Considerations in Allergic Contact Dermatitis in Children
JiaDe Yu, MD, FAAD, interviewed by Flavia Fedeles, MD, FAAD

FLAVIA FEDELES, MD, FAAD: Hello, everybody, welcome to another episode of *Dialogues in Dermatology* podcast. My name is Flavia Fedeles. I'm a dermatologist in the department of dermatology at Massachusetts General Hospital in Boston, Massachusetts, and an instructor dermatologist at Harvard Medical School. Today, I have the privilege of welcoming Dr. JiaDe Yu to the podcast. Dr. Yu is Assistant Professor of Dermatology at Harvard Medical School and he's the Director of the Occupational and Contact Dermatitis Clinic at Massachusetts General Hospital.—

--He has a special interest in allergic contact dermatitis in children. He's also the Associate Director of Clinical Trials at Massachusetts General Hospital, where he's engaged in the development of novel therapeutics for various pediatric dermatologic diseases. Dr. Yu is the President-Elect of the American Contact Dermatitis Society, and he has been invited to speak internationally in this area. He has published extensively on this topic. Today, we're going to be talking about Considerations in Allergic Contact Dermatitis in Children. Thank you so much for joining me today, Dr. Yu.

JIADE YU, MD, FAAD: Thank you so much, I'm happy to be here.

FLAVIA FEDELES, MD, FAAD: This is kind of a big topic, very important in pediatric dermatology. We all have patients that struggle with this issue. It's a very rapidly changing field. So let's start by talking about the challenges of allergic contact dermatitis in children. I feel that there's a lot of challenges, both diagnostic-wise, both in the process of testing children for allergies. So can you talk a little bit about that?

JIADE YU, MD, FAAD: When we're thinking about allergic contact dermatitis in children, I kind of like to break it down into three main hurdles that we have to deal with. Number one is

certainly getting the kids in the door when it comes to patch testing, because most kids who show up to their providers, whether these are their primary care pediatrics, whether this is their dermatologist even, oftentimes come in presenting with what looks like eczema, because allergic contact dermatitis looks just like eczema. So most of us not doing patch testing for a living like myself, oftentimes will look at these patients and say, “Well, chances are this kid just has eczema. Let’s start going down that pathway.”—

--Whether it’s topical steroids, topical nonsteroids, and then eventually biologics if they’re not getting better, that tends to be our mindset. Now, sometimes certain things will trigger providers to send these patients over for patch testing. If you look at the data, this doesn’t happen very often. In the North American Contact Dermatitis group paper that ranges looking at patients between 2001 and 2018, almost 42,000 adults were referred for patch testing but only about 1,800 kids were referred in the same period of time.—

--So I think there’s a severe underrecognition and underdiagnosis of allergic contact dermatitis in children. Now, if you were to be astute enough and say, “I’m going to send this kid over for patch testing because I see something there,” then the next challenge you have is finding someone who is able to do patch testing in children. This usually requires some sort of a specialized series, especially if the kid is a smaller kid, because for a lot of adults we like to put 80, 100, 150 allergens on, and you really can’t do that for some of the smaller kids, so you have to be a little bit judicious when it comes to picking the allergens.—

--And then once you’re able to pick the correct allergens and then patch test them, then you have to do the counseling part, which in my opinion is the most important. Because when you’re going to patch test someone or you just tell them they’re allergic to X, Y, and Z without telling them why, you’re really not helping them very much. Because anybody that you patch test might have a reaction to say nickel, for example, which is the most common allergen across the

board, 20 percent of the world is going to react to that. But most of the kids that you're seeing, nickel is not causing their allergic contact dermatitis. Nickel could be a reaction they had to their watch.—

--It could be a reaction they had to their belt buckle. But certainly not the reason why they have a full facial eczema, for example. So I think it's really important to say, "This is a relevant allergen. This is not a relevant allergen," and why.

FLAVIA FEDELES, MD, FAAD: Are there any tips or tricks for patch testing in children? How do we get kids to kind of go through with the procedure?

JIADE YU, MD, FAAD: I think the most important thing I like to tell the kids, especially the younger ones, is that it doesn't hurt. I always lead off with that. There are no needles, I promise you, and this is not going to hurt. The kids that are old enough to understand that usually kind of breathe a sigh of relief. The younger kids are correctly dubious, because they've been stuck and prodded so many times by their pediatrician already at this point, they're afraid of anything. So what I do is I will take the patches and I will bring it into the room and I will give one to the kid. I will say, "Here, play with this." I will open it up for them. I will have them stick it on mom's skin or dad's skin, I will have them stick it on my skin.—

--And then I'll have them stick it on themselves and then I'll pretend to stick it on their skin, as well, just to demonstrate to them that it truly does not hurt. The next thing that we will do is we distract them. iPhones have really changed the way that we are distracting kids nowadays and it does so very effectively. The world could be falling down and they're just watching Peppa Pig, for example, that's what my daughter loves, on the iPhone. She wouldn't notice, she doesn't care what's happening around her, as long as she's got something on the screen. So that's really helpful when it comes to patch testing the kids in the clinic.

FLAVIA FEDELES, MD, FAAD: Those are really, really good tips. Are there any considerations in testing patients with skin of color?

JIADE YU, MD, FAAD: Yes. So skin of color patients develop allergic contact dermatitis just as common as anybody else. Unfortunately, if you look at most of the studies and most of the databases, they tend to be a white-predominant population. So really we are undertrained when it comes to patch testing skin of color. The allergens that we patch test to I don't think should be any different. Because anybody, whether you are Black, Asian, Hispanic, or White, are likely to be reacting to similar allergens, even though if you look at the studies there may be subtle differences between the different races.—

--These differences are not because of skin color. These differences are because of cultural and ethnic practices that may be different between the groups. So overall, by and large, the allergen series that we use are going to capture most of those things. However, when it comes to reading patch test allergen is when the challenge exists. Because we know that erythema doesn't show up as well in darker skinned patients and one of the ways we read patch testing is looking to see whether an area is red or not. But you really are not going to be able to do that, especially in the very dark skinned patients.—

--What we also noticed is that the type of reactions also show up. Instead of that kind of mosquito bite-like or kind of urticarial-like papule that you see, sometimes these are actually little individual follicular accentuations, kind of like how atopic dermatitis looks different in a Black child compared to a White child, where you have more of that follicular accentuation in the darker skinned kid. So what I really like to do is I always patch test in person. I always do the reading in person. I never do telemedicine for patch test reading, because even in White children you're going to miss a lot of relevant positive reactions.—

--I bring them into clinic and I will feel every single square that I'm patch testing. Even if I don't see anything there, I will take my finger and I will run down every single patch to make sure that I am not feeling those papules that I'm talking about. I'm not feeling any kind of infiltration in the skin. I'm not feeling any elevation differences in the skin. The next thing I will do, especially for darker skinned patients, is to sidelight. We're very fortunate in clinic, where we have these overhead surgical lights that I can just pull to the side at about a 45 degree angle, and kind of shine light indirectly on those areas.—

--And that can really help you distinguish between a raised papule versus a flat macule. If you don't have that capability, sometimes using your cellphone is sufficient. Using a flashlight is definitely sufficient, as long as you are doing some form of side lighting, that can really help accentuate these differences in the skin.

FLAVIA FEDELES, MD, FAAD: What are some of the important allergens to consider in children? And are there any new allergens coming out recently?

JIADE YU, MD, FAAD: There are several important allergens in kids. A lot of these do mimic the ones in adults but there are certainly some differences between kids and adults, as well. A lot of the adult allergens, for example so when we're thinking about hand eczema, we think about occupation in adults. We think about wet work, we think about what are you working with. In kids, by and large, they're probably a non-occupied kind of population, especially the younger kids. So then you would start thinking about allergens that are more prevalent in toys like metals, certain types of preservatives such as if your kid is making slime or putty or clay at home, some of those allergens you might want to consider that could be found in laundry detergents that they're using as an ingredient or dish soap.—

--Sometimes you're also thinking about rubber contact, especially with cellphone and cellphone holders. And other things such as nail polish that you might be doing at home, certainly kids can

be exposed to different allergens in nail polish compared to adults who end up going to nail salons. So there are definitely some allergens that we consider. But by and large, if you look at the top ten for kids versus adults, they're very similar. Studies have been shown that most of the allergens, or about 50 percent of those allergens in the top ten are fragrances. They just go by different names, but fragrance by and large continues to be one of the most common allergens in children.—

--Nickel, as I've mentioned before, not always relevant but we do see a lot of positive reactions in kids. Mostly because of jewelry exposure, metal in clothing exposure, metals in electronic exposure, but nickel definitely another important allergen. And then finally, preservatives. Preservatives like methylisothiazolinone, which can be found in glues, in nail polish, in laundry detergent, in shampoos, conditioners, what not tend to be very important in kids, in atopic kids especially there are certain allergens where in some of their moisturizers, as well as their cleansers can also be overrepresented.—

--Things like lanolin, for example, that can be found in certain types of moisturizers. And then also certain types of surfactants, like cocamidopropyl betaine, which is a coconut oil-derived surfactant found in a lot of kids' tear-free shampoos, can also be culprits in that population. That being said, most of the core series that we are testing to contain all of these allergens. So I would not be in the camp of advocating you testing kids to say one or two different things, or even ten different things that you're going to handpick. I would say using one of these core series that contains either 40 allergens or 80 allergens or whatnot is going to be more comprehensive and more likely to find your culprit allergen.

FLAVIA FEDELES, MD, FAAD: Talking about allergens, one question I always get from my patients, whether adults or pediatric patients, is how about food allergies. Is there a connection with food allergies? How do you counsel your patients when this question comes up?

JIADE YU, MD, FAAD: That's probably the most common question that I get in clinic. Every time a parent brings in a kid who has a rash or an eczema, they're like, "Oh, what's Johnny allergic to? Is it a food? Is it something he ate? Is it something I ate?" especially if we're dealing with infants and younger kids. By and large, the answer is no. Because even if you ask the allergists, and really food allergies is kind of the allergists' wheelhouse, is that most allergists also don't believe that food allergies contribute significantly to most cases of atopic dermatitis or eczema.—

--If you look at all the data that is out there, food allergies probably account for less than 10 percent of kids who have atopic dermatitis. Certainly, there are some foods that are heavier hitters, like milk and eggs and soy and things like that, but we largely do not recommend preemptive avoidance because that can lead to nutritional deficiency in children. And that can lead to failure to thrive and growth deficiency. So most of the time, I'm not saying always but most of the time, food is not the culprit there and I will always tell the parents that food allergy tends to be temporally related with the food.—

--So if someone is allergic to mango, they eat a mango, within 30 minutes you're going to have symptoms, not three days later. Food allergies overall can cause things like urticaria, lip swelling, angioedema, anaphylactoid-like symptoms, rarely do they cause eczematous dermatitis or atopic dermatitis, which is what allergic contact dermatitis often looks like.

FLAVIA FEDELES, MD, FAAD: What are some treatment considerations for allergic contact dermatitis in children? Of course, allergen avoidance but what else do you do in your patients?

JIADE YU, MD, FAAD: Like you mentioned already, allergen avoidance is always number one. I think parents are always going to be very game for that. They will turn over every single rock to find out if their kid is allergic to something because for them, that is the safest way of treating your child. Instead of putting them on some sort of a topical or systemic therapy that even the

safest have that really small risk of potential side effects, they would rather say, “Oh, let’s just avoid this hand soap or this shampoo and they’re going to get better.” And by and large, that is true.—

--However, a lot of times it’s not so clearcut. Patients don’t come in with labels saying “I have allergic contact dermatitis. Patch test me and you’ll figure it out.” More so, they come in with this kind of mishmash of dermatitis, some of it is atopic, some of it is allergic, maybe it’s even early onset psoriasis, maybe it’s something else that we’re missing. So not always so clearcut. So my algorithm at least is when they come into the clinic, I’ll patch test them and I’ll see what I find. If I find something, we’ll try avoidance for about a month or two and see what happens.—

--If nothing happens and I know the parents have been good about avoiding it, I know the kid has been good about avoiding it, then we really have to consider other diagnoses, most commonly atopic dermatitis is going to be up there. So if they’re not improving with allergic contact dermatitis, then I will treat them like atopic dermatitis and go down the pathway of not just topical treatments but sometimes systemic. Case in point, I have a girl who is 17 years old and she plays hockey year round and she’s thinking about playing hockey in college. So she’s someone that plays hockey 11 months of the year. But she’s allergic to her hockey pads and parents have tried looking for different types of hockey pads and there’s really nothing you can do.—

--So if you ask the 17-year-old, “What would you rather do? Would you rather live with the rash or would you rather stop playing hockey?,” she’s going to live with the rash. But we can’t just let her kind of suffer continuously. She was putting on a strong topical steroid, up and down her arm every single day for those 11 months, leading to some degree of skin atrophy. We know that with that amount of steroids, you can also get systemic absorption and side effects. So we

did decide to go on a systemic therapy for atopic dermatitis that has also been shown to help in allergic contact dermatitis, too.—

--She started with dupilumab every two weeks. Saw some improvement but not significant enough. We went to every one week, she got a little bit better but still not where she wanted to be. Ultimately, we ended up on upadacitinib, which as you know is a JAK inhibitor for atopic dermatitis. Now, unlike dupilumab which is a little bit more targeted, upadacitinib is helpful in that it is kind of a broader immunosuppressant. So for her, it was really able to calm down the rash enough. So she takes the medication when she's playing hockey. If her rash gets better, she actually starts coming off of it, especially on the off months. And then if she starts playing again, she kind of goes back on there. So that's the way that I've been kind of able to help her with allergic contact dermatitis but still treat her, because she just can't avoid the allergen.

FLAVIA FEDELES, MD, FAAD: That is such a good example, thank you so much for that. I do feel that in theory, allergic contact dermatitis where the allergen sounds easy to do, but as you pointed out in that case, in reality things are a little bit more messy. Sometimes people cannot avoid the allergens for various reasons and then you do end up treating pretty aggressively to try to control the disease. So thank you for that. So where do you see the field going in the future of pediatric allergic contact dermatitis? Are there any new insights into perhaps any new treatments, anything coming down the pipeline?

JIADE YU, MD, FAAD: I think unlike atopic dermatitis, unlike psoriasis, people have been very successful in identifying the key molecule, whether it's Th2, IL-4, IL-13, IL-17, IL-23, one of those molecules in those other diseases that they've been able to target therapeutically, that doesn't exist in allergic contact dermatitis, whether it's adults or kids. Not only are we talking about the lack of existence of a therapy, we're also talking about the lack of existence of a better diagnostic procedure.—

--Patch testing is something we've been using since the 1800s and it really hasn't improved much, beyond the fact that we have better chambers, better tape, and probably better allergens. But the method is still the same. We take the allergen, we stick it on their skin, we leave it on for 48 hours, and we take a look 48 hours after that. So about 96 hours after application, we take a look and we see is it positive or is it not. There's a lot of room for error because you can have false positives, you can have false negatives, and a lot of it is in the eye of the reader.—

--So sometimes they might call something a "maybe reaction," somebody might call it an "irritant reaction," someone might call it a "true positive reaction," and that's going to determine which way the counseling goes. I think there's a lot of ways that we can potentially improve treatment, especially by investing in understanding the mechanism of allergic contact dermatitis better. If we can figure out that nickel has a so-and-so blood profile, fragrance has a so-and-so blood profile, eventually I think looking forward 10, 20, 30, 40 years, what I'm hoping for is that there is a more molecular-based biological profile test that can be used for detection of allergic contact dermatitis. Only then do I think the likelihood of developing therapeutic or significant therapeutic advancements can begin.

FLAVIA FEDELES, MD, FAAD: I think we're getting close to the end here, so just to wrap things up, what are one or two takeaway points for our listeners? Or something that you would like them to remember about this big topic of allergic contact dermatitis in children?

JIADE YU, MD, FAAD: Don't shy away from patch testing your kids. I definitely would say do not patch test every kid with atopic dermatitis, the yield is going to be low. But patch test those kids with atopic dermatitis that you think might have an inkling of allergic contact dermatitis. Unusual locations, so think about tops of the feet, think about just the eyelids, think about just the face. Older kids who develop atopic dermatitis and never had it before, your 15, 16, 17-year-old that's never had eczema suddenly starts getting what looks like eczema, think about patch

testing them. Or the kids who have even had long term atopic dermatitis but now get different areas of involvement or worsening atopic dermatitis, think about patch testing them, as well.

FLAVIA FEDELES, MD, FAAD: Thank you so much, Dr. Yu, for giving these insights into allergic contact dermatitis in children. Thank you so much for joining us today on *Dialogues in Dermatology* podcast. Again in closing, this is Dr. Flavia Fedeles, interviewing Dr. JiaDe Yu from Massachusetts General Hospital. Thank you.

JIADE YU, MD, FAAD: Thank you.

Commentary

Merideth Vieson with Benjamin Stoff, MD, FAAD (ed.)

Allergic contact dermatitis refers to an inflammatory eczematous skin disease that is a delayed-type hypersensitivity reaction to exogenous contactants[1]. It can affect up to 20% of children. Accurate diagnosis of the condition is vital for effective treatment. This episode of "Dialogues in Dermatology" features Dr. Yu from Harvard Medical School who directs the Occupational and Contact Dermatitis Clinic at Massachusetts General Hospital, interviewed by Dr. Flavia Fedeles, discussing allergic contact dermatitis in children.

Addressing allergic contact dermatitis presents several challenges within the pediatric population. Initially, many clinicians may misdiagnose the disorder as typical eczema due to the overlapping clinical appearance. As the diagnosis requires patch testing[2] and children are smaller than adults, fewer allergens can be tested at a given time. Specifically, physicians should consider allergens prevalent in exposures common in this population such as metals, preservatives, laundry detergents, rubber, nail polish, and fragrances. Thankfully, patch testing is painless. There are several ways to make children comfortable with patch testing such as letting them play with a patch or place a patch on their guardian.

There are important considerations for patch testing in patients with skin of color[3]. The allergens tested should still be the same for different skin types since standard panels encompass most relevant allergens. The main challenge involves reading the patches. For instance, erythema may not be visualized easily on darker skin. A positive reaction in this context may present with follicular accentuation alone, requiring the reader to palpate each patch site. Another useful technique is to use a sidelight to better visualize subtle plaques.

Allergic contact dermatitis in children is generally not related to food allergies. Therefore, avoidance of foods before diagnosis is not recommended, as it could lead to nutritional deficiencies in extreme cases. After patch testing to determine the culprit allergens, avoidance is the most important treatment for allergic contact dermatitis[4]. If this is not sufficient, it may be that the patient simply cannot avoid the allergen or other diagnoses such as atopic dermatitis should be considered. These cases may require topical and sometimes systemic therapies. More research is needed to improve the diagnosis of allergic contact dermatitis in children. Patch testing reading is relatively subjective and time consuming. More advanced testing that could be accomplished with a single blood draw would be a major advancement.

To summarize a few key points of this episode:

1. Allergic contact dermatitis in children is often misdiagnosed as atopic dermatitis, leading to under recognition of this diagnosis in this population.
2. Patch testing poses challenges in children due to their smaller size and limited skin surface for allergens.
3. Skin color impacts the visualization of reactions, making it essential for physicians to use tactile assessment and side lighting techniques.
4. Allergic contact dermatitis in children is not typically related to food allergies, so avoiding foods before diagnosis is not recommended.
5. Avoidance of the identified allergen is the primary treatment for allergic contact dermatitis.

References

1. Litchman G, Nair PA, Atwater AR, Bhutta BS. Contact Dermatitis. In: StatPearls. Treasure Island (FL): StatPearls Publishing; September 4, 2023.

2. Fonacier L. A Practical Guide to Patch Testing. *J Allergy Clin Immunol Pract.* 2015;3(5):669-675. URL: https://pubmed.ncbi.nlm.nih.gov/26054552/

3. Burli A, Vashi NA, Li BS, Maibach HI. Allergic Contact Dermatitis and Patch Testing in Skin of Color Patients. *Dermatitis.* 2023;34(2):85-89. URL: https://pubmed.ncbi.nlm.nih.gov/36917532/

4. Tramontana M, Hansel K, Bianchi L, Sensini C, Malatesta N, Stingeni L. Advancing the understanding of allergic contact dermatitis: from pathophysiology to novel therapeutic approaches. *Front Med (Lausanne).* 2023;10:1184289. Published 2023 May 22. URL: https://pubmed.ncbi.nlm.nih.gov/37283623/