Music was used from the video editor app. Only information available is the song names “Go Easy 01” and “Good Time 01” and that they are by Xuxiao. No other referencing information is available. I mentioned this in class to you.

0:00 Introduction music: “Go easy 01” by Xuxiao.

0:05 Richard (Host): Welcome to the podcast Over-reacting with Antibodies, where we explore all the different ways our immune system can get a bit dramatic. I'm your host, Richard, and today we have two special guests on the show to help us itch our curiosity about the world of allergies. First, a shout-out to our executive producer, Rhea, who makes this whole podcast possible. Our first guest here with me is a local woman, Hannah.

0:26 Hannah (Guest): Hey guys, I'm Hannah.

0:28 Richard (Host): Hannah here is going to walk us through her story of getting her new cat, feeling sick, and discovering that she is actually allergic to her new best friend. Also joining us, a guest you all know by now, our resident expert on all thing’s immunology, and the woman who helps us really break down our body's defences. And no, I don't mean emotional walls, it's Dr McNabb.

0:48 Hailey (Dr. McNabb): Thank you, Richard, it's always nice to join your podcast.

0:50 Richard (Host): We love having you and your wealth of knowledge. So, Hannah, did you want to start us off? How did this whole experience begin?

0:57 Hannah (Guest): Well, it all started when I went to my local animal shelter, Fetch and Feather, to adopt my cat. I met so many wonderful cats, and after a lot of thinking, I decided on the hypoallergenic sphynx, because my mom is allergic to cats. I have now since named him Mr. Meowgi.

1:14 Richard (Host): So, at this point, when you were first adopting him, did you experience any symptoms?

1:18 Hannah (Guest): No, not at all. I didn't start to notice symptoms until I brought Mr. Meowgi home. Actually, the first week or two, everything was fine. Then I started feeling some mild congestion, sneezing, and a bit of a scratchy throat. I thought I was just starting to get a cold, but as time went on, instead of getting better, it just kept getting worse.

1:36 Hailey (Dr. McNabb): I'm just going to jump in here on a couple points, first, and I love that you brought this up, but there actually is no such thing as a hypoallergenic cat.

1:43 Hannah (Guest) What? But I've heard from so many people it's common knowledge that these are hypoallergenic breeds.

1:49 Hailey (Dr. McNabb): I know, it's a prevalent piece of misinformation. In truth, the allergen Fel D1, which I will now refer to as “allergen” for the rest of this podcast, is the allergen responsible for most cat allergies, affecting about one in five adults (Satyaraj et al., 2019). This allergen, which is produced regardless of the cat's sex, breed or age, is excreted through salivary and sebaceous glands (Satyaraj et al., 2019; Schoos et al., 2021). This is why, even though your cat is hairless, it is not actually hypoallergenic. During grooming or when you pet them, the allergen can be spread and become airborne, due to its small particle size (Satyaraj et al., 2019). This allergen easily floats around the air, attaching to clothing and surfaces, kind of following us around the house and surrounding areas (Li et al., 2021; Satyaraj et al., 2019).

2:25 Richard (Host): Oh, interesting. I also grew up believing in hypoallergenic pets. Dr. McNabb, can you explain why she had such a delayed reaction?

2:32 Hailey (Dr. McNabb): Absolutely, many people don't realize it's not the allergen itself that causes symptoms, but the body's response to it. Pet allergies are known as a hypersensitivity one reaction, which has two main phases, sensitization and effector. During sensitization, antigen-presenting cells process the allergen through phagocytosis and present it on its MHC II (Ownby & Johnson, 2016; Satyaraj et al., 2019). T-helper cells then bind to that epitope where a two-signal process involving the release of B7, and C28 proteins allows for the T cell to be activated (Satyaraj et al., 2019). This activation causes the release of interleukin four and three, stimulating a humoral response and causing naive B cells to differentiate into plasma cells capable of producing IgE antibodies specific to this cat allergen (Satyaraj et al., 2019). The IgE antibodies bind to mast cells, preparing them for future encounters with the allergen, resulting in our sensitization (Satyaraj et al., 2019). This process may take weeks to occur, which is why you initially didn't experience any overt symptoms after adopting Mr. Meowgi (Satyaraj et al., 2019). Only after this process is complete does your body recognize the allergen as a threat, triggering those classic allergy symptoms (Satyaraj et al., 2019).

3:35 Hannah (Guest): Oh, so I was always allergic to him, I just didn’t feel it yet?

3:39 Hailey (Dr. McNabb): Precisely, once sensitized, you started developing those symptoms you mistook for a cold. But since this was an allergy and not an illness, being cooped up with your cat only kept the symptoms going.

3:49 Richard (Host): So, Dr McNabb, can you explain what exactly is happening to produce those classic signs of an allergy?

3:56 Hailey (Dr. McNabb): Yes. After sensitization, subsequent exposure to the same allergen binds to the IgE antibodies on sensitized mast cells, which are highly prominent in the respiratory tract, triggering their degranulation and releasing chemical mediators such as histamine, interleukins, leukotrienes, and prostaglandins, just to name a few (Osmosis from Elsevier, 2022). Histamine is the key chemical mediator in this response, causing increased mucus production and red, swollen, itchy eyes (Osmosis from Elsevier, 2022). This is due to increased fluid in the facial tissues from capillary dilation and permeability (Osmosis from Elsevier, 2022). It can also lead to breathing difficulties from smooth muscle contraction in the airways and skin reactions like itchiness or hives (Osmosis from Elsevier, 2022).

4:31 Hannah (Guest): Oh, I see. So why did my symptoms continue to get worse over time?

4:36 Richard (Host): If I were to hazard a guess, I would assume it's because your exposure to the allergens never stopped, right?

4:41 Hailey (Dr. McNabb): That would be the principal reason, yes. However, these inflammatory mediators also do another thing, which is call more mast cells and other white blood cells to the area, via a process called chemotaxis. So then more mast cells come to the area and degranulate, exacerbating and perpetuating your symptoms (Satyaraj et al., 2019). But also signal even more mast cells to come, which creates a bit of a positive feedback loop until either there's no more allergen to bind with the mast cells or we intervene in some way. (Satyaraj et al., 2019).

5:07 Hannah (Guest): Well, that seems really stupid. Why would my body do that, doesn't exactly seem helpful at all.

5:13 Hailey (Dr. McNabb): In this case, it isn't. But allergies, by definition, are an overreaction of your immune system, where your body treats a benign particulate as a pathogen that needs to be contained and dealt with, which, when appropriately utilized, is incredibly helpful in finding actual pathogens and in wound healing as well (Dhanapala et al., 2015).

5:28 Hannah (Guest): Ahh.

5:29 Richard (Host): So, Hannah, how and when did you realize it was actually an allergy and not a cold?

5:34 Hannah (Guest): Well, I went to the doctor because I thought I had pneumonia or something, expecting to get prescribed some antibiotics. However, when I was talking about my situation, he referred me to an allergist because he suspected it was actually an allergy and not an illness per se.

5:49 Richard (Host): Okay, so you made an appointment with this allergist. What diagnostic tools did they use, or how did they confirm your allergy to Mr. Meowgi?

5:57 Hannah (Guest): The allergist just pricked my skin with a bunch of needles. And then I waited about 20 minutes or so, and a few of the places he pricked welted up. And he gave me a list of things he said that I was allergic to, one of which was Mr. Meowgi.

6:10 Richard (Host): That must have been so devastating to hear after just getting him.

6:13 Hannah (Guest): It really was. I did not want to believe the results, so the doctor did a blood test to confirm my results.

6:20 Hailey (Dr. McNabb): The blood test likely wasn't necessary between the positive skin test and patient history, but false negatives occur (Sandbhor & Jain, 2023). When he pricked your skin with that little needle, what he was doing was taking a very small amount of a bunch of common allergens and introducing them under your skin. After 15 to 20 minutes, any of the areas tested that welted up would be considered a positive result, confirming an allergy (Chan & Leung, 2018; Li et al., 2021). The blood test he did would have been an IgE serum test, which measures the level of specific antibodies in the blood, another tool that can confirm an allergy (Li et al., 2021).

6:49 Richard (Host): All right, I think now is a good time to stop for a second and give a shout-out to today's very relevant sponsor.

6:56 Commercial music: “Good Time 01” by Xuxiao

6:57 Richard (Advertisement): Do you love petting your furry flatmate, but tired of sneezing like you're a part of some pollen parade?

7:01: Sneeze Sound effect (Sound Bytes, 2020)

7:02 Richard (Advertisement): Do the bedtime cuddles from Mr. Snuggles leave you puffy, itchy and

7:06: Scratching sound effect (self recorded)

7:06 Richard (Advertisement): all kinds of uncomfortable? Well, worry no more, at Paws Effect, we have all your pet allergy needs

7:12: Cat Sound effect (from video editor app. No reference information available)

7:12 Richard (Advertisement): right at your fingertips, equipped with all the best medication to manage the itchy, sneezy, uncomfortable world of pet allergies. We have a wide variety of treatment options, including antihistamines, corticosteroids, decongestants, and even leukotriene modifiers. With one click,

7:26: Mouse click (Sound Effects, 2020)

7:26 Richard (Advertisement): your pet-friendly meds can be delivered right to your doorsteps, so you can get back to cuddling your furry friend in comfort.

7:32 Richard (Host): That's a wonderful segway into what Hannah can do to help her manage her symptoms, hopefully without getting rid of poor Mr. Meowgi. So, Dr. McNabb, could you go over treatment options for people like Hannah, and maybe touch on those classes of medications our lovely sponsors at Paws Effect have and how they may help, then we can hear what the doctor recommended for Hannah.

7:51 Hailey (Dr. McNabb): I would love to, but first and foremost, I want to give a quick disclaimer that this information is meant to help you facilitate a discussion with your own healthcare provider, not replace their advice.

8:00 Richard (Host): As always.

8:01 Hailey (Dr. McNabb): So, regarding treatment, I know of three broad categories, environmental, pharmaceutical, and one medical treatment that's available (Li et al., 2021. Your environmental interventions all aim to reduce the abundance of the allergen in your environment. Ideally, it would be removing the allergen altogether. But I suspect Hannah here might take issues with re-homing Mr. Meowgi.

8:19 Hannah (Guest): Correct. I really do not want to have to give up my beloved Mr. Meowgi, he's already become my best friend.

8:25 Hailey (Dr. McNabb): So outside of rehoming your cat, you can reduce the allergens in your environment by bathing him regularly, using a HEPA air filter, washing sheets and surfaces frequently, and increasing cleaning and vacuuming (Li et al., 2021). This may not remove the allergens entirely, so medications are often started. Antihistamines block H1 receptors on mast cells, stopping allergens from binding to the receptor site, thus, preventing mast cell degranulation, which will stop your symptoms (Farzam et al., 2023). Leukotriene modifiers bind to leukotriene receptors to help decrease swelling, congestion, and mucus production (Choi & Azmat, 2023). Corticosteroids reduce inflammatory cell activity and edema in airway mucosa (Vallerand & Sanoski, 2023). And lastly, there are decongestants, which stimulate Alpha-adrenergic receptors to constrict capillaries that line the nasal cavity, resulting in decreased nasal congestion (Vallerand & Sanoski, 2023).

9:10 Richard (Host): Dr. McNabb, did you also mention a medical treatment? What is that all about?

9:15 Hailey (Dr. McNabb): Yes. So, you can go through what's known as AIT, or allergen immunotherapy (Li et al., 2021). Typically, it's used in cases where medication and environmental interventions aren't sufficient (Li et al., 2021). AIT encourages the body to produce the anti-inflammatory cytokine interleukin 10, and it also helps in regulating T helper cells (Li et al., 2021). This treatment option results in an immunological tolerance by exposing the body to the allergen in very small amounts that increase over time (Virtanen, 2017). So, it's not a quick fix, but it has been proven to lower the need for medication, reduce symptoms, improve quality of life, and prevent the progression of allergy to asthma, which can happen after prolonged exposures (Li et al., 2021).

9:49 Hannah (Guest): That makes me feel better since it's pretty much the same as what my doctor told me. He has me on an antihistamine and a decongestant. He also told me about keeping my place well-ventilated and clean, and ensuring I wash my hands after petting Mr. Meowgi. However, he didn't mention immunotherapy, so I might make an appointment to talk to him about starting that, especially if it takes so long to work.

10:11 Hailey (Dr. McNabb): Well, I'm glad I can give you some more information. Helping people have informed conversations with their healthcare providers is why I come on here, and I'm so glad you found some useful information today.

10:20 Richard (Host): Thank you, Hannah, for coming on and sharing your story.

10:22 Hannah (Guest): Of course, it was fun and informative.

10:23 Outro Music: “Go Easy” 01 by Xuxiao

10:24 Richard (Host): Dr McNabb, thank you again for taking time out of your busy schedule to help educate me and all our listeners about type one hypersensitivity.

10:31 Hailey (Dr. McNabb): It's been my pleasure.

10:32 Richard (Host): So that's it for today. If you're interested in getting involved with the research Dr. McNabb is doing out of the University of Immunology. You can contact her at Dr.Mcnabb@tcell.edu, I hope you enjoyed this week's episode of Over-reacting with Antibodies. I'm your host, Richard, and you can listen to me again next week. Thanks for tuning in, folks.

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