

## Social Media for Clinicians Who Care For Infants

### Myths and Facts About Allergy

### ✦ Course Transcript ✦

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## Social Media for Clinicians Who Care For Infants



**David R. Stukus, MD:** Hello, I'm Dave Stukus. I'm a pediatric allergist/immunologist and I've been engaging in social media, as a medical professional, for over a decade. And

the reasons I wanted to join that space was because of all the misconceptions and, frankly, incorrect information I kept hearing from the families that were referred to me for evaluation of their children for concerns about allergies, as well as from the referring physicians themselves. And I've learned a lot of lessons over the last decade, and I think we all have to acknowledge that we live in a world where everybody's on their phone. Social media is absolutely influencing the patients that we're seeing, and especially their parents, and that can really impact their medical decisions. We are going to talk about some of those ways that that may be playing a role today.

When we think about who is in this space, we're all familiar with the term "influencers," but what does an influencer do and what does that mean? Well, basically it's somebody that has gained a very large platform, or followers, on any of the social media channels, whether it's Instagram or X or Facebook or TikTok, and people tune in to their content because they find it very engaging. And in the health space, and when it comes to medical information, there are a lot of influencers in this space that are giving out really bad advice. And one of the ways that we can really help the patients that we're seeing, when we see them in the office setting of course, is by understanding that they are seeing these influencers and we can have that dialog with them. And it helps for us to recognize what the difference is between an influencer and an expert, such as ourselves, whereas that may not always be readily apparent to our patients. Unfortunately, many people confuse the number of followers as meaning that a large number means somebody knows what they're talking about,

but that's not always the case. And there are fewer and fewer experts involved on social media.

There's one example that I personally received—and I have no doubt this went out to several others—of a company that was touting a cure for food allergies, which does not exist by the way, and they were basically looking for influencers to talk about their product. And that's happening more and more in this space, so when people are recommending specific types of tests, especially unvalidated tests such as food sensitivity tests or treatments or things like that, if an influencer is divulging this information and they're doing it in a very engaging way, people may mistake that for credible medical advice when usually it's not.

We can help people really understand this. And if they want to understand what the difference is between an expert vs an influencer, well, we can go through, for example, the training involved. For those of us who are physicians, we had to go to medical school and then we had to choose a residency program. If you specialize after that, you have to do even more years of training in a fellowship, and then, of course, we have our board certification programs and maintenance of certification. It's not like we're done as soon as we're done training. We have to maintain the certification and stay up to date with all the evidence as we go through our careers. And just explaining to our patients that a lot of the influencers don't even have that background, so they've never obtained the degrees necessary and they don't have the expertise. And then ultimately, if we want people to understand the difference between an influencer or an expert, we can suggest that they actually go look up that expert or that influencer online in places like PubMed and see if they are publishing peer-reviewed articles and research and things along those lines. We can really help people identify these key

differences, which hopefully all of us can recognize and explain.

Another way that social media really taps into our primordial brain is it plays to these cognitive biases that we all have. And cognitive biases, of course, were around long before social media and exist outside of that realm as well. And these are ways that our minds have really developed shortcuts or sort of mental hacks to sort of navigate the world that we live in. And we're all bombarded by so much information all day, every day and we have to learn how to make very quick assessments of situations or people that we meet. And a lot of that is based upon our own prior experience or these cognitive biases come into play that sort of influence the way that we view the world we live in.

With social media, it really taps into this limited attention span that people have. They're watching 30-second videos, making judgments on it, they're sharing information without quite understanding whether it's valid information or if it's even correct. And people, frankly, if you come across content that reinforces what your beliefs are, or what your cognitive biases tell you in regard to how the world operates, you're going to be more likely to believe that information as being true, even if it's untrue.

There are a few very powerful forms of it that I'll discuss here, but there's really dozens of these cognitive biases. I encourage anybody watching this to explore on your own and learn more about it. I found it helpful for myself. We all have them, myself as well, and it's really helped me better understand what information I tend to lean towards and believe, even if it may go against my own belief system. One example—this is something I see on a regular basis from families—is called recency bias where, let's take somebody with food allergy, for instance, and let's say that they've done a great job of managing their food allergy, they've learned how to communicate at restaurants, they know how to read menus and ingredient lists, and they've avoided accidentally eating their allergen, and they're living their best life really with limited restraints. But let's say they come across some really scary content online— whether it's a documentary or an article that's being shared—of where somebody that has the same allergy as they

do, went to a restaurant and a mistake occurred and it caused, let's say, a fatal anaphylactic reaction. Well, just because they happened to come across that information, those people might place unnecessary weight on that and neglect their years of living with this food allergy without having any problems whatsoever. Just because it's new to them doesn't mean that it's necessarily the most important part of information, but that recency bias makes it seem like it may be.

The bandwagon effect is also very strong, and this is where social media really thrives. People sort of join their like-minded echo chambers where they share information with and they all have similar interests to begin with. With the bandwagon effect, it makes it seem like if everybody's sharing the same information, then it must be true. Whereas the reality is just because folks in your social media circle are sharing information, that doesn't necessarily mean that, 1, it's correct or, 2, that the rest of the world believes in that as well.

Anecdotes are very powerful. And this is where social media really can impact people because you have these very strong, emotional stories that people share. Sometimes it's the rarest of the rare, sometimes it's something that was never proven. And there's dramatic examples of this where people share their story, but they're always missing important pieces of information. We're very used to taking a very complete medical history and identifying those elements that may or may not pertain to that person's story, whereas anecdotes really select out those pieces that they think are most important and neglect others that may be.

Other mental shortcuts occur, such as the anchoring effect where people tend to hold on to the first explanation they heard. We see this all the time in the food allergy world where now we know the best evidence tells us that the earlier we introduce food allergens to infants and keep them in their diet consistently, that's the best way to prevent food allergies, but for decades we told people to avoid them. We said no milk until 1, no eggs until 2, no nuts or seafood until 3. And people hold onto that. That's a great example of sort of the anchoring bias and effect that people can hold onto.

Confirmation bias is very powerful and all of us are subject to it. And it's basically us sort of navigating towards information that reinforces our beliefs. Nobody likes to feel that they're wrong about something and, with confirmation bias, we may ignore all the evidence that goes against our beliefs, even if there's mountains of evidence, because it makes us question ourselves. That's really uncomfortable for a lot of folks and that happens a lot on social media where people just navigate towards that information that really makes them feel like they understand their child's medical condition or the decisions they're making.

Negativity bias is also very strong, as is the fear-mongering effect, where basically people will placate our fears and that's a very powerful motivator for people to share stories or click on links and share things. Because nobody wants to walk around thinking that they have a bunch of hidden food allergies that are smoldering underneath the surface. And that's a great way to get people to kind of share content online, but we can recognize that.

There's a whole host of flawed logic that occurs as well. And the more you understand these sort of flawed thinking patterns, the more you recognize it online, especially from influencers. There's a lot of pseudoscientific explanation being done. There's a lot of marketing that's being done in this space as well and it's all for the purpose of making profit, but it does not benefit our patients on the whole, unfortunately.

With confirmation bias, as I mentioned, it really is one of the most powerful things. If you have that family in your office and you're giving them information that really goes against what they believe in, I think it's important for us to pause and listen to their concerns and reflect upon that. This was a major ordeal during the COVID-19 pandemic when there was a lot of vaccine refusal because people were being bombarded with anti-vaccine messages. They didn't know what to believe or who to believe. And that's an opportunity for us, as medical professionals, to listen to their concerns, ask them if it's okay to discuss, give them reputable information and really address all those biases that they had.

There are all kinds of great, different visuals online that you can see and there's certain cartoons that I like to share as well that really kind of highlight some of these cognitive biases and anecdotes and things along those lines.

What can we do as healthcare professionals? Well, love it or hate it, social media is not going away. The train is off the tracks and there are billions of people across the world using it. I think we need to acknowledge that and better understand how it is impacting all our patients, and especially for those of us who treat children, their parents. I think it's important for us to proactively address this during clinic visits as well, and to talk about social media and to ask basic questions like, "Have you come across anything online that made you question the plan that we have in place?" or "Where do you tend to go for your information? Do you like to go to Instagram or TikTok?" And things like that and just have the conversation and normalize it because that's what they're doing on a regular basis anyway.

At times, for medical professionals on social media, like myself and many of you watching, we're just chasing our tails because we simply cannot keep up with all of the misinformation that's going on out there. Instead of trying to combat every single piece of incorrect information or myth that you come across, I encourage you to use social media too, because we need good voices out there engaging in social media on a professional level, otherwise the bad actors kind of win out. But we can also help people understand how they're being influenced by this and teach critical thinking skills. And that's where I've shifted my time in recent years of trying to help people understand that they're being subjected to this and being bombarded by it. And there's some tools that we can use as medical professionals. We can listen to what people are saying and empathize with them. We can try to help people identify the misinformation and provide the good evidence-based information. Sometimes it's a handout in the office setting; sometimes it's us posting it online ourselves. And then really talk about the value of reputable resources. We have wonderful professional advocacy organizations that really put out high-quality, evidence-based information, and they have medical

and scientific councils that vet everything and we can steer our patients in that direction instead of watching that influencer on TikTok talk about some health condition or treatment or something like that.

When we engage online, we have to make sure that we do our diligence, as well, because we're all subject to this and it can get really difficult, especially with artificial intelligence. This is gaining steam very, very quickly. There's deep fakes that are out there. Before we share anything or post anything, we have to make sure that we can vet it and make sure that it's accurate. And then we can also help people understand why that's important, as well.

Before we share anything, there's some basic things to think about. One, who wrote the piece? Where did the content come from? Are they actual experts on this? Are they qualified to talk about this on a general platform? Do they have the expertise to back it up? Is this consistent with what we know to be true in the evidence? If somebody says they have the cure for food allergy, that's something I've not read about in one of our peer-reviewed medical journals and I'm pretty sure that would be on the front page and also being discussed at our medical conferences as well. Is there risk for cognitive bias based upon how the content's presented? Once we learn more about this, we can identify this on a regular basis. What about conflicts of interest? If the person who's providing medical information is also selling supplements or treatment plans or some sort of program or book, then that's a huge conflict of interest and that's a big red flag. People should be getting their medical information from those who are not trying to sell them something at the end of it.

What about the headlines? We need to read past the headline and not just share something because it grabs our attention or it plays into that negativity bias that's so powerful. Is it timely and what's the motivation in sharing it? Just things to think about as

we help others and also for all of us before we share anything online.

There's various resources out there and different acronyms. One of my favorites is the SHEEP (Source, History, Evidence, Emotion, Pictures) acronym. Think SHEEP before you share. What's the source? What's the history? Do they have an agenda behind this or are they just putting it out there from the goodness of their own heart? What does the evidence actually show? Can we click through the links that they have? More and more articles are putting citations in there and sometimes if you click on the citations, you realize that they're actually not pertaining to what the article says they are. They don't back it up. Does this generate some emotion? For all of us, if you're reading something on social media and it generates a strong emotion, that's a huge red flag that our biases are at play here and especially that fear mongering and negativity bias that we talked about. And then, pictures paint a thousand words. Really what's going on underneath that? Context is often lost online, but it's more important now than ever. There's a lot of nuance in what we do as medical professionals and it's important to take a deeper dive into this.

Some of the key takeaways—and hopefully you get the sense that social media really is a powerful force in all of our lives, including our patients and their parents—are that it's really changing the way people are thinking about their health and they're coming to us with preconceived notions by the time we see them in the office setting. We have to acknowledge that and I think it's important to proactively address it and then, ultimately, for those who want to get involved online, I encourage all of us to do so. The more, the merrier and the more of us who are actual experts and are putting out good evidence-based information, the better chance we have of combatting all the misinformation that's out there.

## Myths and Facts About Allergy



**Mimi Tang, PhD:** I thought I would touch on questions that are commonly presented to me, both in my clinical practice as well as at social events. Consistently, I seem to be asked 3 very

similar questions. The first one is what's an allergy and what is an intolerance and how are they different. This is an algorithm that has been published by the World Allergy Organization in 2021 summarizing how we define food allergy, as compared to food intolerance, in the immunology sector. Firstly, we can think about reactions to foods as a group. Any reaction to food that is consistently occurring on repeated exposures would be referred to as an adverse reaction to food. Now, these can then be considered as either immune-mediated or non-immune-mediated. It is only the immune-mediated conditions that are considered allergies. In other words, in an allergy, the immune system has gone astray. It is now inappropriately recognizing food allergens as harmful and generating an immune response to the food. In the healthy state, the immune system would actually correctly recognize the food as safe and not harmful and would, in fact, generate a tolerance response to the food, therefore you're able to eat a myriad of foods without having any reactions.

How are food allergies different to an intolerance? What do we mean by food intolerance? The key point here is that the immune system is not the cause of the reaction. It might be involved in mediating the symptoms that develop, but it is not the cause of the reaction. What causes the reaction instead could be due to either host factors or something due to the food itself. Let's think about the case where it's related to the food itself. Here, there might be something in the food. For example, tyramine responses, or actually a better one might be MSG reactions. Foods that contain MSG in people who are sensitive to MSG will cause the flushing, the headache, the poor sleep that you can have from being exposed to MSG. This will be reproducible in the individual who's sensitized to or who has an issue with MSG, and it's due to something within the food.

Another example then would be a situation where the individual themselves have a factor that leads to a consistent reaction to the food. Here, I would use lactose intolerance as a good example. In this case, the individual lacks an enzyme in the gut barrier, an enzyme called lactase. This enzyme is necessary to break down lactose, a sugar contained in milk, into its 2 components. If you lack the enzyme, lactase, every time you take a food that contains lactose, in this case cow's milk, as a common source of lactose, you will have symptoms of tummy pain, bloating and diarrhea because you haven't been able to break down the lactose, it stays in the gut and causes fluid to collect inside the gut and the diarrhea response.

These 2 examples show you situations that are intolerances. In the first case, where there is something contained within the food that causes a reproducible reaction in an individual, and, in the second case, a host factor that leads to a consistent reaction to that food.

Now, I'm now going to dive in a little bit further to the different types of food allergy. You might have heard of different types of allergies, those that are gut allergies and those that are IgE-mediated allergies, and this causes a huge amount of confusion, not just amongst the community, but also among health professionals. So, when we talk about food allergies, in other words reproducible adverse reactions to foods that are caused by an aberrant immune response, we can divide those food allergies into 3 different types. The first is an IgE-mediated food allergy, the second is a non-IgE-mediated food allergy, and the third is a mixed, a mixture of the IgE- and non-IgE-mediated allergy response.

Now, these can each lead to different food allergy syndromes that are associated with different symptoms. Let's start with IgE-mediated food allergies. These are the ones that everyone is very familiar with. These IgE-mediated food allergies cause hives and swelling in the skin which make parents very frightened to see their child become so unwell so quickly. It's also the type of allergy that can cause anaphylaxis. That's your IgE-mediated allergy and most people are very familiar with those.



Families are less familiar with gut allergies. Here, what we have is a delayed onset of the reaction. It's usually hours after exposure to the food and the symptoms are typically limited to the gut. You can have pain, vomiting, diarrhea, but you don't get hives or swelling, and you don't get breathing problems, difficulty breathing, wheeze, hoarse voice. These are the 2 major differences between the IgE-mediated and the delayed gut non-IgE and mixed IgE-, non-IgE-mediated allergies. It's the time of onset and the fact that symptoms are restricted to the gut in most cases.

Now, there is 1 situation where you can get circulatory involvement, and that is in a condition called food protein-induced enterocolitis syndrome. In this situation, you can have excessive fluid compartmentalization into the circulation, out of the circulation, into the gut, causing some degree of hypotension in which case you can have circulatory compromise. But this occurs only in about 10% of children with the food protein-induced enterocolitis syndrome. In the vast majority of non-IgE-mediated and mixed IgE-, non-IgE-mediated food allergies, symptoms are restricted to the gut, and they are delayed in onset.

Here I've just used, as an example, cow's milk allergy to illustrate all of these different scenarios, the IgE-mediated allergy, the non-IgE-mediated allergy and the cow's milk protein intolerance. In an IgE-mediated allergy, a child will take, say, a cow's milk formula, the cow's milk formula will lead to triggering of mast cells, following crosslinking of IgE receptors on the surface of mast cells, and then you get release of mediators from these mast cells that cause the hives in the skin, the swelling of the skin, the vomiting, the diarrhea, the difficulty breathing and, in some cases, circulatory collapse. In the case of non-IgE-mediated cow's milk protein allergy, there are actually several different syndromes. We could talk about food protein-induced enterocolitis syndrome which typically will cause delayed onset of profuse vomiting. In a small subset, they may have some circulatory compromise due to this fluid loss. In another scenario, for example with the mixed IgE-, non-IgE-mediated cow's milk allergy, these are your eosinophilic cow's milk allergy conditions and here you can have delayed onset, tummy pain, vomiting, reflux, for example

eosinophilic esophagitis can cause these symptoms. But the key symptoms here are delayed for the non-IgE-mediated and mixed IgE-mediated allergies. Cow's milk intolerance is, for example, lactose intolerance. The child will develop diarrhea, bloating, but will not get vomiting. They will not get skin symptoms and they will not get circulatory compromise.

The second question that I'd like to discuss is whether or not food allergies are, in fact, increasing. I get asked this question all the time. Let's have a look at the evidence. High-quality studies conducted in the United States have shown that admissions for food anaphylaxis across the US have gone up. Using the same statistical approach, you can see that food anaphylaxis admissions have steadily increased from 2000 to 2009, and most recent data shows that this trend continues. And similar findings have been reported in the United Kingdom and in Australia. You can see, using national admissions databases across the globe, there is a consistent and continuing increase in food anaphylaxis admissions.

What's interesting is that over a similar timeframe, we've actually had a plateau, if not a slight reduction, in asthma admissions. Now, why is this? This is a very interesting observation, I suppose. We think, in the immunology community, that allergy problems have occurred in 3 separate waves. The first wave was actually with eczema. Eczema was 1 of the first allergic conditions to rise in prevalence. This was followed then by asthma and then, thirdly, by food allergies. We think that there have been 3 consecutive waves of allergy conditions that have been increasing. Whilst we're fortunate to have seen a plateauing of asthma, there is currently no clear evidence that food allergy is waning, other than the slight reduction that we have shown in Australia following implementation of prevention guidelines, around early introduction of allergenic solids.

The last thing I'd really like to expand upon is why food allergies are increasing. I think this is an area that everybody is talking about and I hope that I can share with you some insights in this regard.

What we know is that the increase in food allergy has occurred much too quickly for this to be due to changes in our genes. As I showed you earlier, this

increase has occurred in the last 20, 30 years, and we know that it takes much longer for genes to shift in any population. What this tells us is that it has to be due to changes in our environmental exposures. And now we know that food allergy, as with many chronic illnesses affecting the modern world, food allergies do involve a combination of genetics and the environment, and these 2 work together in what we refer to as gene environment interactions to determine whether or not you develop these particular conditions. What happens, we believe, is that there is an immune dysregulation. The immune system becomes more prone to develop allergies. In the individual who has a dysregulated immune response, they are more likely to respond inappropriately to the food allergen than someone who has a healthy immune programming. If you are 1 of these individuals who happens to have now moved along the path of immune dysregulation, you are more likely to then develop allergic disease.

What are the factors in the environment that might be supporting this increased immune dysregulation? What we do know is that it's related to the westernized lifestyle. Through epidemiological studies conducted around the world, we see that the greatest increases in food allergy prevalence have occurred in modern societies, modern, adopting modern lifestyles such as the United States, the United Kingdom and Australia. Other societies, such as developing countries, have not shown as dramatic increases nor as high rates of food allergy in their studies.

We also understand that there is this concept of lifetime risk for developing allergies. This is a very interesting concept that highlights the importance of environmental exposures, but it's the environmental exposures that one has in the first 3 years of life, in early life, that ultimately are the biggest impact on your lifetime risk for developing these chronic illnesses. So, that's food allergy, other allergy problems, autoimmune disease, neurodevelopmental abnormalities and metabolic conditions, such as diabetes. And so now what we understand is that it's these environmental exposures in the first years of life that play a critical role in determining your lifetime risk.

Let's walk you through this because this is quite an interesting concept. What I plotted here is the actual risk that you could project for an individual, let's say, and you might have a standard risk in the dotted line, an increased risk in the solid line, but what makes the difference? What can influence whether you sit on either of these lines is related to both the environment and the genes. If you have environmental exposures or interventions in this early stage where immune programming is actually occurring, you have the greatest chance of modifying your risk trajectory. Healthy exposures in the first years of life are going to influence your lifetime risk trajectory and push it downward much more effectively than if you've had the same intervention later on in life. Okay? And the reason for that is because it is early in life that your immune programming of lifetime risk is actually established.

The other point to make here, using this nice image, is that the fixed contribution from genetic risk is actually relatively small. The difference that genes can make is actually relatively small, and the biggest factors determining how far your risk goes up or how far your risk comes down relates to your environment. This is exciting for 1 reason. Because we are able to actually greatly modify disease risk if we address the right environmental exposures at the right time. This is why we have the opportunity to—or why we must work very hard on—identifying risk factors for development of food allergy and then evaluating interventions that can modulate those selected risk factors.

Let's have a little think now about what are the environmental factors and how do they modulate the development of allergy? Why is the environment able to change the way that our immune system works to either increase or reduce our risk for developing food allergy? Well, it all boils down to the gut and the gut microbiota or the bugs that live in our gut. Emerging evidence, it's really now well-established, I shouldn't say emerging evidence, but evidence over the last 2 decades has now established that the intestinal microbiota plays an absolutely critical role in programming or educating the immune system to either reach a very healthy state that supports tolerance or move it along an unhealthy state,

something called dysbiosis, that leads to immune dysregulation.

If we have a healthy microbiome, what you end up with is an optimal immune programming that deals with exposures from the environment in an optimal and healthy way. The immune tone is set correctly. If you have a suboptimal gut microbiome, we can refer to this as a dysbiosis, this then unfortunately drives immune dysregulation where upon the immune system responds poorly, inappropriately, incorrectly, to environmental exposures. Now, I'm going to give you a bit of an example here where if you have a baby and we expose it to the healthy environment of lots of different noises that are not harmful, the baby will then be well-tolerized to sounds in the environment and they will not overreact inappropriately to something that isn't harmful but dropped 10 feet away from them. If, on the other hand, we have a baby and it's protected through being raised in a soundproof room where they don't hear any noise at all and they are no longer exposed to a healthy mixture of noises in the environment, if you then drop a completely harmless item 10 feet away, they are going to react with a startle and inappropriately generate a response to that action. We're trying to here give you a healthy exposure to lots of different microbes that then allow the immune system to generate a healthy tolerance to things that are not harmful.

Now, what are the environmental factors that influence the risk of food allergy and the risk for microbial, a healthy microbiome? What you'll see is that the factors that have been identified to increase your risk of food allergy actually are also factors that have been identified to modify the intestinal microbiota. Let's start with thinking about factors that improve—well let's start by looking at the factors that increase or protect against food allergy. We know that being exposed to pets in early life, having siblings when you're born, both reduce your risk for food allergy. Having a diet that is diverse, made of healthy foods prepared at home, and things that contain fermented foods, or probiotics and prebiotics have also been associated with a reduced risk of food allergy.

Being exposed to a farming lifestyle has been associated with a risk of food allergy and I suppose cesarean birth has, in some studies, been associated with an increased risk of food allergy. Now, if we consider that each of these exposures have also been shown to compromise or support a healthy gut microbiome. Let's start the same way. Being exposed to pets, having siblings in the home, have been shown to support optimal gut microbiome diversity and populations of healthy bacteria. High fiber foods act as prebiotics, fermented foods act as prebiotics to support a healthy microbiota. Probiotics populate the gut with healthy microbes. Being exposed to a farming lifestyle in early life has been shown to be associated with more diversity and healthy populations of gut bacteria. In reverse, intake of junk food, the westernized diet, high meat intake, alcohol intake, have all been associated with interruptions to the gut microbiota, reduced diversity, shifts in populations of gut bugs towards an unhealthy signature.

Exposure to disinfectants and antiseptics have been shown to modulate the gut microbiota, antibiotics also. Cesarean delivery is associated with a less diverse gut microbiota, as well, and shifts in the gut microbiota. The takeaway message I'd like to give you is that there is a very strong overlap between environmental exposures linked to food allergy and environmental exposures that lead to a compromised gut microbiota. I think, in my mind, supporting the thesis that the gut microbiome plays a very critical role in establishing risk for food allergy and that there are opportunities for us to investigate further identifying key risk factors that we could potentially modulate in preventing food allergy.

The concept that I like to also talk about when we think about probiotics, prebiotics and symbiotics is this example. With immune dysregulation, we know that there's likely to be not the healthiest population of bacteria, not the healthiest intake of prebiotics that support the bacteria, all of which leads to a dysregulated environment that will not support optimal tolerance. If we want to modulate that, there has been some discussion around probiotics, prebiotics and symbiotics. The hypothesis here is that probiotics populate the gut with the right bugs, prebiotics are the food for the bugs, like fertilizer for



grass seeds. The prebiotics are supportive of healthy bacteria and giving the 2 together might potentially optimize your chances of having a healthy microbiome and supporting tolerance.

Now, while this is a very nice theory, I must point out that the evidence that probiotics, prebiotics or symbiotics reduce the likelihood or are effective at preventing food allergies is not strong. Currently, there is no convincing evidence that probiotics, prebiotics or symbiotics are effective at preventing food allergies. There are a few studies that support its potential benefit, but when you look at the consistent evidence, it's not there. Currently, guidelines around the world do not recommend probiotics, prebiotics or symbiotics for preventing allergic disease, in particular food allergy.

The takeaway points from this presentation are food allergies are not the same as food intolerances. Food allergy is caused by the immune system generating an aberrant response to otherwise harmless food antigens. There are a number of different food allergy classes, IgE-mediated, mixed IgE- and non-IgE-

mediated and non-IgE-mediated food allergies. The way these present are quite different, with the IgE-mediated allergies typically occurring very quickly and involving the skin, the gut, the airway and the circulation. The non-IgE and mixed forms of food allergies, on the other hand, present with delayed onset of symptoms, hours after eating the food, and generally have symptoms limited to the intestines. Food allergies are increasing in prevalence around the globe and data from US, UK, and Australian studies show consistent and continuing increase in food allergy issues.

Finally, the rising rate of food allergy around the world appears to be related to changes in our environment over the course of recent decades. In particular, these changes are linked to the modern lifestyle and seem to be mediated through modulation of the intestinal microbiota. For the future, hopefully we can find effective strategies to optimize the gut microbiome and reduce the likelihood of food allergy, but at this time we have not identified any effective strategies to achieve this particular outcome.