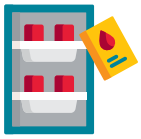
Empowering Solutions for Allergies and Asthma

Fall 2023

Stanford MEDICINE | Sean N. Parker Center for Allergy & Asthma Research

Our Impact by the Numbers

1,700+
clinical visits



71,000
biobank samples

18
clinical trials

60+
faculty and staff

80+
scholarly articles

Our manufacturing facility supplies

14 sites across the nation producing

10,000 doses per month

Thank You to Our Donors, Patients, and Friends

Your support of the Sean N. Parker Center for Allergy and Asthma Research at Stanford University makes a lasting impact on our young patients and their families. Through your generosity, we continue to serve as a preeminent resource for innovative research that is transforming how we understand, treat, and even prevent allergies and asthma.

Your commitment is the driving force behind our accomplishments. Together, we are moving toward our ultimate goal of curing allergies and asthma.

Today, the Center is at a moment of transition—but also a moment of great promise.

This past year, Sharon Chinthrajah, MD, stepped into the role of interim director to build on the extraordinary legacy of Kari Nadeau, MD, PhD, who has accepted a new role as the chair of environmental health at the Harvard T.H. Chan School of Public Health.

With a bold vision to extend the Center's cutting-edge research and protocols beyond the walls of Stanford and our partner institutions, Dr. Chinthrajah and her team aim to deliver breakthrough treatments to diverse patients around the world. This goal would be impossible without your compassionate giving, and we are pleased to share this report on how your philanthropy is making a difference.

Follow the QR code or visit supportLPCH.org/Allergy23 to watch a personal message from Dr. Chinthrajah.

Pioneering Food Allergy Research

Complex food allergies continue to increase around the world. Your support helps our experts fight back.

There has never been a greater need for improvements in diagnostics, preventative strategies, and therapies. In order to make these advances, we need to better understand the underlying immune mechanisms behind food allergies.

By revealing how the immune system works—and how it varies across individuals—we move one step closer to delivering innovative solutions directly to our patients.

Decoding the Immune System's Role

Oral immunotherapy (OIT) has shown promise in helping kids with food allergies by gradually exposing them to small, controlled amounts of their allergen. This approach aims to desensitize their immune system and reduce the body's response to the allergen over time, thereby enabling kids to enjoy a broader range of foods and lessening their risk of accidental exposure.

While OIT can provide extraordinary benefits, it may not be effective for every food allergy. In the POISED clinical trial using OIT to treat peanut allergy, we compared immune cells in patients who did not experience allergic reactions after treatment with patients who did. Using next-generation analyses, we examined immune cells in trial participants and found that the function and interaction of specific cells can influence the success of OIT.

Addressing Multiple Food Allergies

While most people with food allergies react to more than one food, traditional OIT can only safely treat one allergen at a time. To extend treatment options for individuals with complex food allergies, the Center is pioneering research that combines biological therapeutics with OIT to address multiple allergens at once. For instance, the groundbreaking COMBINE clinical trial investigates the use of two biologics, called omalizumab and dupilumab, alongside OIT for treating multiple food allergies.

Biologic medications also have the potential to desensitize the immune system, eliminating the need for ongoing allergen consumption through OIT. To explore this further, the Center's OUtMATCH clinical trial assesses the safety and efficacy of omalizumab used alone or in conjunction with multi-food OIT.

Developing Tonsil Organoids

From enrolling participants to collecting data and publishing results, a promising OIT trial can take years to complete. Researchers may also encounter unexpected delays when patients experience adverse side effects or drop out of trials due to unrelated hardships.

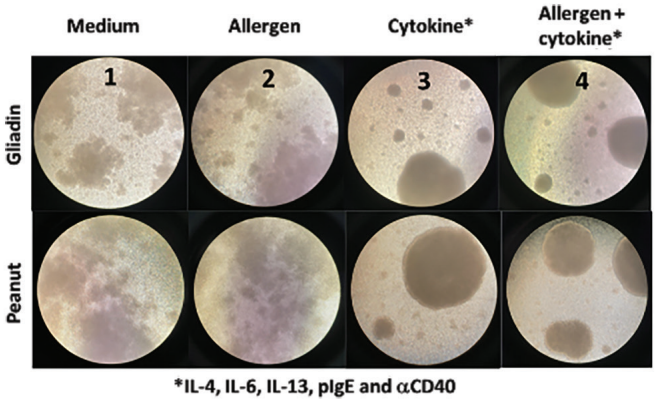
To expedite the development of more effective treatment options, Center researchers Diane Dunham, MS; Jackson Schuetz, BS; Scott D. Boyd, MD, PhD; Sharon Chinthrajah, MD; and Stephen Galli, MD, are collaborating with Sindy Tang, PhD, an associate professor of mechanical engineering at Stanford.

The team is developing a model for testing OIT and other drug interventions using specialized groups of cells called organoids, which are three-dimensional "mini organs" that are grown in the laboratory. Using tonsils removed from food allergy patients, the team can create fully functional tonsil organoids that mimic key aspects of the human immune system.

Utilizing these tonsil organoids, researchers are testing the body's allergic response at the cellular level—without ever exposing a patient to a dangerous allergen.

In this way, they will soon be able to test the efficacy of novel treatments like OIT in a faster and safer way than ever before. To date, the team has isolated more than 915 million peanut-allergic cells, as well as cells from other food allergies, building a strong foundation for future breakthroughs.

This bold approach will help predict allergic responses, provide initial data about promising new therapies, and speed up the clinical trial process—accelerating care and cures for the children and families who need them.



Cultured tonsil cells showing the development of the organoid.

Nic Castano works with Dr. Sindy Tang to refine a novel device and method that will improve the diagnosis of food allergy.

Improving Food Allergy Diagnostics

Despite decades of advances, clinical diagnosis of food allergy remains difficult. The oral food challenge, in which patients gradually ingest increasing amounts of their allergen under supervision, is still the gold standard for diagnosis. Unfortunately, this method can be resource-dependent, time-consuming, and distressing for patients and families.

Nic Castano, MS, a graduate student in Dr. Tang's lab, is developing a new device and method that will enable physicians to evaluate patients for multiple food allergies at one time using a diagnostic tool called the basophil activation test. This test relies on basophils, a type of white blood cell that releases histamine in response to an allergic reaction. Scientists will be able to mix a blood sample with various allergens and measure how the basophils react.

While this type of test has been available for years, it is challenging for many physicians to implement. Blood samples must be analyzed within 24 hours—an impossible barrier for the majority of clinicians who don't have access to a research lab. It is also time-consuming and resource intensive. Additionally, there are very few standardized procedures for the test, making it difficult to get approval from the U.S. Food and Drug Administration.

To overcome these hurdles, the research team has developed a new device that facilitates mixing the blood samples with different allergens, initiating basophil activation, and stabilizing the samples in the clinic. Physicians then have up to a week—or even longer—to ship the stabilized samples to a laboratory for full analysis.

This simplified approach will offer a streamlined method to test for allergies, ensuring patients can get the answers they need without the anxiety and uncertainty of the oral food challenge.

Peter's Journey: Changing Lives Through a Clinical Trial

When Peter was an infant, his parents quickly noticed something different about their son: He would develop severe hives and cry after breastfeeding. Following extensive medical testing, Peter was diagnosed with life-threatening allergies to casein, a protein in milk, and most tree nuts.

"It wasn't easy growing up feeling different because of my food allergies," Peter explains. "Dairy is in everything, so it was hard to enjoy special events like birthday parties because I couldn't eat foods like cake or pizza."

Now 25 years old, Peter spent his entire life avoiding his allergens—until a friend told him about promising clinical trials at Stanford.

"I never thought I would be able to do something about my allergies, let alone help others by participating in a clinical trial," he says.

Intrigued, Peter enrolled in the MAGIC study. Under the direction of Sayantani Sindher, MD, this trial focuses on enhancing the safety and efficacy of OIT in patients with a milk allergy. Peter also volunteered for the String sub-study, dedicated to developing a less intrusive test for eosinophilic esophagitis, an allergic disease that causes vomiting, difficulty swallowing, and abdominal pain. Both the MAGIC and String studies would not be possible without donor support.

Peter's family worked hard to remove dairy and nuts from his diet so that he could avoid his allergens while growing up.

"I was nervous at first because improving my allergen tolerance meant eating dairy, which had always been dangerous for me. But everyone at the Center was so kind and passionate about their research. I knew I was in good hands."

When Peter started the trial, he reacted to trace amounts of dairy. Today he can tolerate nearly half a teaspoon of milk without a reaction. Excited by his progress, he encourages others with food allergies to take the leap and explore clinical trials themselves.

"My dad and sister love to bake, and they'd always use dairy substitutes for me," Peter says. "A few weeks ago, they baked a pie for me with normal butter, and I had no reaction. It was delicious!"

Helping Kids Outside Our Center's Walls

Your commitment helps us deliver impactful solutions where they matter most: to patients around the world.

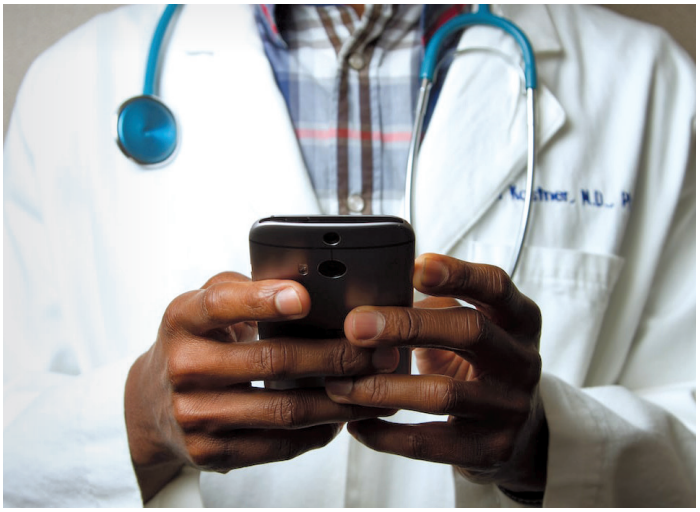
Expanding Our Impact Through Clinical Trials

Atopic dermatitis, also known as eczema, makes skin more susceptible to allergens, such as dust or even peanuts. Upon entering the body through the broken skin barrier, these allergens interact with the immune system, potentially leading to life-threatening allergies.

Led by Dr. Sindher, the SEAL (Stopping Eczema and Allergy) clinical trial focuses on the connection between this challenging skin condition and food allergies. Now recruiting across the United States—and with a site in London launching soon—the trial has registered 159 participants since it began in 2021.

Our goal is to enroll 875 babies under 12 weeks of age and monitor them for three years. Specifically, we aim to evaluate if these children develop food allergies when their eczema is well controlled with daily moisturizer use and aggressive treatment of eczema flares.

With rising rates of food allergies around the globe, this study offers a way to identify emerging allergies early and implement simple, accessible preventive measures. For families worried about their babies developing allergies, this research could be a game changer.



Sharing Our Expertise

The innovative treatments pioneered at Stanford hold extraordinary promise for people with allergies around the world. To help deliver these therapies directly to patients, Dr. Chinthrajah and her team are collaborating with scientists in London to disseminate findings, launch promising research, and offer in-depth training.

At Guy's and St. Thomas' NHS Foundation Trust, our researchers have worked with Helen Brough, MD, PhD, to successfully implement multi-allergen OIT. In particular, we have guided the London team by providing detailed insights into managing patient inquiries, administering multi-allergen OIT, and providing instructions for home dosing.

Dr. Chinthrajah has also presented at key medical gatherings and facilities, including King's College London, Royal College of Physicians, British Society for Allergy & Clinical Immunology, and other large society meetings across the United Kingdom. These presentations increased protocol visibility among allergists and fostered connections with advocacy experts and patient families.

Investing in Digital Tools to Revolutionize Care

While the Center has made remarkable progress in treating allergies and asthma, our team alone cannot reach every family who needs care. That's why we are establishing a new portfolio of digital tools, including:

- **Comprehensive training for providers:** Uptake on innovative treatments for food allergies has been shockingly low across the nation. To overcome this obstacle, we are partnering with Stanford's Center for Advanced Pediatric and Perinatal Education (CAPE) to find new ways to train more providers.
- **Decentralized clinical trials:** Participating in clinical trials can be challenging for many families. Our plan for a digital portfolio includes the ability to conduct research studies that are led remotely. This way, patients can enjoy the comforts of home for the majority of the trial.
- **Digital monitoring:** Families in need of care often face significant barriers to accessing treatment. With technology like digital monitoring, we can directly connect with patients at home, delivering vital care without the financial burdens involved with a clinic visit.

By venturing beyond our Center's walls, we are bridging the gap between medical innovations and the diverse communities we serve. Thanks to donors like you, we are working to make health care more equitable and accessible.

Understanding Climate Change

Climate change has become the defining issue of our time. Today, we stand at a turning point in this growing global crisis.

As severe weather events increase around the world, your support ensures the Center stands as a leading resource for research and advocacy on the impact of climate change on human health.

From investigating how wildfires affect children with asthma, to adding climate change education to Stanford's medical school curriculum, our experts are dedicated to addressing this urgent topic.

Evaluating the Impact of Air Pollution

The increase in climate emergencies—like wildfires and heat waves—is having a profound impact on air pollution across the world. When children breathe polluted air, harmful particles and gases enter their lungs and bloodstream, leading to conditions like asthma and bronchitis, as well as delayed development and increased risk of heart disease.

In particular, our research has demonstrated how high levels of air pollution during pregnancy negatively affect the health of both mothers and babies. Based on our analysis, exposure to fine particulate matter during the prenatal period and first three years of life is associated with decreased lung function during childhood.

Additionally, while 6 million children in the United States have asthma, little is known about the effect of air pollutants on the immune system and their implications for pediatric asthma.

We investigated whether ambient levels of fine particulate matter are associated with changes in the white blood cells that play a crucial role in our immune response. In particular, we found that increased exposure to these pollutants was linked with changes in white blood cell types, especially in children with asthma. This finding suggests that initial exposure to fine particulate matter may trigger a heightened inflammatory response during subsequent exposures.

This discovery has the potential to improve how we predict pediatric asthma. Additionally, the changes in white blood cells present a promising target for treating children who live in heavily polluted areas.

Honoring Dr. Nadeau and Passing the Torch

After nearly 20 years at Stanford, Dr. Nadeau has embarked on a new chapter in her career at Harvard University. She built a strong foundation of research and care at the Center, and we pay tribute to her incredible impact. We are deeply grateful for her steadfast leadership, which elevated our Center to extraordinary heights.

Today, Dr. Chinthrajah is continuing this work, expanding our impact around the globe. Sharing Dr. Nadeau's commitment to our patients, she is focused on delivering compassionate care while pushing the boundaries of science.

Dr. Nadeau will continue to serve as a special adviser at the Center, expanding her legacy and inspiring the next generation of allergy research.

With a new era on the horizon, we are grateful for the enduring partnership of donors like you. Together, we are creating a brighter future for children and families throughout our community and beyond.

Thank You for Your Commitment!

Your generosity has helped make our Center a beacon of innovation and excellence in allergy and asthma.

With your partnership, we will make even greater strides in our mission to revolutionize research and care around the world.

For more information, contact

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