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Prevention, Precision, and Policy: Interview with Ruchi Gupta

Q1 What initially drew you to allergy and immunology, and what motivated you to focus so deeply on food allergy research in particular?

When I began my career in Chicago, USA, my research was centred on asthma, a condition that affects so many children every day, but one family shifted my entire path. They had two young sons with food allergies and invited me into their daily world of label reading, reaction vigilance, and constant uncertainty. Their courage was inspiring, but their challenges were eye opening. At the time, the field lacked the most basic data and guidance. Families were essentially told: "Avoid the food and carry epinephrine." It was clear that it wasn't enough, not for public health and certainly not for families living this reality.

A few years later, the issue became personal. When my daughter was a year old, she had a severe reaction to peanut butter. In that moment, I wasn't a researcher or a clinician; I was a mom terrified for her child. That experience changed my trajectory. It deepened my commitment to building the evidence base we desperately needed, improving diagnosis and prevention, and advocating for policies that would make daily life safer and more manageable for families everywhere.

These experiences ultimately led me to establish the Center for Food Allergy & Asthma Research (CFAAR) at Northwestern University, Chicago, and Lurie Children's Hospital of Chicago, Illinois, USA. Our mission is simple, but ambitious: use rigorous science to make a meaningful difference in the lives of children and adults living with food allergy and asthma.

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At CFAAR, we study how allergic conditions develop, who is most affected, and which interventions truly help. Our team brings together epidemiology, clinical research, and community partnerships to create solutions that work in the real world, whether that's defining national prevalence, advancing early life prevention strategies, or improving preparedness in schools and communities. Above all, we want every child and adult living with food allergy or asthma to have the knowledge, support, and systems they need to stay safe and thrive.

Q2 What do you see as the most significant changes in how we conceptualise and manage food allergy and asthma today compared with when you began your career?

One of the biggest shifts over the past two decades has been recognising these conditions as widespread public health issues that affect entire communities. Large, population based studies finally gave us the data we lacked, showing not only how common these conditions are, but how unevenly the burden falls across racial, ethnic, and socioeconomic groups. That knowledge changed the conversation. It

pushed schools, workplaces, and healthcare systems to think more proactively about preparedness, equity, access to epinephrine and inhalers, and the day to day quality of life for families.

Another major change is the movement toward prevention and precision care. In food allergy, we've gone from advising parents to avoid allergenic foods in infancy to learning that early and sustained introduction, combined with good skin barrier care in babies with eczema, may actually reduce risk. In asthma, we've strengthened guideline based care and integrated better risk assessment, environmental support, and school based partnerships. Across both conditions, we now have targeted therapies that are changing lives: biologics for moderate to severe asthma, and oral immunotherapy and other approaches that reduce both the likelihood and severity of reactions in food allergy.

We're also getting better at being flexible. Prevention isn't a one size fits all protocol; it's a toolkit we adapt to each infant, family, and community. Asthma management works the same way: some families benefit most from environmental remediation or school support, others from biologics, inhaled therapy adjustments, or a focus on symptom pattern monitoring. The goal isn't to force families into rigid pathways, but to give them choices, clarity, and support, so they feel confident navigating what can be unpredictable conditions.

Overall, the biggest shift is that we're thinking more holistically about risk, resilience, equity, families, and the environments where people live and learn, and that shift is making a real difference.

Q3 Your work has been instrumental in defining the prevalence of paediatric and adult food allergy in the USA. How has having more precise epidemiological data changed the national conversation around food allergy, from clinical care to school policy and public awareness?

Good data have reshaped the national conversation about food allergy. When our team published national, population based estimates showing that about one in 13 American children and one in 10 American adults are affected by food allergy, it gave the field a new, shared baseline for addressing this widespread public health issue.

These numbers drove action. School districts strengthened emergency preparedness and epinephrine access, legislators advanced stock epinephrine and labelling policies, and healthcare systems began treating food allergy as a condition requiring structured pathways, better diagnosis, and attention to disparities. Data show that over 40% of food allergic children have experienced a severe reaction, and a similar share have required emergency care at some point (with about one in 5 in the past year), which underscored the urgency and helped set priorities.

The prevalence work also reframed food allergy as a quality of life and equity issue. Understanding which allergens are most common, how many children have multiple allergies, and the financial and emotional toll on families shifted the conversation from individual burden to community responsibility. In short, precise epidemiology didn't just inform science; it changed systems, policies, and public awareness in ways that tangibly support families.

Q4 A major focus of your research has been understanding racial, ethnic, and socioeconomic disparities in food allergy development and care. What do you see as the most urgent gaps in equity today, and what practical interventions have shown the greatest promise in closing those gaps?

The most urgent gaps in equity come down to diagnosis, access, and safety. Families in under resourced communities are less likely to receive a clinician confirmed food allergy diagnosis and more likely to rely on emergency departments for care. They also face higher costs and reduced access to safe foods, epinephrine, and allergist follow up. Together, these barriers increase the risk of severe reactions while placing disproportionate financial and emotional strain on families who already carry the heaviest burdens.

The most effective solutions are those that meet families where they are. School based preparedness and stock epinephrine programmes consistently save lives by ensuring timely treatment. Community health workers, peer support, and culturally tailored education help families navigate diagnosis, label reading, and prevention strategies with confidence. In primary care, practical tools that help clinicians recognise food allergy, and clear pathways for referral, can significantly reduce under and misdiagnosis. Policy change is also critical: lowering out of pocket costs for epinephrine and medically necessary foods can make an immediate difference for families. In research, embedding equity considerations at the design stage helps ensure that new interventions are both effective and feasible in the communities most affected.

Q5 Recent research, including work on eczema onset and food allergy risk, suggests that early-life factors play a critical role in allergic disease trajectories. How do you think emerging insights into atopic dermatitis, early feeding practices, and skin barrier health will reshape prevention strategies over the next decade?

Infancy is a critical window for shaping the immune system. We now understand that severe eczema in the first year of life often reflects skin barrier disruption, which increases the likelihood of sensitisation through the skin. At the same time, early and consistent oral exposure to a variety of foods helps promote tolerance rather than allergy. Together, these insights point toward a prevention strategy that is both simple and powerful: protect the skin and feed the immune system early.

Over the next decade, I expect prevention to become more integrated and practical. We'll likely see pathways that combine proactive eczema management, timely introduction of allergens, and nutrition that supports a healthy microbiome, all delivered in ways that are easy for families and paediatricians to follow. Large, diverse early life cohorts are already giving us the evidence we need to design tools paediatricians can use during routine 4 and 6 month visits, with tailored guidance for infants at highest risk.

Most importantly, these approaches must be flexible. Prevention should adapt to each family's culture, resources, and comfort level. When we create space for shared decision making and honour the realities of family life, we make it possible for prevention strategies to work not just in theory, but in practice.

Q6 Your recent work estimating the societal economic burden of food allergy highlights the wide-reaching impact beyond the clinic. How should policymakers and healthcare systems respond to these findings, and what systemic changes are most needed to reduce this burden for families?

When families are spending thousands of dollars each year on medical visits, emergency care, epinephrine, and the higher cost of safe foods, it's a sign that our systems are asking too much of individuals and not enough of institutions. Policymakers can make a meaningful difference by reducing the financial burden, from lowering out of pocket costs for epinephrine and evidence based treatments to improving the clarity and consistency of food labelling. Strengthening preparedness in schools and workplaces, and ensuring that federal and state nutrition programmes accommodate allergen free needs, can also prevent families from having to choose between safety and affordability. Importantly, policy should protect choice, making it feasible for families to pursue the management pathway that fits their needs, whether that's strict avoidance, immunotherapy, or a combination of approaches.

On the health care side, we need systems that make accurate diagnosis accessible, including the ability to complete oral food challenges when appropriate, and regular re evaluation so families aren't avoiding foods unnecessarily. Care models that integrate allergy, dermatology, gastroenterology, nutrition, and mental health can make a profound difference. For many families, quality of life, not just anaphylaxis risk, is a real driver of burden, and multidisciplinary support helps address the emotional, social, and nutritional dimensions that traditional models often overlook.

Q7 You've studied clinician adherence to peanut allergy prevention guidelines and developed school-based interventions for asthma management. What are the biggest challenges in translating evidence-based guidelines into real-world practice, particularly in primary care and community settings?

Bringing evidence based guidelines into real world practice remains one of the most persistent challenges in primary care and community health. Many clinicians are aware of the early feeding and asthma management recommendations, but they often lack quick, practical tools to assess risk, counsel families, and arrange follow up within the constraints of a short visit. There's also understandable hesitation, especially with high risk infants, when workflows aren't clear or when support for follow through is limited. Even the strongest guidelines can fall short if they don't account for daily realities, such as food insecurity, limited access to safe infant foods, cultural feeding practices, or caregiver anxiety.

We've seen real progress when implementation is made easy and intuitive. Electronic health record prompts that fit naturally into the visit, short training modules, and parent friendly materials in multiple languages all help clinicians and families act on the evidence with confidence. In schools, the same model that has strengthened asthma care, bringing protocols, supplies, and staff training directly into the environment where children spend most of their day, works equally well for food allergy prevention and emergency response.

Ultimately, translation takes time, because it's not just about sharing new information; it's about building systems that make evidence based care easy to understand and easy to carry out. When research is paired with practical tools, community partnerships, and culturally grounded support, evidence based guidelines become something families and frontline providers can truly use.

Q8 Looking forward, what developments, whether in prevention, precision medicine, policy, or community-based interventions, do you believe will most meaningfully reduce the burden of food allergy and asthma over the next 10–15 years, and where should the next generation of researchers focus their efforts?

I'm excited for the next decade of research, when so many of the puzzle pieces in prevention, precision medicine, and equity will finally come together. With these pieces aligning, we have a real opportunity to not only treat allergic disease more effectively, but to fundamentally change its trajectory.

For infants, I expect integrated pathways that combine proactive eczema care with early, sustained multi allergen feeding, supported by clear tools in primary care and community based resources so every family, not only those with easy access to specialists, can participate.

In diagnosis, smarter use of component testing and thoughtfully chosen oral food challenges will help reduce unnecessary avoidance and improve quality of life. Therapeutically, we'll continue refining immunotherapy and biologics, guided by biomarkers and microbiome insights that make treatments safer, more precise, and more tolerable. At the systems level, evidence based policy (stronger food labelling, improved access to epinephrine and specialty care, and insurance coverage for prevention and diagnostic services) will help reduce the burden families face every day.

For the next generation of researchers, I think some of the most meaningful progress will come from working at the intersections. The breakthroughs ahead lie where skin barrier biology meets infant feeding, where microbiome science connects to daily behaviour, and where precision biomarkers shape school and community health policies. We need scientists and clinicians who can move between population research, clinical care, and implementation.