



Mitchell H. Grayson

Grant Morrow, III, MD Endowed Chair in Pediatric Research; Professor of Pediatrics and Chief, Division of Allergy & Immunology, Nationwide Children's Hospital and The Ohio State University College of Medicine, Columbus, USA

“I’m most excited about a hypothesis that we’ve been exploring, which is that atopic disease can provide protection from severe respiratory viral infections”

Citation:

EMJ Allergy Immunol. 2026;11[1]:61-63.
<https://doi.org/10.33590/emjallergyimmunol/Y71H5287>

Q1 What initially drew you to medicine, and how did you ultimately gravitate towards allergy and immunology as your specialty?

My father trained as a dermatologist and then became board certified in allergy and immunology the first year that allergy and immunology became a board-certified specialty. It seems that from birth I knew I wanted to be a physician. When I was little, I went with my dad to see a patient in the emergency room, and my dad joked that I would give the patient a shot. Supposedly, I picked up a syringe and was going to inject the patient (I didn't and they quickly took the syringe away from me). My dad would also come to my elementary classes and teach us about the immune system. He had cards with hand-drawn T cells, B cells, and macrophages, and would use them to demonstrate how the immune system worked. I think it was seeing my dad as a physician and allergist that led me to want to go into medicine, and by the time I was in high school, I knew I wanted to do research.

In college, it was the peak of the AIDS epidemic, and the whole focus on the disease and what happens when cluster of differentiation (CD)4 T cells are depleted led me to want to study the immune system. In medical school, it seemed that either allergy and immunology or rheumatology were the two specialties that focused on immunology. My medical school, the University of Chicago, Illinois, USA, did not have an allergy and

immunology division or clinic, so I rotated in the rheumatology clinic. At that time, most of the treatments were injecting steroids into patient's joints, which I found unfulfilling, so I decided I would follow my dad into allergy and immunology. It was a specialty where you would have time to do research and have a clinical practice where patients weren't that ill and really only required outpatient care.

Q2 Your research focuses on how viral infections can drive allergic disease. Why do you think respiratory viruses seem to have such a long-term impact on immune development, and what do we now understand that we didn't a decade ago?

I think the impact of a respiratory viral infection on the immune system is very much due to timing. Early in life, the immune system is still developing, and this seems to be the time at which a respiratory viral infection has the greatest impact (at least in terms of skewing the immune response). This may relate to immaturity of the immune response at the time (impaired interferon responses, for example) or even the relative naïveté of the immune system early in life. We have learned many things over the past decade, including the previously mentioned impaired immune response; the fact that different respiratory viruses drive risk for asthma in different ways (respiratory syncytial virus [RSV] drives a risk for recurrent wheeze/asthma in those who aren't atopic, while rhinovirus drives the risk in

those who already have allergic disease); the potential impact of biologics (like anti-IgE or anti-IL4/IL13) on immune response; and even the effect of atopy on the antiviral immune response (including protection from severe disease). And this is all ignoring the unique, real-life experiment of the COVID-19 pandemic.

Q3 Allergic diseases are increasing worldwide, particularly in westernised settings. Beyond genetics, what environmental or societal factors do you believe are most influential, and are there any emerging hypotheses that excite you?

I'm most excited about a hypothesis that we've been exploring, which is that atopic disease can provide protection from severe respiratory viral infections. The thought here is that with increased urban communities, we are seeing more respiratory viral infections, and that an immune response skewed towards Type 2 immunity (atopy) can protect from severe disease. If this hypothesis is correct, it may lead to novel

interventions that could prevent death from future respiratory viral pandemics, and even from the seasonal influenza outbreaks.

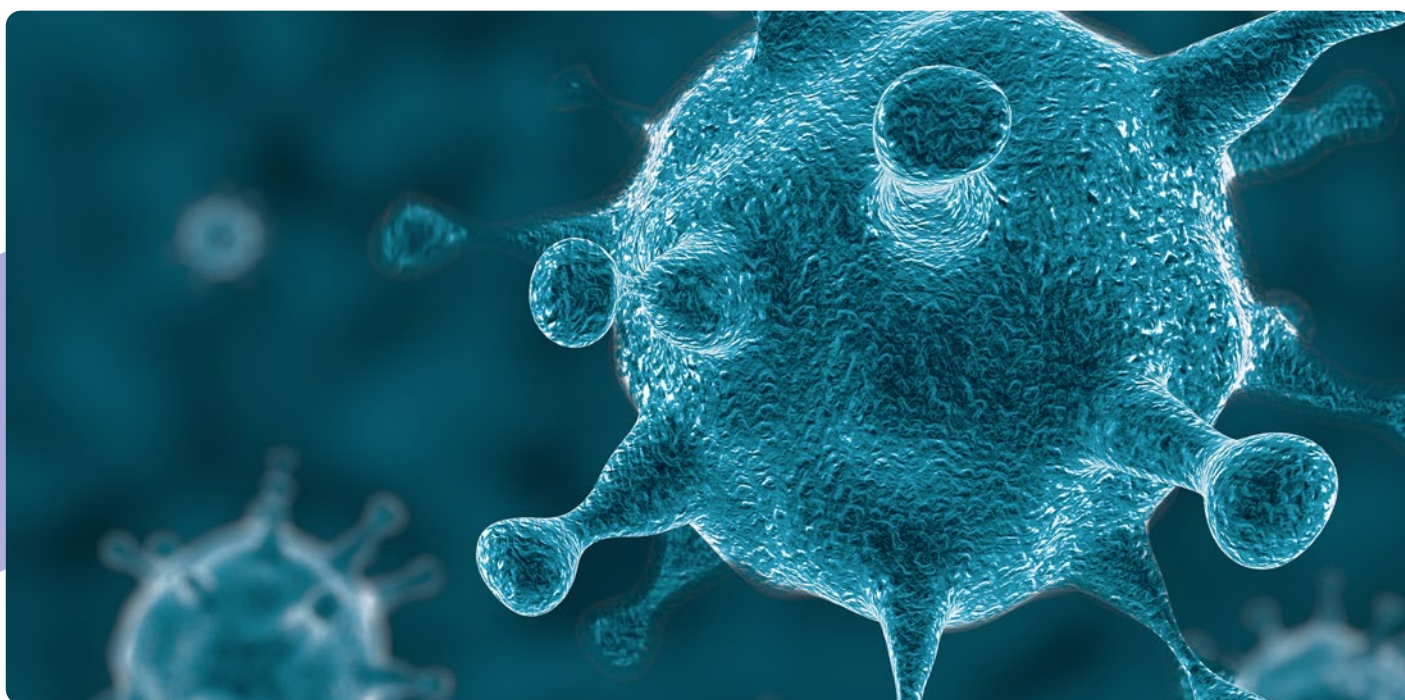
Q4 In your laboratory work, what discovery has surprised you the most, either by confirming or challenging assumptions about how allergies develop?

I was most surprised about our initial discovery 20 years ago that IgE, the antibody associated with allergic disease, was necessary to translate a respiratory viral infection into 'asthma' in a mouse model. This led to the idea that anti-viral IgE (that is, IgE directed against the virus itself) might be important in developing and exacerbating asthma. Indeed, studies have shown that use of anti-IgE prevents viral induced asthma exacerbations, as well as seasonal allergen (like pollen) exacerbations. However, whether this protection is through blockage of anti-viral IgE has never been studied. More recently, I've been surprised by the fact that making mice atopic can prevent them

from dying from a normally lethal respiratory viral infection. This has led to my thoughts on the potential evolutionary advantage that atopy might impart on the host and is something we are actively studying at this time.

Q5 Asthma and food allergy remain major public health burdens. Where do you see the greatest opportunities for prevention rather than treatment, and what would a truly preventative strategy look like?

Our current strategies for asthma and food allergies are primarily focused on treating the disease once it develops. However, in food allergy, there has been more interest in prevention through feeding children the food before they develop the allergy. I think we have a great opportunity with our biologics to potentially prevent the development of allergic disease, if only we were able to identify those most at risk before they had a disease. I also think the RSV vaccine has the potential to reduce the number of children that will go on to develop asthma, presuming



that we are going to be able to convince pregnant mothers to get inoculated, which may be difficult in the current environment. Looking ahead, I think we will get to a point where infants are protected from RSV infection through vaccination (primarily of their mothers). Then, using a predictive algorithm (probably utilising AI), those most at risk of allergic disease will be treated with a biologic (likely anti-IL4/IL13 or similar) for a short period of time (probably less than a year). After this, they will develop normally and not have any allergic diseases (eczema, allergic rhinosinusitis, food allergy, or asthma).

“**AI will provide the power to really bring personalised medicine to fruition**”

Q6 As a leader in multiple professional organisations and editor-in-chief of a journal, how do you balance advancing rigorous science with ensuring it translates into patient benefit?

As an editor, I want to provide my journal readers with the most cutting-edge and up-to-date information in the field. This includes mechanistic and clinical science that will impact patient care. However, determining whether a given study will truly impact patient care is difficult. The best we can really do is make sure the study is rigorous and novel, and that the conclusions apply to the patient population (or disease, if mechanistic) that is seen by our readership (allergists and immunologists, in my case). Allergy and immunology is a field in which basic discoveries do translate fairly rapidly into clinical

care, and I think this is in part due to the dissemination efforts of the field. Not only do the fields' journals provide a robust source of research across the entire research spectrum (basic science to population health), but our national organisations highlight these advances in their annual meetings. My responsibilities are to identify these findings and try and bring them to the specialty through both my activities as an editor and as a speaker and/or programme committee member of the various professional organisations.

Q7 Immunology is advancing rapidly with tools like single-cell sequencing and AI. How might new technologies reshape allergy research and patient care in the next 10–20 years?

I think that the big change in allergy research and patient care will come through use of AI. In the research realm, I believe AI will provide the power to really bring personalised medicine to fruition. In the future, AI could produce algorithms to predict which patients are at risk of disease (such as recurrent wheeze/asthma after a respiratory viral infection), which could allow for preventative intervention. AI will also allow researchers to quickly consider multiple hypotheses and design appropriate studies to test these. For better or worse, I suspect that grant and paper writing will involve AI editing (if not writing much of the text), and there likely will be an AI version of 'peer-review' that occurs before human review of the proposals and manuscripts. From a clinical standpoint, AI will likely run in the background on electronic medical records, providing support and assistance to the physician as they see the patient. This could be suggesting diagnoses, as well as potential medications, in real time. Already, AI is reducing the burden of medical note writing through various

ambient scribe programmes.

Q8 For young scientists or clinicians considering a career in allergy and immunology, what advice would you give, and what qualities do you think are most important for driving meaningful progress in the field?

For those considering a career in allergy and immunology, I would say you have picked an outstanding field. This is an area of medicine that is strongly based in mechanistic science and allows you to take care of patients across all age groups. We have treatments that really make people's lives better, and this can lead to an extremely rewarding career. In my opinion, successful clinicians are those who show empathy and a consistent thirst for knowledge. This is a field where playing detective is required to find out the triggers that are making a patient sick (is it the dog, dust mites, tree pollen, etc.). For those considering a research career, my advice is to stay focused and be persistent. Research does not usually bring rapid success; it is called 're-search' for a reason. Persistence is what leads to those 'aha' moments and the discoveries that really move the field forwards. And for both clinicians and scientists, I think identifying mentors who can provide advice and a path forward is always critically important.