to diagnosis before taking a lot of foods or doing a lot of testing, come see us. Again, thinking about immunotherapy, it's a conversation that really needs to be had and it's not a short conversation, there are patients that avoidance should be an option as well but again, finally that this is an exciting time, we're really at the forefront of learning things and it's going to be an exciting time.

**David Stukus, MD:** Great. We hope you enjoyed listening to today's episode, Please visit http://www.AAAAI.org for show notes and any pertinent links from today's conversation. If you like the show, please take a moment to subscribe to our podcast through iTunes or Google Play so you can receive new episodes in the future. Thank you all for listening.