



# SickKids Wants to Cure Allergy

## KEY FACTS:

**An estimated 2.5 million Canadians live with anaphylaxis**

**3,500 Canadians experience anaphylactic shock every year from food allergies alone**

**Of those 3,500, about a dozen will die every year**

**300,000 youth under 18 are affected by food allergies**

**The frequency of food allergies has increased over 350% since 1996**

An estimated 2% of the Canadian population is at risk for anaphylaxis—a potentially fatal allergic reaction. SickKids is working with national and international partners to eliminate this health burden by developing a pill to turn anaphylaxis into a non-fatal reaction.

### The Challenge: The Threat of Anaphylaxis

Constant anxiety and stress over the possibility of a deadly allergic reaction is a reality of everyday life for thousands of Canadian children and their families. There is currently no known cure for allergies, and the only way to avoid a dangerous reaction is to completely avoid its trigger. But childhood can make avoidance of common allergens difficult.

The prevalence of allergy is on the rise, with an approximate 18 per cent increase in severe allergic reactions over the past 15 years. Despite the increasing burden allergy places on families and society, there remain significant gaps in scientific discovery in allergy research. SickKids, in partnership with scientists, educators and clinicians across Canada and the USA, is working to change this.

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# Towards Non-fatal Anaphylaxis

Our emerging understanding of the role of PAF in human anaphylaxis, and the potential for PAF-AH to lead us towards a cure, is based on a large body of evidence. While a number of mediators—histamine, tryptase and carboxypeptidase—have been implicated in milder manifestations of anaphylaxis, recent studies in Dr. Vadas’s laboratory have shown that PAF is a pivotal mediator of life-threatening anaphylaxis. In animal models, intravenous injection of PAF reproduces the severe inflammatory response characteristic of anaphylaxis. Data from human anaphylaxis studies show that levels of PAF increase proportionately with the severity of anaphylaxis and that a deficiency in the enzyme that regulates PAF predisposes a person to severe or fatal anaphylaxis.

# SickKids®

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## Vision: Turn Anaphylaxis into a Non-Fatal Reaction

The Allergy Program at SickKids will drive transformation by researching the factors that influence the development and successful treatment of allergic reactions. Now, more than ever before, researchers are poised on the cusp of major breakthroughs in allergy research.

One example of breakthrough research already underway is Dr. Peter Vadas’s work on the biological mechanisms of anaphylaxis. Through his research, Dr. Vadas—a key partner of the Allergy Program at SickKids and Head of Allergy and Clinical Immunology at St. Michael’s Hospital—is exploring ways of turning anaphylaxis into a non-fatal reaction.

The focus of Dr. Vadas’s current research is a molecule called **platelet activating factor (PAF)**. The molecule is released by a variety of cells as part of the body’s natural immune response. However, a large body of research has shown that when the enzyme that regulates PAF levels in the body is in short supply, PAF has the potential to cause life-threatening anaphylaxis.

In a previous study, Dr. Vadas found that activity of the PAF regulating enzyme—called **platelet activating factor acetylhydrolase (PAF-AH)**—was low in patients who presented to an emergency department with severe anaphylaxis and in patients who had died of peanut anaphylaxis, in comparison to control groups.

By studying PAF and its regulating enzyme, Dr. Vadas will develop a fundamental understanding of the mechanisms and mediators of anaphylaxis, which will provide a therapeutic target that can become the focus of efforts to develop new, life-altering and life-saving treatments for the reaction.

## Outcome: A Pill to Prevent Life-Threatening Anaphylaxis

Funding for Dr. Vadas’s groundbreaking research will help transform the quality of life for children and families affected by allergy around the world. Using new knowledge about the potential of PAF-AH to prevent a fatal anaphylactic reaction, we will develop new treatments and a cure for allergies.

The goal of Dr. Vadas’s research and the work of other SickKids partners, is to develop a well-tolerated treatment of *acute* anaphylactic reactions with fewer side effects than epinephrine. In addition, the team is working towards the development of a treatment for *chronic* severe allergies, like a pill that can be taken daily to prevent potentially fatal anaphylactic reactions for those at risk. By eliminating the potential for anaphylactic reactions to be fatal, children will be able to live longer, healthier lives free of the daily anxiety of encountering their allergy triggers.

## Be Part of the Solution.

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