Dr. Mariam Hanna:
Hello, I'm Dr. Mariam Hanna, and this is *The Allergist*, a show that separates myth from medicine, deciphering allergies and understanding the immune system. You either grow up with a pet or you don't, and then as an adult, you either have a pet or you don't. People have distinct perspectives on the household pet question, or they don't, but then their partner, their children, the pandemic, or whatever the circumstance may be happens, and things can change. I always ask during consults about pets in the household. I've always wondered if it was my tone or perhaps it was my profession that makes people answer in a rather defensive manner. They often pause, state the animal, mumble how many of that particular animal they have, and exclaim how long the animal's been there, or justify how it's hypoallergenic or profess that it's part of the family. I often end up smiling and saying, "I'm simply completing the chart, and that's not our discussion for today," because we're here to discuss a drug allergy or something that's entirely unrelated—or perhaps it's all related.

I've broken many hearts in my practice, telling people that while their beloved pet is not the only reason for the child's asthma, it's contributing to their symptoms. I've even advised families to consider a household fish. They can be fun, right? Allergists have self-coined the phrase, "It's easier to replace your allergist than to replace your pet." Today's guest was actually an automatic choice when we brought up this topic. He gave an invigorating plea to allergists at our 2024 North American Pediatric Allergy Conference entitled *Fido's Got to Go.* It's my distinct pleasure to introduce Dr. Shahzad Mustafa. Dr. Mustafa is the chief of allergy, immunology, and rheumatology at Rochester Regional Health, where he sees both pediatric and adult patients. He's a clinical associate professor of medicine at the University of Rochester and the clerkship director for the medical student elective in allergy and clinical immunology. Dr. Mustafa is a clinician, teacher, and lead investigator on multiple clinical research projects, with a special interest in secondary immunodeficiency due to malignancy and chemotherapeutics. Dr. Mustafa, welcome to the podcast.

Dr. Shahzad Mustafa:
Thank you so much for having me.

Dr. Mariam Hanna:
Okay. Whether it's Fido or Fluffy, how common are dog and cat allergies overall?

Dr. Shahzad Mustafa:
Yeah, so environmental allergies are pretty common. I think we all have maybe family members or friends or loved ones who have environmental allergies. It's interesting—in Canada, America, and North America, 20 to 30% of the population can have environmental allergies, and this can include cat and dog allergies, as well as other environmental allergies that people are aware of, like dust mites, tree pollen, grass pollen, weeds, and molds. So, cat and dog allergies can be very common—up to a quarter or a third of the population.

Dr. Mariam Hanna:
Wow, that's a lot. And in terms of presentation, what are we talking about when we talk about dog and cat allergies? How do they usually present?

Dr. Shahzad Mustafa:
Yeah, so dog and cat allergies tend to present like environmental allergies. They tend to have nasal and ocular symptoms—nasal congestion, runny nose, sneezing, itchy, watery, red eyes. When you come in contact with dogs or cats, you can sometimes have contact hives, or an itchy rash. So these are very, very common symptoms that can present for environmental allergies, whether it's due to pollen or pets as well. Kind of the standard nasal and ocular symptoms. For individuals who have a propensity for asthma, they can trigger asthma symptoms too, which is more like coughing, difficulty breathing, wheezing. You mentioned in your intro that environmental allergies and pet allergies can certainly affect asthma and respiratory status as well.

Dr. Mariam Hanna:
How early can someone typically present with this?

Dr. Shahzad Mustafa:
Generally speaking, for environmental allergies, we don't think about them until about three to five years of age. Pets in particular may present a little earlier in younger individuals because they're exposed to the allergen more often year-round, right at home or at loved ones' homes. But really, environmental allergies tend to present around three to five years of age, and they tend to increase until about puberty, teenage years, or young adulthood—that's kind of when they plateau in prevalence and severity. So they can present in children—a little bit older children is when we start really noticing them. And then, as we get into our teenage years and young adulthood, we see that environmental allergies are causing more and more symptoms.

Dr. Mariam Hanna:
Okay, so because the prevalence is changing throughout someone's lifetime, that means that we have nuances with allergies that can appear during early childhood years as well as adolescence. Can the reverse also be true? Do children with some pet allergies resolve over time or can that get better over time as well, in adolescents and adults? Can that—

Dr. Shahzad Mustafa:
Get better? Yeah, it can. I mean, everything has a little bit of a natural history or a projected trajectory, but absolutely, allergies can get better over time, especially as kids. I always joke, kids get better with age; adults, old dogs like me, get worse with age. So kids often can outgrow allergies. Puberty is a great time for change—it can affect allergies, it can affect asthma. So children can certainly outgrow environmental allergies, and conversely, you can develop environmental allergies as an adult as well. It certainly changes with exposure, new pets, or moving to a different region where you're living.

Dr. Mariam Hanna:
Are there certain factors that make some people more likely to develop a dog or a cat allergy versus another?

Dr. Shahzad Mustafa:
So the biggest risk factor is this. It's certainly a component of genotype and phenotype, certainly how you're made up. Family history plays a role. If you have one parent with environmental allergies or pet allergies, your likelihood is slightly higher. If you have two, it's much, much higher. So certainly genetics and family history play a role. Exposure plays a role too. So in individuals who have a slant to being allergic, if they have other environmental allergies, asthma, or food allergy, they do have a higher likelihood of becoming allergic to pets as well. There are some interesting things that have been studied very well on what may lead to pet allergy in individuals, and we can talk about how this affects other allergies too, but there's some data that growing up around a dog can help prevent allergies or dog allergy. So there's some data on that that we can get into more. So allergic makeup, family history, genetics, and environment exposure certainly play a role. And interestingly, exposure to dogs at a young age seems to be more protective against allergy than exposure to cats at a young age. So not even just the presence of pets or no pets, but which pet may even make a difference.

Dr. Mariam Hanna:
Okay. Speaking of which pet—are certain pets better or worse for allergies? I've heard many different theories, and I can't even tell you what's myth and what's fact anymore. So I need you to set me straight. Does it matter the gender of the animal, the breed, the hair versus fur situation, how big your animal is or how little it is, or is it a cat or dog? So let's go through each of those.

Dr. Shahzad Mustafa:
So simplistically, is it a cat or is it a dog? I think it's important—generally speaking, and I'm oversimplifying, but it's how I think it's easier for me to understand—when you're allergic to something, you're allergic to the protein structure, so you're allergic to the protein of the cat or the dog. It's not so much the fur or the hair, but more so the protein that makes a dog a dog or a cat a cat. Most of the concentration of this protein is in saliva and urine, actually not the fur. So that's important. This goes for other allergies too. If you're allergic to ragweed, it's the protein; or if you're allergic to peanut, it's the protein; or penicillin, it's the protein. So I think that's important. So generally, dogs will have a certain predominant allergenic protein, which we actually know, and cats will too. With that being said, some dogs are bigger, furrier, they shed more, so there are degrees or amounts of allergenic protein among dogs. Generally speaking, more allergen may drive more symptoms than smaller amounts of allergen.

Generally speaking, the presence of allergen can elicit symptoms, and we know that in the setting of food allergy—I'm trying to make analogies here—if someone's allergic to a food, even a little bit will often cause symptoms. So if you're allergic to cats or dogs, even a small exposure to a small pet or a non-shedding pet will likely cause symptoms. Now, of course, if you are allergic to your pet and you have one cat versus 11 cats, you might have a difference in symptoms. But still, it's kind of like what you said—a dog is a dog, a cat is a cat, and much of

the protein is in the urine and saliva. So there are dogs or cats that may be hypoallergenic, but we all know what hypo means. Hypo means less, not none. So there is good data also that hypoallergenic pets do not particularly make a difference in the likelihood of symptoms from the pets, even though they may have slightly less protein load or allergenic load. So I don't know if the juice is worth the squeeze there in spending the money or seeking out a hypoallergenic pet. It may be less likely to be allergenic, but studies have actually been done and show that's not consistently the case.

Dr. Mariam Hanna:
I.e., the juice is not worth the squeeze. I'm going to use this in consultations moving forward. I also heard about this—gender of the animal, like a male versus a female. Does that make sense, or does that matter at—

Dr. Shahzad Mustafa:
All? I don't think that matters in the allergenicity of the animal. I think that's a simple answer there, and I actually can't even really rationalize in my head why it would matter.

Dr. Mariam Hanna:
I'm not familiar with their grooming practices, and many times people justify their animal to me again when I'm asking about whether they have pets at home. And I'm always puzzled, like, I wonder if that makes an actual difference. I just was asking what you have at home. It's—

Dr. Shahzad Mustafa:
Funny that you mentioned the guilt they feel when they tell you they have a cat or a dog. I'm happy for them—pets are important parts of families, right? And cats and dogs have very different social norms in how they interact with families and loved ones. So that may play a role too. Cats tend to be more solitary, a little more moody. I don't have pets, by the way. Dogs tend to be—

Dr. Mariam Hanna:
I was going to try to guess this episode whether you own pets or not.

Dr. Shahzad Mustafa:
My kids have been lobbying for a dog for many, many years, but dogs can be—

Dr. Mariam Hanna:
Circumstances might change, Dr. Mustafa; your circumstances might always change. Okay, let's talk about the evidence to support the idea that perhaps owning a pet may be a good thing. You already mentioned owning a dog early on in a child's life may be protective. What does that evidence look like?

Dr. Shahzad Mustafa:
Yeah, so we're in a world where we talk a lot about microbiome—good bugs, bad bugs. There are some great books on this that people should look up if they're interested in the topic. We're covered in a hundred trillion bacteria in our body, and they're not just hanging out; they're interacting with our body. They are communicating, they're sending signals. And this

microbiome absolutely has an impact on human health. There are incredible studies showing that allergies are more common in Canada, the U.S., Europe, and Australia compared to Africa, China, India, or South America. And it has a lot to do with microbiome—the bugs, the bacteria. There's data on the role of C-section versus vaginal delivery and risk of allergy. So lots of studies, but we really have a lot to learn about microbiome, and as you can imagine, if you have a pet in your home, it changes the microbiome.

They have a different microbiome, and they interact with you differently. What does your dog do when you walk in the door? It may or may not jump in your lap. It may or may not lick your face, right? And that has microbiome implications. So there is pretty decent data that having a dog, but not a cat, in young life and exposure during childhood may be protective against developing allergies. And I think that speaks to the behavior of these pets. Dogs are very interactive—they're all over their owners, they're licking faces. Cats tend to be a little bit less interactive that way, and that may be playing a role. So there is some data for protective effects against developing allergies if exposed at a young age. It's very interesting, and we have a ton more to learn because we all want to be preventing allergic conditions rather than treating them, right? That's the holy grail, I think—prevention.

Dr. Mariam Hanna:
Absolutely, absolutely. And even this represents a change in our mindset around what the role is of pet allergies. So it's relatively new. Okay, how do we test for pet allergies, Dr. Mustafa?

Dr. Shahzad Mustafa:
So I think in allergy, it's very, very important—and I think this always goes for medicine, but it's certainly true in allergy—that any good test starts with taking a really good history. There's no reason to be testing for things that aren't medically plausible. So we take a good history. We talked about the symptoms of pet allergy and environmental allergies—nasal symptoms, ocular symptoms, respiratory symptoms, maybe skin symptoms with contact. So if there is a history that is plausible, and people are coming in with symptoms like that, as allergists, we do a lot of skin testing. A negative skin test has more power; it has more negative predictive power than a positive skin test. Sensitivity and specificity—there's two types of skin tests, right? There's prick testing, which is kind of scratches, and then there's a little more higher dose testing, which we don't do a lot of, but it certainly picks up more allergy results.

So it's higher sensitivity, but with higher sensitivity in medicine, you get less specificity, right? So you won't miss as much with the intradermal, but you might be picking up more almost like false positives. Whereas with the skin test, the scratch testing, you have good sensitivity, but you might miss some—I think maybe 20%, is that right? That might be debatable, but you have very good specificity. So there's always a give and take, and it's important to try to get this data to counsel patients about potential environmental control measures and medical therapy. But if you're thinking about immunotherapy or allergy shots, then it's certainly important to try to get this right. And I think there are a couple of things you can do with skin testing, and there may be a role for prick testing. There may be a role for intradermal testing. There may even be a role for specific IgE testing—blood work. They all have pros and cons, but no test is perfect. Really, the history remains paramount.

Dr. Mariam Hanna:
Why is the skin test for dog so terrible in comparison to cats? I have a lot of this contact urticaria with a negative skin test for dog, but the story sounds so convincing—and they have pictures to boot. Why is that?

Dr. Shahzad Mustafa:
I think the extracts for dog are not as standardized, by the way, as they are for cat. So there's more heterogeneity in the skin testing. I also think it's sometimes hard. I mean, sometimes I see individuals who will have symptoms around pets consistently, particularly dogs, and it's actually not the dog but the dog harboring other pollens, right? They just went outside. That's a possibility, or a sensitivity rather than an IgE-mediated allergy. If you rub a pen against your hand for five minutes and it gets a little red, you're not allergic, right? It's more of an irritation. So dog fur may be an irritant; it may be a contact irritant where it's not truly an allergic response. And it matters with therapy because if it's an irritant, of course, it's still bothersome, and it's still a symptom, and you want to treat it with medications—maybe antihistamines—but you couldn't desensitize or use immunotherapy against that. But I do think the extracts for dog are a little more heterogeneous, less well ironed out for concentrations as compared to cat, which I think is a little better ironed out.

Dr. Mariam Hanna:
Okay, perfect. Now we got to go into this *Fido's Got to Go* part of your talk. So what are the most effective treatments that we have for managing dog or cat allergies in both children and adults?

Dr. Shahzad Mustafa:
If you don't mind me giving a caveat, I have to defend myself. Like your patients speak with guilt, that title was forced upon me for my talk. I did not pick it. So I started that—

Dr. Mariam Hanna:
It's memorable, though.

Dr. Shahzad Mustafa:
I started this talk with a study from *Consumer Reports* last year that surveyed a thousand millennials—so younger than me, but millennials. Eighty percent said that they love their cats or dogs more than family members. And 60% said they'd rather have a cat or dog, and they likely will have a cat or dog but will never have a child, which is actually a little bit surprising. The 80% didn't surprise me, but the 60% did. So pets are an imperative, very, very important part of families. With that, I tend not to tell people to get rid of their pets because, again, it's like a family member, but there's another very important reason too. Even if your household does not have a cat or dog, there's a very high likelihood of you encountering cat and dog protein as you go about your day. Buildings that have never had pets in them have been studied, and there's detectable cat or dog protein in buildings that have never had pets.

These proteins can be sticky—they can be enclosed. If you don't have pets but you see someone else who does, you can be exposed. Obviously, there's a difference in dose. So yes, potentially getting rid of pets is helpful if you have these allergies, but of course, exposure is not zero, though it is decreased. Practically speaking, if you have a pet and you are allergic to that pet, probably the most meaningful thing you can do, practically speaking, is keeping it out of the bedroom. We spend a third to a half of our lives in our bedroom. If you sleep eight hours, 10 hours, six hours even. So potentially keeping it out of the bedroom. But Dr. Hanna, again, our recommendations for environmental control measures really—well, we say a lot of things, but there's not great research and they're hard to implement. So maybe keeping your pet out of the bedroom is helpful. There's some data for weekly baths, really, really bad data. Maybe you can do that for a dog, but that's a tough one for a cat.

Dr. Mariam Hanna:
Not going to happen with a cat safely—not going to happen.

Dr. Shahzad Mustafa:
And again, the science supporting this is really suboptimal. So I tend to—and this is just my bias—focus on medical therapy and immunotherapy. I don't spend too much time on environmental control measures. Even for other allergens like dust mite, some of the things we recommend have very poor data to support their use. And quite frankly, they're not easy. They're involved. They ask a lot of families, and I am happy to ask a lot of families if I feel strongly that it's going to work. But in the absence of that data, I tend to focus more on what there is good information and good research on, and that's medical therapy and allergy shots or immunotherapy. Was that the answer?

Dr. Mariam Hanna:
It takes a lot. *Fido's Got to Go* takes a lot of that guilt away, and I think patients are already going to be more receptive to listening versus my opening line of, "Well, you could get rid of the animal," right? That one's not worth the squeeze either.

Dr. Shahzad Mustafa:
No, it's a lot to ask, and it may not get them home either. They may not have a pet, but daycare has a pet, or grandma has a pet, or it just comes up a lot. These things are all commonplace. So I think there are other ways to approach—

Dr. Mariam Hanna:
It. So let's talk about evidence-based medical therapies that we have for the management of pet allergies.

Dr. Shahzad Mustafa:
So we have a great arsenal of medical therapy to address environmental allergies for chronic symptoms. And people don't love hearing this, but nasal medications—nasal corticosteroids—are actually the most effective medicine for environmental allergies, including

cat and dog, for nasal congestion, particularly runny nose, rhinorrhea, and post-nasal drip. They can certainly be used in tandem with systemic antihistamines—non-sedating, over-the-counter, second-generation antihistamines that don't tend to make people sleepy or somnolent. These tend to be very effective for rhinorrhea, sneezing, and itchy eyes, though they're less effective for nasal congestion and post-nasal drip. These medications are safe, well-tolerated, and can certainly be used in combination.

But beyond the antihistamine tablets that people are very familiar with and some of the nasal steroids that people are familiar with, I think there are a couple other options too. There are nasal antihistamines—nasal antihistamine sprays that work almost as well as the nasal corticosteroid sprays. The beauty here is they can be used as needed. We're very, very bad at taking medications daily—I'm very bad at taking my medicines daily—so on good days and bad days, nasal antihistamines work better as needed compared to nasal steroids. For individuals who are having a lot of clear runny nose, there's a safe way to dry up your nose: it's nasal ipratropium, which is a nice medication. So there's a nice arsenal of medical therapy that we can use alone or in combination with each other that can often lead to significant symptomatic relief.

Dr. Mariam Hanna:
Are there newer therapies available to help manage pet allergies?

Dr. Shahzad Mustafa:
Yes. We've talked about medical therapies, and we've touched a little bit on immunotherapy, and there are new strategies for immunotherapy. So immunotherapy—allergy shots, right? We're exposing you to the allergen in very controlled doses and increasing the dose over time to hopefully desensitize you or induce tolerance. These have historically been given as shots, injections, but there are different forms of immunotherapy being studied. There are sublingual tablets, which are not yet government-approved or regulatory agency-approved for cat and dog, but they're being studied. It's wild—there's immunotherapy being studied as intralymphatic immunotherapy, with injections into a lymph node. Studies have shown that even three injections one month apart may have long-lasting improvements. So we're looking at different methods to deliver these kind of old strategies, and that's happening in a lot of spaces. But again, with the medical therapies that we have right now and the options of immunotherapy through an allergist, I think the vast majority of individuals who are allergic to pets or environmental allergens can have really, really good symptomatic relief.

Dr. Mariam Hanna:
I want to touch on myths that I sometimes hear in the office, and we've touched on them already, but just to make sure we're emphasizing this correctly. I heard you talk already about hypoallergenic cats or dogs. Do they make a difference in terms of presentation or severity of the allergies in patients?

Dr. Shahzad Mustafa:
Yeah, I would say generally speaking, hypoallergenic pets do not make a clinically meaningful difference in the likelihood of someone having allergic symptoms or the severity of their symptoms. "Hypo" may be true—there are some breeds that may be less allergenic or produce

more or less allergenic protein than others—but there have actually been studies showing these don't lead to significant changes in symptoms. So I don't think it really matters. And again, a pet's a pet, and it's the protein; most of it's in, again, saliva and urine. It probably doesn't make a big difference—hypoallergenic pets.

Dr. Mariam Hanna:
Okay. Is a pet the cause of a child's or teenager's asthma or atopic dermatitis?

Dr. Shahzad Mustafa:
That's a great question. I think it's important to consider the phrasing there. For atopic dermatitis, I see no reason to believe—no data—that pets cause atopic dermatitis. And we talked about how dog exposure at a young age may even be protective against allergens. I also don't think a pet is a cause of asthma, but a pet could be a potential trigger for someone who has a component of asthma. Individuals with asthma often feel it with extreme exertion, viral illness—like colds—and then around some allergens as well. So I don't think pets cause asthma, but they may contribute to or worsen asthma symptoms. But again, there are a lot of very good, safe, well-tolerated medications for asthma as well. So even if you are having asthma symptoms and you think it may be due to a pet, I think there are opportunities to treat it with really well-studied medications. So I wouldn't say it's a cause, but it may contribute to symptoms.

Dr. Mariam Hanna:
A contributor. I learned when I purchased my dog during the pandemic, after having never had a dog in my entire life, that the presentation of animals with allergies is vastly different from the presentation of humans with allergies. And the interventions are very different. I have come to the realization that this perhaps causes confusion in some patients who help care for animals, making them think we have the same kinds of triggers and treatments, which are vastly different. But that's been my own personal learning, and I've also picked up lots of interesting gems from today's conversation. Dr. Mustafa, thank you so much for joining us. Time to wrap up and ask today's allergist, Dr. Shahzad Mustafa, for his top three key messages to impart to patients and physicians on today's topic: pet allergies. Dr. Mustafa, over to you.

Dr. Shahzad Mustafa:
Yeah, so I think pet allergies are common—up to 20 to 30% of the population. I think our environmental control measures to address pet allergies are suboptimal and actually very difficult. And I do not think families typically should be getting rid of pets if they're having symptoms. There are very, very well-tolerated medications that we can use. We can use desensitization therapy with immunotherapy, and I think that's where the discussion should revolve—how to manage these. But these are common allergies. We busted some important myths, and I think we have some great therapeutics. If you have concerns about pet allergies, I think an allergist is a great person to consult with because we have a lot of options to discuss with our patients and families.

Dr. Mariam Hanna:
Perfect. Thank you, Dr. Mustafa, for joining us on today's episode of *The Allergist.*

Dr. Shahzad Mustafa:
Thanks so much.

Dr. Mariam Hanna:
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