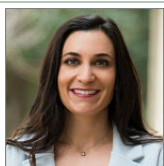


Trends in the Clinical Management of Food Allergy

Transcript

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Current State of Food Allergy



Raquel Durban, MS, RD, LDN: I think for us to discuss where we're going in the future of food allergy, we need to understand the current state of food allergy. And one of the questions

that I get the most in clinic is how is a food allergy different than a food intolerance. And distinguishing these is really essential to managing patients.

Food allergy is a reproducible adverse health effect that is an immune response. Typically, when we think of food allergy, we think of epinephrine type of food allergy, but there's also a whole other bucket of food allergies that are non-IgE-mediated which just means it's still an immune response, but it doesn't involve immunoglobulin-E. And the most common foods that we think about are peanuts, tree nuts, cow's milk, egg, wheat, soy, fish, shellfish and, most recently, sesame now is required by law to be listed as a top 9 allergen in the United States. However, that doesn't mean that those are the only foods that can be a food allergy. So, food allergy, think immune system response.

And for food intolerance, it's also sometimes reproducible, like we might have a lactose intolerance, and that's typically to the carbohydrate, which is the milk sugar, but if it's a milk allergy, it's going to be to the food protein. So, food allergy's also typically to the protein. And then food intolerance is typically to the carbohydrate.

To give you a better picture of where we're going to be focused, we're more so looking at the adverse food reactions that have the immunological response from an IgE standpoint, more specifically, today.

How do food allergies come to be? Well, there's this theory of an allergic march and it's where we think about the development of eczema in infancy and about 45% of children with eczema will have symptoms before 6 months of age, and up to 85% will have eczema before 5 years of age. But the

younger the development of eczema, that's what's associated with an increased risk of food allergies. These patients can then go on to potentially develop allergic rhinitis, which is kind of what we think about is those pollen allergies, and then allergic asthma can also transpire as the child continues to age and grow and their immune system is changing because, again, these are immune-mediated responses.

So, we know how it develops, but what we're also noticing is that we're hearing a lot more about it. Is it that we're learning more about it or is it that it's actually happening more? It's actually happening more and we're learning more about it. So, the prevalence has actually increased over time and the prevalence increases with age, meaning that the older that the person gets, the prevalence of these food allergies becomes more prominent.

Why is this happening? And there's so many different hypotheses on why this could be happening. So, take all of these things with a grain of salt because know that food allergy and evolution of food allergy kind of on the allergic march is really likely multifactorial and we can't blame or pinpoint any one thing. But these give us opportunities to investigate and ask those research questions, those hypotheses, so that we can better understand food allergy to better support our patients.

We have some of the environmental factors which are such things as vitamin D deficiency or insufficiency, air pollution, we have a lot more cars on the road, although I see a neat shift towards the electric cars. If we look at other countries, we've seen in Asian countries that there's increased allergic disease in the urbanized areas. We also have learned a lot about early life nutrition and the timing of allergen exposure, possibly even intake of those long chain fatty acids. And then when we get to the microbiota, I think that that could be an entire lecture, but in summation of the microbiota, it's so important to food allergy, but what we need to remember is that there's still a lot to learn and we have a lot of opportunities to do more research in that area.

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We know why food allergy might be increasing in prevalence, but then we need to understand what populations are maybe more at risk and how we should be identifying those populations to ensure that they have adequate support. There are not only cost disparities between a socioeconomic standpoint, but there's some racial and ethnic disparities as well. And interestingly, this is the US data, and if we look at the introduction of allergenic foods from the patients who were maybe privately insured vs publicly insured vs those patients who maybe had to take corn out of their diet, such as maybe in the Hispanic population in that corn is more prevalent in their diet, and then the economic burden of having to find those substitutions for those families who might find that food is something that they're trying to make ends meet while also thinking about their rent, or we might be concerned about taking wheat out of a diet and how do we obtain gluten-free foods with needing to use government assistance for our food. So, it's not just the racial disparities. It's also those financial disparities and the high cost of therapies, like the cost of obtaining maybe an inhaler if they have asthma or the epinephrine auto-injector. And, also, how do we ensure that these families are all represented in our clinical trials so that everyone's getting the support that they need?

We have kind of gone through the journey of what we're looking at from a food-allergic population and maybe how it's come to evolve. So, what can we do with what we have learned? And how does what we've learned from research apply to how we practice in clinic?

In 2015, there was a study that was called LEAP, or Learning Early About Peanut, and this study was based on a hypothesis from Israel where they introduced peanut early in their infants. And they took 640 infants, between the ages 4 and 11 months of age, that were at high risk for peanut allergy. And what that means is that, based on a severity score, they had severe eczema. They also potentially had egg allergy or maybe they had both. And they divided these kids into different groups, and it was based on whether they had a preexisting sensitivity to the peanut extract on a skin prick test. And a skin prick test kind of looks like a 4-pronged toothpick and we dip it in a peanut extract that's in like a saline solution and then we kind of roll it onto the child's skin or the person's skin and the wheal and the

flare are 2 different sizes that we're measuring. The wheal is the immediate red circle in the center and then the flare is how far the redness flared out.

For these children, they had a 1 to 4 mm diameter wheal from a skin prick to peanut extract. And what they were looking at was tolerance at 60 months of age—or 5 years of age. And what we saw is that in the skin prick test-negative group, which means they had no wheals to peanut, that some of them still developed peanut allergy because they had severe eczema and/or egg allergy. And they were assigned to the avoidance group, and they had a greater likelihood of development of peanut allergy than those that were consuming it. And consumption was those 2 teaspoons of peanut protein, 3 times a week. So, it was 2 g of peanut protein.

But what's really catching is the skin prick test-positive group. These were the children or the infants who were already sensitized to peanut. And what we learned is that not only those with the preexisting conditions of eczema or egg allergy or both, but those who had already been sensitized to peanut, had a significantly greater risk of development of peanut allergy in the avoidance rather than those patients who were assigned to the consumption group. They had a much greater decrease in their likelihood of developing peanut allergy.

From LEAP was the evolution of all of these other studies looking at how does introducing allergenic foods affect our infants. And the EAT study (Enquiring About Tolerance) was looking at when we introduce these foods early, how does this affect their intake of liquid nutrition, which is the most important part of their nutrition in the early stages of infancy. So, interestingly, when you introduced the highly allergenic foods to breastfeeding infants, by 5 months of age, these kids were consuming all 6 of these foods, which were the cow's milk, peanut, hard-boiled hen's eggs, sesame, cod fish and wheat, and they were consuming it in a standard infant-feeding portion for age. And at the outcomes, these kids were actually consuming more breast milk than was the national average. So, we were able to find reassurance that introduction of highly-allergenic foods by 6 months of age actually helped them to potentially prevent food allergy, but also ensure that they were getting adequate nutrition through breastfeeding as well. And

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this has been kind of a pull for many of us clinicians as to how do we take these very calorie-dense foods—like 1 egg is 70 cal and 6 or 7 g of fat and 7 g of protein or even the 2 g of peanut protein—and how do we ensure that these aren't going to interfere with consumption of the liquid nutrition? So, the good news is that this pretty large study showed that these kiddos were able to thrive really well with their breastfeeding rates.

Then, in 2019, this really came to be. If we do introduce these foods early in the healthy infant, so the nonallergic or the non-at-risk patients, how does that affect their allergy development? To clarify, for complementary feeding or complementary foods, those are anything that's not human breast milk or formula. So, complementary foods are any solids or even any purees that are being introduced except for the formula or the breast milk. So, they took these healthy infants and toddlers and they looked at the feeding of these foods between 0 to 24 months of age and then followed them through 18 years of age because we know that this is the atopic march, or the allergic march, and it's the evolution of allergic diseases.

And they looked at 31 different studies over about almost 40 years. And what was determined was that for the non-at-risk patients, there was no relationship between the age at which the complementary feeding first begins and then the risk of developing food allergy or that eczema or asthma. But remember, these are for healthy kids and I think what this goes back to is reassuring families that if their child is not one of the at-risk kiddos, then to feed in a way that feels right for them, that feels culturally appropriate, that feels less anxiety-provoking for parents because we've kind of medicalized feeding and this gives us support that we should be continuing to take the baby's lead on when we start solids, take the family's lead on what solids are important to them in that non-at-risk population. And there's not a sufficient amount of evidence to determine the age at which we introduce complementary foods or beverages and the risk of developing allergic rhinitis.

Guidelines to Improve Allergy Management and Patient Care

Taking these guidelines, these papers, these studies and how do we use them to improve our care because it's that bench-to bedside, and how do we bridge that gap? And the first one that

really became kind of a huge movement was the 2017 Addendum Guidelines for the Prevention of Peanut Allergy. The trickle-down effect went from the allergist's office and the dermatologist's office, into the pediatrician's office. And that took some time to get there, but these were the guidelines that were developed and, it's giving reassurance to those families and those pediatricians that if there's no eczema or any food allergy, then we do it when it's age appropriate. If it's mild-to-moderate eczema, then we feed peanut around 6 months of age and, then, for those children who kind of fell into those LEAP guidelines, then an allergy referral would be appropriate. But it gives us a bedside, literal chart of how to assess when these patients do need to be evaluated by the allergist.

And, as we continue to evolve in our ways of thinking about primary prevention of food allergy through nutrition, this also stratifies patients into how you fall into a risk category. And I have the luxury of seeing a lot of patients from the pediatric community and they're just wanting to know how do I feed my baby? Because there's a lot of information, as I'm sure all of you are aware, on social media or just blogs that you can gather on best feeding practices and allergy comes into a lot of that. But if we're trying to feed a kid egg as their first food, I think we have to really consider what's the value of that, what evidence are we trying to practice? Because maybe we should be starting with a food that feels more normal to the family, and maybe that's not an important food to them at this time.

This was a group of physicians and dietitians that sat down and said, "How do we help families and clinicians understand what to feed and when?" Peanut introduction, we've talked about, as far as the LEAP study, and it's the same in this document. Introduce peanut-containing products to all infants, irrespective of their risk, starting around 6 months of life though not before 4 months of life. Certainly, if the patient requires an oral food challenge through an allergist's office because of adverse reactions, or if they're needing an evaluation prior to introduction, that would be the recommendation, though again around 6 months of age if it was based on those parameters from the LEAP trial.

And then egg introduction sometime around 6 months of life, but again it depends on the acceptance of the family and the

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acceptance of the kid. And from a delayed introduction standpoint, we're not deliberately delaying anything, but we're also not deliberately feeding a certain food first. Even for the LEAP guidelines, we're trying to introduce a few easily accepted solids so that we can mix the peanut into it and the same for egg. Egg is ... next time you make yourself breakfast and you have an egg, think about the textural kind of oddness of an egg. So, sometimes I'm trying to get wheat in first because I can make French toast with the egg or perhaps I want to make a pancake first with the egg because the texture of egg can just be a little bit more challenging.

We introduce all of these foods and that's awesome and fantastic and they're all really nutrient-dense, but we also need to remember that the diet needs to be diverse. Because I mentioned a small blip about the microbiome, but I think just, in general, we're trying to feed our guts good food. And so, thinking globally, does this child have fruits and vegetables, does this child have whole grains, does this child accept different textures and temperatures and colors? So, a diverse diet is more than just the diversity of the foods and the variety of the foods. It's the way that we prepare them, the way that we season them, the way that maybe we present them. Cutting something into a circle vs a square vs a star, all of those can take on different mouth feels and that can foster diet diversity.

From a hydrolyzed formula standpoint, we really, about a year and a half ago, all hit a really tough spot when there was a formula recall. And we had to triage patients and decide what formulas to use and how to navigate that and we don't routinely prescribe or recommend the use of hydrolyzed formula for prevention of food allergy or development of food sensitization. But I think, during that time, the number of questions that arose because it became more prominent in the media about these specialty formulas that people were questioning why am I not using one of those. This was a way for us to lean back and say, these are not recommended, these are not necessary, continue as you are, they are not going to prevent food allergies. And we also don't recommend maternal exclusion of allergens during pregnancy and lactation for prevention of food allergies.

Those were from 2019. So then in 2022, there was another set of guidelines, and these were the Global Allergy and Asthma European Network Guidelines, and this was, again, a multidisciplinary task force and they looked at 161 studies and made these recommendations based on not only the benefits, but the potential harms, with the reality check of doing this, and then patient and clinician experiences. The first and most important recommendation is avoiding the offending agent. And the significance of that is that there are many patients who actually will tolerate a baked version or a heat-manipulated version of a food and it's important that we distinguish which foods are safe and are not safe. And then that we educate breastfeeding mothers that they don't really need to avoid the allergen. Now, certainly if a child is reacting through the mom's breast milk, then yes. But for the most part, in my clinic, breastfeeding moms continue to eat a liberalized diet and this is supported by these guidelines as well.

And then this reinforces our specific formula use, but in this context it's infants with cow's milk allergy, the use of formula is specific to hypoallergenic, extensively hydrolyzed formula. Hypoallergenic in the EU is a different definition than hypoallergenic in the US. In the EU, hypoallergenic means a partially hydrolyzed product, but in the US hypoallergenic means it's extensively hydrolyzed, and this also came up a lot last year with the shift towards these hypoallergenic but partially hydrolyzed formulas due to the labeling confusion. So, if they're a cow's milk allergic infant, extensively hydrolyzed or amino acid-based formula is recommended and it specifically suggests against partially hydrolyzed formula, other mammalian milks and no soy milk for children under the age of 6 months.

There's not a recommendation, at this time, for or against prebiotics, probiotics, or synbiotics and no recommendation for or against the hydrolyzed plant formulas which have also become quite popular recently.

Peanut oral immunotherapy, peanut epicutaneous immunotherapy, and general oral immunotherapy, specifically to hen's egg or cow's milk, are discussed in these guidelines, which is kind of groundbreaking. So, peanut oral immunotherapy had a high certainty of evidence for select

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children greater than 4 years of age. And then, peanut epicutaneous, which is where it's placed on the skin, there's a moderate certainty of evidence. It's not yet available for children, specifically ages 4 to 11. And then, in the patient population that is using hen's egg or cow's milk allergy oral immunotherapy, which in a nutshell is kind of a desensitization process, had a moderate certainty of evidence.

Some more really practical guidelines that came out of this was the use of educational intervention. Now, I want to make a note that it says a very low certainty of evidence because it is good practice to offer structured education, but where the low certainty of evidence comes in is that we don't quite know exactly the best way to provide education, but we know that education is really important. But we don't have evidence to support which method of education, but we do want to make sure that the family is educated, the patient is educated and that it's tailored to their age group and their individual needs.

There's no recommendation for or against using biologics at this time, according to this task force. And because we do not know how to identify those at risk for severe reaction, the skin prick testing and blood testing gives us great evidence to support that someone is highly likely to react or highly not likely to react, but it doesn't tell us the severity at which they may react. So, it's good practice to put into place effective risk management and transition strategies because children have different needs at different ages. So, are they going to be self-carrying their epinephrine or self-carrying their inhaler. Making sure that we've optimized their asthma control in patients with food allergies because that can reduce their morbidity and mortality due to asthma. And we really want to look at the severity of those previous symptoms and the likely triggering dose when evaluating that risk for anaphylaxis because, again, those specific IgE levels alone are not useful in predicting the risk or the severity of an allergy.

Clinical Tools for Management of Food Allergy

We're going to take those hands-on tools, gather our evidence and discuss some more practical pearls for how do we manage these patients. The approach to food allergy management, first really needs a clear clinical diagnosis, but for those of us that have worked in clinic, we know that a clear clinical diagnosis is

not always that clear-cut. For example, if somebody ate a sandwich with multiple components and that was their first reaction, we kind of have to dissect what are all those components and how do they relate and putting together the picture with our board-certified allergist on the contributors to that reaction.

When I'm in my clinic, I'm thinking we know what the allergens are, and how do these potentially relate to appropriate avoidance of triggers. Do we need to discuss cross-contact precautions? Do we need to discuss safety in schools? How do I make sure that they know which suitable alternatives to buy? Could there be ingredients in a safe alternative that actually end up being not safe? And how do I take all of this information to not cause anxiety and allow them to continue to explore foods while ensuring that they're growing and developing appropriately? Because I might be able to give them a few safe foods, but as we talked about earlier, if I'm not able to really diversify or make those foods maybe even fun, then they might not be willing to eat them because these might be a really limited diet where they only have 20 foods and how many ways can you make broccoli or how many ways can you make a potato? So, we really have to consider beyond the clinic room, how are these patients going to be able to implement your recommendations at home?

I like to start with what can you eat rather than focusing on what can't you eat, but we do kind of have to talk about what you can't eat to make sure that we're staying safe. Food allergy label reading can feel like a really clunky task because label reading is confusing. There's front-of-label packaging, underneath the nutrition panel and front-of-label packaging for my patients does not have a lot of utility. So, you must turn the package over and read the actual ingredient panel.

These laws do vary by country, but in the United States, there's the top 9 major allergens and they must be labeled in plain language. So, if it has whey, it has to say milk. If it has casein, it has to say milk. If it has semolina, it has to say wheat. And they don't have to post a sign that says, hey by the way, it was cheaper for us to get semolina flour than it was for us to get corn flour, so we switched it out to semolina, which is wheat. So, they have to recheck the labels each and every time that

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they purchase a product. And then, if there's any question, call the manufacturer. And giving them resources from professional organizations, lay organizations such as the Food Allergy Research Education or the American Partnership for Eosinophilic Diseases, that is really critical to provide them with additional support and even some of the local parent support groups can be really beneficial. And then, giving them guidance on precautionary allergen labels which is highly individualized, and they need to talk to their allergist about whether or not they need to avoid those and for which foods.

Once we've discussed what you can't have, which can feel kind of gloomy, then we want to talk about what you can have and liberalize their diet. If you can't have egg, how do I bake a cake? Maybe there's a product where I can have an alternative egg for breakfast. Maybe there's a milk that tastes more creamy or maybe there's one that blends better when you add vinegar to it to make a homemade buttermilk. So, giving them those tips and tricks and resources and that's what we can do in the home, right? So, then we have to think about outside of the home. Eventually they're going to go to school, they're going to go to a restaurant and even in their home, they're going to want to discuss avoidance of cross-contact, shared fryer, shared cooking equipment, shared cooking surfaces, shared utensils. All of these things are really essential to keeping them safe. But if we can reframe it as these are some websites that might support you in dining out, here's a handout on how to avoid cross-contact. I tell my patients that have peanut allergy in their home, maybe they have 2 different colored sponges, 1 for peanut and 1 for the nonpeanut person, and things can go through the dishwasher. So, just giving them those practical tips will be really, really critical for them in decreasing their anxiety.

For anybody who's gone shopping in the last 6 months, you will find that food prices are astronomical and we have to consider that my recommendation for a beverage alternative might be wicked expensive compared to a cow's milk that comes in a store brand. Or we talked about those financial disparities or even living in a food desert, how do we ensure that their WIC or SNAP benefits are going to cover their food? Maybe they go to a big box retailer and they purchase allergen-free foods that they then split with another allergen family. What if we take wheat or corn out of their diet and that's a native staple for

them culturally? How do we get these kids to school and make sure that they have a packed lunch that's not going to disintegrate in their lunch box? And I say that because there are safe breads for wheat- and egg-free patients, but by the time it's lunch the bread is soggy and kind of disintegrated. And so how do we make it appealing so that the kids aren't tossing their lunch or more likely to eat their friend's lunch? There's a lot that goes into maintaining these families' quality of life and it really does require a specialized clinician to support them. And so I feel so fortunate to be able to work in this space and help these patients.

I talked about the use of alternative milk beverages and this chart highlights the differences and stark contrasts in these options. Soy and pea milk are the most appropriate for a child who is avoiding cow's milk, but we don't want to forget that there are opportunities to supplement these kids with appropriate formulas when needed. And soy is currently the only cow's milk alternative that is supported through WIC. And there was recently an open commentary section on WIC where we advocated for alternative options to be offered because, in some of the non-IgE food allergic patients, cow's milk and soy allergies actually are comorbid and oftentimes both have to be avoided.

A lot of times those foods aren't nutritionally equivalent. So, we have to assess for micronutrient deficiencies, see if we can correct them, potentially needing to use a vitamin. There's also feeding difficulties. If you've had an allergic reaction to a food that you didn't suspect was going to make you feel sick, you might be a little nervous to eat food again. So, feeding difficulties are present. Some of these children also have anxious parents and maybe foods with different textures or flavor modification haven't been offered or accepted by the child or offered by the parent. And so they don't know how to use their oral motor skills appropriately. So, these things—with limited dietary intake as well—can result in insufficient growth, specifically really in height is what we're going to be seeing.

My job is really more than growth and feeding and making sure that they're getting all that they need to grow at their best, but it's also about that quality of life. I intervene for poor growth or I'm correcting these opportunities for advancement, in a way

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that supports them financially, culturally and from a quality-of-life standpoint.

When these issues arise, these are the things that I'm thinking about. How did we get to having these issues? Well, milk is an entire food group. So is wheat. And these are the nutrients that are contributing most from those groups. And some of my patients have multiple food allergies. So, it's a huge opportunity for us to teach them how to eat in a way that's creative, fiscally manageable and accessible. And it really speaks to the bravery of these families to go out and try new things and kind of step outside of their comfort zone for cooking to make sure that they're able to meet these not only nutrient gaps but also to enhance their feeding skills of their child.

Food allergies and these nutrition and feeding issues are hopefully not forever, because our goal is to reintroduce foods. But food reintroduction, as it's defined, is the gold standard to confirm if the food allergy diagnosis is still accurate or if it's resolved, and this is the case for both IgE and non-IgE. So, we generally have you come into our office, sit in front of us and we feed you the food in incrementally increasing doses. Maybe we start with a few grams and then double that and then double that until you get to a portion sized for age, and these vary, based on the clinician. Most of the time they're open challenge vs being blinded, so that the kid doesn't have anxiety as to what they're eating. Sometimes they are blinded so that the child doesn't know, because sometimes anxiety can result in belly pain which then can be an unsuccessful challenge because of the belly pain due to anxiety, and it's hard to tease out if it's from that or from a true adverse reaction.

This is also based on skin prick testing and serum IgE. And so we're really looking at has the patient potentially outgrown it based on their labs and skin prick test, but also thinking about are there other cofactors, like their asthma and their allergies. And the oral food challenge is the gold standard, but recently what we've been seeing is these food ladders coming to light. And a food ladder is a form of home-based dietary advancement that gradually exposes a patient to an allergenic food through small, manipulated forms of the food, such as a baked product to a well-cooked form to less processed forms. And I want to be extremely clear that food ladders are

predominantly used in non-IgE-mediated allergies or nonanaphylactic type food allergies or non-life-threatening food allergies. There is some use in some studies that we'll discuss in IgE-mediated food allergy but these should always be discussed with a physician prior to following a food ladder. And what's happened is that there's just so many choices online and if you just do a Google search for food ladders, a bunch of different options are going to come up. But the thought behind them is that perhaps it lessens the clinical burden because getting an appointment for a food challenge can feel like months and months away and so possibly it would be that burden. Also, the anxiety of being in a clinic and we're kind of demedicalizing food because we're not doing the grams that we're dosing, we're not serving it to you in a little cup and possibly it even helps us with purchasing a specific item and making sure that you're having it on hand and it's fresh, the day of the challenge.

Some of the gaps are that we don't have specific details on the dose of the food and the protein, time and temperature for baking, alternative foods. Then there's also the cultural appropriateness. Most of these are very standard American diets, but we're all well aware that America's a giant melting pot and so there's all these different diets that come into play. I have a huge Asian population, a huge Ethiopian population and some of these foods, the families wouldn't know how to make them. And there's also a lack of straightforward recipes, so we need to know who's an appropriate candidate, how many days per step, exact recipes would be really helpful as well.

What we saw is that it has helped. In this small study, 86 patients between 8 and 33 months of age, that had anaphylactic type of cow's milk allergy, 43% had allergic symptoms, 80% of these from the milk ladder, no anaphylaxis and by 6 months, only 8 patients were not tolerating almost all dairy products. So, it does work. I just am really thoughtful about identifying the appropriate patients. And then the second study was a case-controlled study where they were resolving egg allergy. So, this does have opportunities to be used, but we want to make sure that we're using it appropriately and safely so that we can support these families to still decrease their anxiety and our anxiety when they're not going to be in our office.

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Where Are We With Immunotherapy?

The illusion of immunotherapy is finally pulling back the curtains on this. So, the oral food challenge is based on skin prick testing and blood testing where we feed you a full serving sized for age, but immunotherapy is a desensitization process and where it really stems from is when people get injections under their skin of maybe grass pollen, ragweed or dust mites. These patients are being desensitized to the environment and so the thought was can we feed people these allergens in really small, microgram doses to maybe desensitize them kind of like we've done with environmental allergens. And the answer is yeah, we can. And there are different kinds, but the ones that we have the most data to support are oral immunotherapies and epicutaneous therapies.

Oral immunotherapy (OIT) is when you're regularly ingesting that food in certain medicalized amounts and then epicutaneous is where you're actually wearing a patch and the allergen is on the patch. So, for OIT and my office is on the oral immunotherapy hallway, these patients come in and they do multiple increasing doses of 1 allergen ingested over several hours in clinic. And then the highest dose that they tolerate is what they're going to go home on and maintain that dose. And then they'll come back after 1 to 2 weeks, we'll escalate them again and then they'll eventually get to a maintenance phase that might be maybe 1 peanut or 2 peanut butter cups. It's decided kind of as they're going and where the patient and clinician feel like it would be best to hold them.

And then epicutaneous therapy is where the allergen is in the patch and is applied to the skin and there's not an initial dose escalation. It's more about the duration of wearing the patch. And the maintenance dose is a 24-hour application.

So, OIT is where there's this rapidly increasing dose escalation and then they're at a maintenance dose that they maintain for X amount of time, which could be years. And then for the patch, it's this placement of the patch, adhering it to the skin. It's really cool how we've evolved in our understanding of food allergy to desensitize people.

We have these different immunotherapies and when looking into the systematic review and meta-analysis from 2022, this

task force did a pretty extensive search of about 2,200 patients and found that oral immunotherapy improves tolerance while on therapy and is probably safe in peanut, cow's milk and hen's allergies, but what we need to better understand is their quality of life. Because these appointments do take a lot of time and the cost of these appointments, as well as what we're going to see from a longevity standpoint, like how long are these people actually going to be able to maintain this maintenance dose. And interestingly, there was not a statistically significant increase in adverse reactions in the use of allergen immunotherapy.

Cow's milk and hen's egg immunotherapy are becoming a little bit more prevalent. I just heard about a hen's egg allergy patient who... this was our first egg allergy patient, actually, who completed OIT.

Ongoing Studies on Food Allergy Prevention and Management

We've talked about where we've been and we've talked about where we are and a little bit about where we're going as far as these immunotherapies, so let's just spend 1 minute or so on these ongoing studies.

This study is looking at maybe we can prevent eczema, which would stop that allergic march, by providing a ceramide-dominant emollient, and there are several on the market. I always say if your baby's not shiny, then we need to lube them up again because I think good skin control is always essential to management.

There's another study looking at how do we keep these—the early peanut introduction—and determining who should be screened prior to early introduction, how that should be done and what quantity is really needed for these patients. Do we still need that 2 g 3 times a week?

In the FAST program, this is about providing education and trying to standardize a method of education in children ages 6 to 8 years of age.

And then the Natural History and Genetics, from a prospective and observational standpoint, the development of food allergy in children as it relates to those unaffected relatives or healthy

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controls, maybe how their stools or saliva or blood or some GI biopsies could be different, and what that might tell us from a genetics standpoint.

The TreEat Study is looking at tree nut introduction in the peanut allergic patient and if we can prevent tree nut allergy, but rather than doing individual nuts, doing a 4-nut butter.

And then looking back into our EMR to see what the adherence has been since those LEAP guidelines were put into place. So, there's a lot of interesting research coming out and this is just kind of the tip of the iceberg. We've seen that food allergies are becoming more prevalent, and our management recommendations and that sort of bench-to-bedside are really evolving based on abundant research.

We don't want to delay those highly allergenic foods. Maybe we want to do it early, but working with your team of pediatricians and board certified allergists and dermatologists to determine that is really essential. And educating patients is the most critical part of this because if they're not enabled and empowered to go home and do this for themselves, then we haven't done our jobs. We've told them what not to eat, but we need to focus on what to eat, especially in those growing children and young adults. So, thank you for your time, your attention and I would like to open the floor to questions.

AUDIENCE QUESTIONS

Editor's Note: This is a transcript of live audience questions with the educator's responses from the presentation on May 23, 2023

✦ **Are there any circumstances in which you do not recommend early introduction of allergenic foods?**

I think there's always circumstances, but it would be because of not having had an allergy evaluation. Let's say I was seeing them from a pediatrician's office and I didn't know what their allergy evaluation is and they come to me and their skin is really crusty, severe allergy, maybe they're exhibiting signs of chronic infection and I wouldn't not recommend it, but I would start by saying let's work with the allergist to make sure that we're doing this in a way that's safe and maximizing skin care with their guidance and recommendations.

✦ **Do you have any advice for how to handle the logistics of early allergenic food introduction for a younger sibling to a food that the older sibling in the same house is allergic to?**

Yes, I do this all the time. I actually have some parents who are peanut and tree nut allergic and were trying to feed the baby. So, sometimes it is fed at a neighbor's house, but if we're trying to keep it in the diet as part of a regular diet, which is always my goal, but some parents are very fearful, which is completely validated, then we try to feed them only in their highchair and we make sure that the food is not a powdered object, like we're not using powdered peanut, we're using peanut butter so that it's actually more sticky and it won't aerosolize. And we're always making sure that we're cleaning down the space that the child has used with warm soapy water. Feeding the child something nonallergenic after they've just eaten, which would go for parents feeding allergenic foods for their allergenic baby because the allergens stay in your saliva, so you want to cleanse your saliva by either brushing your teeth or eating something nonallergenic before kissing that baby or the parent maybe being slobbered on by the baby. And maybe having the nanny, babysitter, mom, dad, grandparent, other person feeding it, if that helps if it's a parent who's allergic. But if it's the sibling who's older, then just making sure that everyone's practicing good hand hygiene and cleaning the space appropriately..

✦ **Do you have any suggestions for infants with a cow's milk allergy who have trouble taking hydrolyzed formula or for families who struggle to pay for these more expensive formulas. So, meaning the taste of the formula, because we all know hydrolyzed formulas can be rough.**

The formulas can definitely be rough. It helps if you're able to transition them by fading by about maybe 4 oz of the previous formula with just an ounce or even half of an ounce of the new formula. Sometimes we will use like an index finger and thumb pinch of sugar, and once the child accepts it, we'll wean them off of that pinch amount of sugar. There's also nonalcohol vanilla extract and you can use just a teeny, tiny dot of that, like a quarter of a cc, and then again wean them off of it once they accept it. But usually, I try to wean them by replacing the small amount of their current formula, if possible, and then gradually increasing that amount.

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✧ **And the second part of that question, as far as paying for those formulas, obviously there's WIC for families who qualify, but even if you don't, they can still be really expensive. Is there a place to find coupons or anything like that?**

Going to the manufacturer's website, you can find resources for insurance reimbursement, letters of medical necessity templates and you can apply for free samples and they usually have patient assistance programs where they might send you a free case. And always asking your pediatrician and your allergist for samples because if they can accept them, I know that we definitely keep our closets stocked to support our families.

✧ **Does IgE allergy to peanut in the mother increase risk of peanut allergy for her baby?**

Well, mom would be avoiding the peanut when she was pregnant, so that would be something I would need to look at more specifically. But I would think that it would, that's what mom has to do and I wouldn't stop mom from introducing peanut to her baby.

✧ **Where do you see the role of immunotherapy going for treatment of food allergy? You mentioned it's really active in your office. How do you see this sort of, is it going to become more mainstream? Is it something kids are going to be able to do at the pediatrician's, the allergist? Where do you see that going?**

I think it is definitely like the wave of the future. I see that all immunotherapy will become ... I mean we had the first FDA-approved product in recent history and so there's definitely a desire for it, a need for it from a quality of life standpoint. I don't know that it would move to the pediatrician's office, but I do think that it will soon exist in most allergy offices.

✧ **Which patients should primary care physicians be referring to an allergist? Should it be every patient with a food allergy, those with more severe allergies or only if they need a food challenge or immunotherapy? What do you think?**

I would suggest that any patient who's got severe eczema, signs of a food allergy or maybe some growth faltering because it could be due to underlying non-IgE-mediated allergy, should be sent to an allergist. I know that pediatricians will oftentimes do blood allergy panels, but the evaluation of those blood allergy panels by a board certified allergist can ensure that we're not overeliminating foods as we do get false positives on those serum IgE tests. So, even if it's just 1 consult with the allergist to say yes, go ahead, eat all the things, or let's take a pause and consider which foods should be eliminated and how to eliminate them.

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