



 **AllerGen**

*Innovation from cell to society*

2011.2012



NCE RCE

Networks of Centres of Excellence of Canada | Réseaux de centres d'excellence du Canada

AllerGen NCE Inc. is hosted at McMaster University, Hamilton, Ontario, Canada.

AllerGen NCE Inc. is supported by the Government of Canada through the Networks of Centres of Excellence (NCE) program.

Networks of Centres of Excellence is a joint program of the Natural Sciences and Engineering Research Council (NSERC), the Social Sciences and Humanities Research Council (SSHRC), the Canadian Institutes of Health Research (CIHR) and Industry Canada.

Created in 1989, the NCE Program currently supports four national initiatives: Networks of Centres of Excellence (NCE); Centres of Excellence for Commercialization and Research (CECR); Business-Led Networks of Centres of Excellence (BL-NCE); and the Industrial Research and Development Internship Program (IRDI).

**AllerGen NCE Inc.**

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## Corporate Profile

**AllerGen NCE Inc. was established in response to the fact that one in three Canadians** is living with allergic disease. In addition, there is a dearth of research on the causes of and cures for allergy, asthma and related immune diseases. Since its inception in 2004, AllerGen has fostered a national network comprising leading Canadian allergy, asthma and immune diseases experts who are working in trans-disciplinary and multi-sectoral teams with national and international collaborators, as well as stakeholder and research partner organizations. These teams are addressing gaps in knowledge and seizing new opportunities in diagnostics, therapeutics, health care, public health, ethics, policy and patient education. They are also training the next generation of researchers, innovators and clinician-scientists, while collaboratively working to reduce the morbidity, mortality and socio-economic impacts of allergy, asthma and anaphylaxis.

**AllerGen-funded research aims** to accelerate the development of new diagnostic tests, better medications, accessible patient education tools and more effective public policies. AllerGen's investments in education and training are expanding public education, improving allergy, asthma and anaphylaxis management, and increasing the number of medical professionals researching and practicing in these areas.

AllerGen NCE Inc. (AllerGen), the Allergy, Genes and Environment Network, is a national research network funded by Industry Canada through the Networks of Centres of Excellence (NCE) Program. AllerGen supports excellence in research and fosters commercialization, social innovation and knowledge mobilization that will enable Canadians to better prevent, treat and manage allergy, asthma, anaphylaxis and related immune diseases.

Through the creation of a national network of allergy and immune disease experts, AllerGen brings together 190 Network investigators and collaborators and 446 students and young professionals, research associates and technicians, who together represent the equivalent of 232 full-time network research staff. In addition, over the last year, AllerGen worked closely with 180 partners from across sectors, including academe, industry and government, on 24 research projects and eight strategic initiatives.

### **AllerGen's Vision**

To create an enduring network of allergy and immune disease experts whose discovery and development efforts contribute to reductions in the impact of allergic and related immune diseases nationally and globally.

### **AllerGen's Mission**

To catalyze and support discovery, development, networking, capacity building, commercialization and knowledge translation that contribute to reducing the morbidity, mortality and socio-economic burden of allergic and related immune diseases.



## Message from the Board Chair and Scientific Director

**The past year marked a significant milestone in AllerGen's activities as a Network of Centres of Excellence.**

Following 18 months of national stakeholder consultation, development of detailed reports on Network-wide progress and extensive strategic and operational planning, on March 23, 2012, at McMaster University, the Honourable Gary Goodyear officially announced AllerGen's successful renewal to 2019. Minister Goodyear confirmed AllerGen's receipt of \$36.5 million over the next seven years to continue its work. This announcement brings AllerGen's total NCE funding since 2005 to \$73.83 million.



From left: M Wallace, Dr. J Denburg, Hon. G Goodyear, Dr. D Royce, L Drouillard and Dr. P Deane

AllerGen's *2012-2019 Strategic Plan* was developed collaboratively with Network partners across sectors from coast to coast following intensive consultations. Regional meetings included representatives from industry, government, community and patient advocacy groups, clinicians and researchers. At these meetings, AllerGen invited partners to identify research gaps and share strategic priorities for the next seven years, opportunities for collaboration that would address partner needs, and gaps that could not be met by the respective organizations working alone. A large part of AllerGen's success is attributable to its *networked way of working*.

The research, capacity building, commercialization and knowledge mobilization initiatives proposed in AllerGen's *Strategic Plan* to 2019 were complemented by a compendium of 110 individual



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**This year's annual report is a particular tribute to the accomplishments** of AllerGen investigators, trainees, research collaborators and partners. Since 2005, AllerGen investigators have produced 1,391 publications. Of those, 397 were peer reviewed, 168 were non-refereed, 476 were specialized publications and 350 were scientific posters.

letters of support detailing commitments in excess of \$45.3 million in cash and in-kind support. This represents a 1:1.24 leveraging by AllerGen of its NCE funding award.

Over the past year, AllerGen has deepened existing international research relationships and increased the global capacity building opportunities it has developed for Network trainees. AllerGen signed four Memoranda of Understanding related to new capacity building opportunities with The Karolinska Institute in Sweden, The University of Newcastle in Australia, The Allergie-Centrum-Charité at Charité – Universitätsmedizin Berlin (Germany) and the Munich Allergy Research Center (MARC) – Technische Universität München (TUM) and Helmholtz-Zentrum München (Germany). These four collaborations are the basis of developing and launching AllerGen's new *International Trainee Research Visits Program*.

AllerGen trainees are Canada's future leaders in allergy, asthma, and gene-environment research. Since 2005, AllerGen has enhanced the capacity of over 700 individuals through Network participation. Graduates have gone on to work in academe, industry, the not-for-profit sector, and government.

Other AllerGen research highlights over the past year include the CHILD Study team's achievement of its recruitment goal of 3,500 pregnant mothers. This milestone means that there are now more than 10,000 participants involved in the study, including babies-to-be, mothers and fathers. Home visits at three months of age have been completed with more than 2,000 families. In addition, a variety of biological samples have been collected and more than 1,000 babies have participated in the one-year visit when skin allergy tests are performed and a full health review is undertaken.

AllerGen's Allergic Asthma Clinical Investigator Collaborative (CIC) expanded into Sweden last year, completing its first international clinical trial with Genentech at the Karolinska Institute in Stockholm. The CIC is also in the process of expanding its clinical trials into studies focused on Severe Asthma (SA-CIC) and Allergic Rhinitis (AR-CIC).

The Canadian Group on Food Allergy Research (CanGoFAR) has continued to build on two previous AllerGen-funded studies that aim to determine food allergy prevalence amongst Canadians. Surveys were administered to Canadians of varied backgrounds including vulnerable populations, individuals of lower socio-economic status, Aboriginals and new immigrants. Over the past year, this team has been synthesizing the survey results and will soon be ready to provide a first-ever Canadian perspective on food allergy prevalence.

AllerGen's success is a reflection of the commitment of its entire network of researchers, trainees, national and global collaborators, stakeholder and patient organizations, research partners, government, and healthcare providers. We thank them for their continuing support.

This year's annual report is a particular tribute to the accomplishments of AllerGen investigators, trainees, research collaborators and partners. Since 2005, AllerGen investigators have produced 1,391 publications.

We would like to thank AllerGen's Board of Directors, Research Management Committee and our many advisory committee members for their ongoing contributions of time and expertise, especially given the additional demands over the past year necessitated by the requirements of the NCE renewal process.

A Network is but the collective reflection of the many dedicated individuals who contribute to its success. We would also like to recognize the outstanding contributions of several retiring members of AllerGen's Board of Directors: Dr. Zave Chad, MD, Allergist and Clinical Immunologist and Associate Professor, University of Ottawa; Dr. Tom Hudson, MD, President and Scientific Director, Ontario Institute for Cancer Research; and, Dr. Kelly

McNaghy, PhD, Professor, Department of Medical Genetics Hematopoietic Cell Development at the University of British Columbia.

Also retiring from several roles is AllerGen trainee, Jennifer Protudjer, PhD. Dr. Protudjer is the past President (to February 2012) of the AllerGen Students and New Professionals Network (ASNPN), was an *ex-officio* member of the Board of Directors, and a member of AllerGen's Advanced Education and Training Opportunities Advisory Committee (AETOAC). She played a major role in AllerGen's renewal efforts, providing outstanding representation on behalf of AllerGen's trainees and Network graduates during the evaluation process.

We would also like to thank the outgoing ASNPN executive members who served from 2009 to 2012, and who provided invaluable support to AllerGen's successful renewal bid.

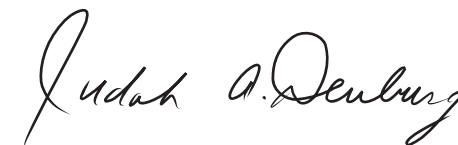
Finally, we would like to thank the NCE directorate and members of the NCE Steering Committee for the opportunity to pursue our vision through to completion in 2019. Looking ahead, we see a future replete with new challenges, new opportunities, new collaborations and new knowledge underpinning the development of innovative tools, technologies, policies and programs that will collectively reduce the burden of disease for

Canadians living with allergies, asthma and anaphylaxis.




**Mr. Graham W.S. Scott,  
C.M., Q.C**

Chair,  
AllerGen Board of Directors,  
AllerGen NCE Inc.




**Dr. Judah Denburg, MD,  
FRCP(C)**

Scientific Director and CEO,  
AllerGen NCE Inc.



2011 . 2012



In August 2011, following a rigorous 18 month planning process, AllerGen submitted a written application consisting of a *Progress Report* documenting the first seven years of the Network's achievements and impacts, a *Strategic Plan* outlining strategic priorities for the next seven years of focus, and *Letters of Support* from 110 partner and stakeholder organizations.



## 2011-2012 Highlights



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AllerGen's Scientific Director, Dr. Judah Denburg, noted that "over the next seven years, AllerGen aims to focus on commercialization and knowledge mobilization activities and will remain dedicated to ongoing investments in training the next generation of allergists and clinical immunologists that will increase access to services for Canadians living with allergies, asthma and anaphylaxis."

### New Strategic Plan Garners NCE Funding Approval, 2012-2019

Fiscal 2011-2012 was the final year of the first cycle of AllerGen's research development, knowledge translation and capacity building programs. Three integrated research programs – Gene-Environment Interactions; Diagnostics and Therapeutics; and Public Health, Ethics, Policy and Society – provided the conceptual framework around which the Network was built.

The 2012 NCE Funding Renewal Competition consisted of two parts: a written application and an in-person full-day presentation to an NCE International Expert Panel. In August 2011, following a rigorous 18 month planning process, AllerGen submitted a written application consisting of a *Progress Report* documenting the first seven

years of the Network's achievements and impacts, a Strategic Plan outlining strategic priorities for the next seven years of focus, and letters of support from 110 partner and stakeholder organizations.

Highlights of this application were presented on September 20, 2011 to an NCE International Expert Panel. This panel documented the strengths and weaknesses of the Network's application in a report to the NCE Standing Selection Committee, which in turn provided recommendations to the NCE Steering Committee for a final decision.

In preparing the NCE application, AllerGen convened numerous meetings with program leaders, researchers, partner organizations, stakeholders, and commercialization experts to identify strategic priorities that would guide Network investments

over the next seven years. This process provided AllerGen with valuable feedback that led to the convergence of Network research expertise into integrated Legacy Projects and Enabling Platforms.

### Legacy Projects 2012-2019:

- **The Canadian Healthy Infant Longitudinal Development (CHILD) Study**, led by Dr. Malcolm Sears, Professor, Department of Medicine, McMaster University;
- **The Clinical Investigator Collaborative (CIC)**, led by Dr. Paul O'Byrne, Professor and Chair, Department of Medicine, McMaster University; and
- **The Canadian Food Allergy Strategic Team (CanFAST)**, led by Dr. Jean Marshall, Professor and Head, Microbiology and Immunology, Dalhousie University and Dr. Ann Clarke, Professor, Department of Medicine, McGill University.

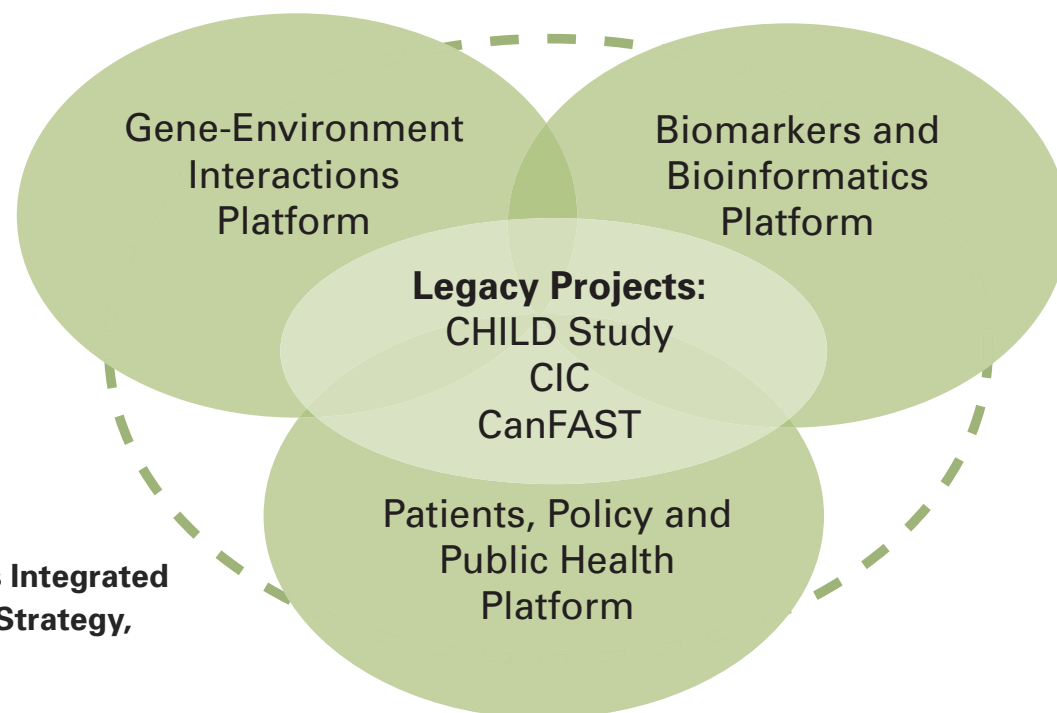
#### Enabling Platforms 2012-2019:

- **Gene-Environment Interactions**, led by Dr. Andrew Sandford, Associate Professor, Department of Medicine, University of British Columbia and Dr. Jeffrey Brook, Senior Scientist, Air Quality Research Branch for Environment Canada;
- **Biomarkers and Bioinformatics**, led by Dr. Dean Befus, Professor, Department of Medicine, University of Alberta and Dr. Kelly McNagny, Professor, Department of Medical Genetics, University of British Columbia; and
- **Patients, Policy and Public Health**, led by Dr. Susan Elliott, Professor and Dean, Faculty of Applied Health Sciences, University of Waterloo and Dr. Ann Clarke, Professor, Department of Medicine, McGill University.

On March 23, 2012, the Honourable Gary Goodyear, Minister of State for Science and Technology, announced that AllerGen would receive \$36.5 million over seven years to continue its work. Minister Goodyear noted that “this investment will support the application and development of world-class excellence in the knowledge and people necessary to provide relief to the millions of Canadians suffering from the complications of allergic diseases.”

The Minister went on to say that “the Government of Canada is committed to improving the lives of all Canadians. While we believe that prevention and health care promotion will help keep health costs down and improve our quality of life, we also understand that investing in science and technology will not only achieve these objectives, but will also contribute to economic growth.”

AllerGen’s Scientific Director, Dr. Judah Denburg, noted that “over the next seven years, AllerGen aims to focus on commercialization and knowledge mobilization activities and will remain dedicated to ongoing investments in training the next generation of allergists and clinical immunologists that will increase access to services for Canadians living with allergies, asthma and anaphylaxis.”



**AllerGen’s Integrated  
Research Strategy,  
2012-2019**



Over the past year, the CHILD Study has demonstrated that it is a catalyst of innovative approaches that will accelerate the identification of biomarkers and new therapeutic targets for predicting and monitoring disease. This unique platform will produce results that inform the development of new ways of diagnosing and treating diseases across a wide range of health issues, and engage multiple generations of Canadian researchers.

#### The CHILD Study Achieves Recruitment Targets

Over the last three decades, reported allergy and asthma in children has more than doubled. The risk of developing asthma is highest in children. One in three children develops breathing difficulties (wheezing) in the first few years of life and 20% of all children are diagnosed with asthma before the age of 12. One in three Canadians will be diagnosed with asthma over their lifetime, sharing the same risk level with diabetes, cancer and heart disease.

The Canadian Healthy Infant Longitudinal Development (CHILD) Study, led by Dr. Malcolm Sears at McMaster University, is the largest multidisciplinary, longitudinal, population-based birth cohort study in Canada and is designed to be one of the most informative studies of its kind in the world.

This cohort recruits pregnant women at centres in Vancouver, Edmonton, Winnipeg and Toronto and follows their children for six years, from pre-birth to five years of age. Infants are being studied at birth, three months, one, three and five years of age.

Study researchers are creating comprehensive biological, psychological, genetic and environmental profiles of the parents and children participating in the study. This will enable researchers to track the development of asthma, allergies and other environmentally triggered diseases across a large group of individuals. The CHILD Study will test multiple hypotheses within the theme that genetic and immunological factors, together with specific environmental exposures, lead to the development of allergic responses.

The multi-sectoral and trans-disciplinary nature of AllerGen's research teams, supported by AllerGen and CIHR, has enabled Network investigators to

#### CHILD Study Recruitment Profile



leverage the CHILD Study infrastructure and obtain more than \$2.36 million in partner funding from Health Canada for three separate projects. These projects will help determine the impact of indoor and outdoor chemicals, toxicants and air pollution particles on the development of chronic disease, especially allergies and asthma, in Canadian infants and will contribute to federal government risk assessments and policy development. Urbanization correlates with increased asthma rates, yet we remain uncertain of the impact of many of the common environmental substances to which we are exposed. We need to know whether or not air quality in our communities, types of housing and building construction, where we live, and what we eat directly influence the development of asthma and allergies. The CHILD Study is meeting these challenges. It is suspected that the environment plays an important role in the development of childhood asthma, and cohort studies are a powerful observational tool for studying exposure-response relationships.

By early 2012, 3,600 pregnant mothers were recruited, representing more than 10,000 participants (babies-to-be, mothers and fathers) in the CHILD Study birth cohort. Data collection and analyses are ongoing. Home visits at three months of age have been completed with more than 2,000 families. These visits involve an extensive

questionnaire and the collection of babies' urine, stool samples and nasal swabs, dust from the babies' bedrooms and beds, and breast milk samples. Over 1,000 study subjects have reached the one-year visit milestone, when skin allergy tests are performed and a full health review is undertaken.

Over the past year, the CHILD Study has demonstrated that it is a catalyst of innovative approaches that will accelerate the identification of biomarkers and new therapeutic targets for predicting and monitoring disease. This unique platform will produce results that inform the development of new ways of diagnosing and treating diseases across a wide range of health issues, and engage multiple generations of Canadian researchers.

#### **AllerGen Trainees Advance Canadian Research**

A cornerstone of AllerGen's mandate since its inception has been building future capacity among academics and clinicians to pursue allergic disease and asthma research. Over the years, AllerGen has also steadily increased its investment in trainee mentoring opportunities. AllerGen trainees are exposed to multi-disciplinary team environments providing uniquely valuable experiences. They graduate more mature, better connected and more confident of their abilities to address complex challenges using team-based, trans-disciplinary approaches.



**Dr. Michelle North, Queen's University**

**Dr. Michelle North** has been involved in AllerGen since its inception, taking full advantage of the capacity building opportunities available to Network trainees, which included attendance at all seven of AllerGen's annual conferences and six AllerGen *Annual Trainee Symposia*. Michelle's PhD supervisors, AllerGen Investigators Drs. Jeremy Scott and Frances Silverman, encouraged her involvement in Network activities from the outset of her graduate training. These events played an important role in Michelle's career development and represented unique value-added opportunities that significantly augmented her graduate training experience.

AllerGen networking activities led Dr. North to her postdoctoral supervisor, AllerGen Investigator Dr. Anne Ellis, and she is currently working in Dr. Ellis' laboratory at Queen's University. In January 2012, Michelle visited the lab of Dr. Michael Kobor at the Centre for Molecular Medicine and



Therapeutics at the University of British Columbia on a *Laboratory Exchange* funded by AllerGen. That exchange offered Dr. North a unique opportunity to learn new techniques and work with technologies that are not currently available at Queen's University and indeed are only available at select centres in Canada. She was also involved with committee work and gained valuable leadership skills as the President of the AllerGen Students and New Professionals Network (ASNPN) from 2008 to 2009. In 2011, she was the recipient of an AllerGen *Canadian Allergy and Immune Diseases Advanced Training Initiative (CAIDATI) Fellowship*.

**Dr. David Préfontaine** joined AllerGen as a trainee at the beginning of his doctoral degree in Pathology at the Meakins-Christie Laboratories, McGill University, where he worked under the supervision of AllerGen Investigators Drs. Qutayba Hamid and Bruce Mazer. Employed as a Clinical Research Associate at Mount Sinai Hospital Center in Montreal since completion of his PhD, David's involvement in AllerGen provided him with invaluable opportunities to develop a professional network in the allergy research community and to nurture strong relationships with established researchers across the country. The Network greatly contributed to David's academic accomplishments as a doctoral candidate.

David was also actively involved in the ASNPN, first as the Regional Representative for the Quebec/Atlantic Region and then as Vice-President. By virtue of his VP position, David sat on AllerGen's Research Management Committee, which provided him with insights into the decision-making and management of Network activities, and allowed him to gain experience in administration, management and governance in a networked context.

**Dr. Jeremy Hirota** is a postdoctoral fellow at the University of British Columbia's James Hogg iCAPTURE Centre, working under the supervision of AllerGen Investigator Dr. Darryl Knight. Jeremy is studying the role of airway epithelium in asthma pathogenesis.

In 2010, Jeremy was awarded an AllerGen CAIDATI Fellowship, and in 2011 he received a joint *AllerGen-Michael Smith Foundation for Health Research (MSFHR) Postdoctoral Fellow Research Trainee Award*.

Jeremy's involvement in AllerGen has resulted in numerous opportunities to engage and interact with Canadian and international investigators, including Dr. Paul Foster at the University of Newcastle in Australia, and Dr. Sven-Erik Dahlén at the Karolinska Institute in Sweden. AllerGen has also provided Jeremy with mentorship opportunities



that extended well beyond those typically available to Canadian graduate students.

Since joining the Network, Jeremy has taken full advantage of the capacity building opportunities offered to AllerGen trainees, including participation in annual research conferences and trainee symposia. He has also taken an active leadership role in the Network, sharing his expertise with other trainees on knowledge translation and career development in workshop presentations at various events. In early 2012, Jeremy became the ASNPN's Pacific Regional Representative.

2011 . 2012

**In 2011-2012, Allergan leveraged an additional \$7.48 million in cash and in-kind support from partner and stakeholder organizations — a leveraging ratio of 1:1.43.**



## AllerGen's Integrated Research Program



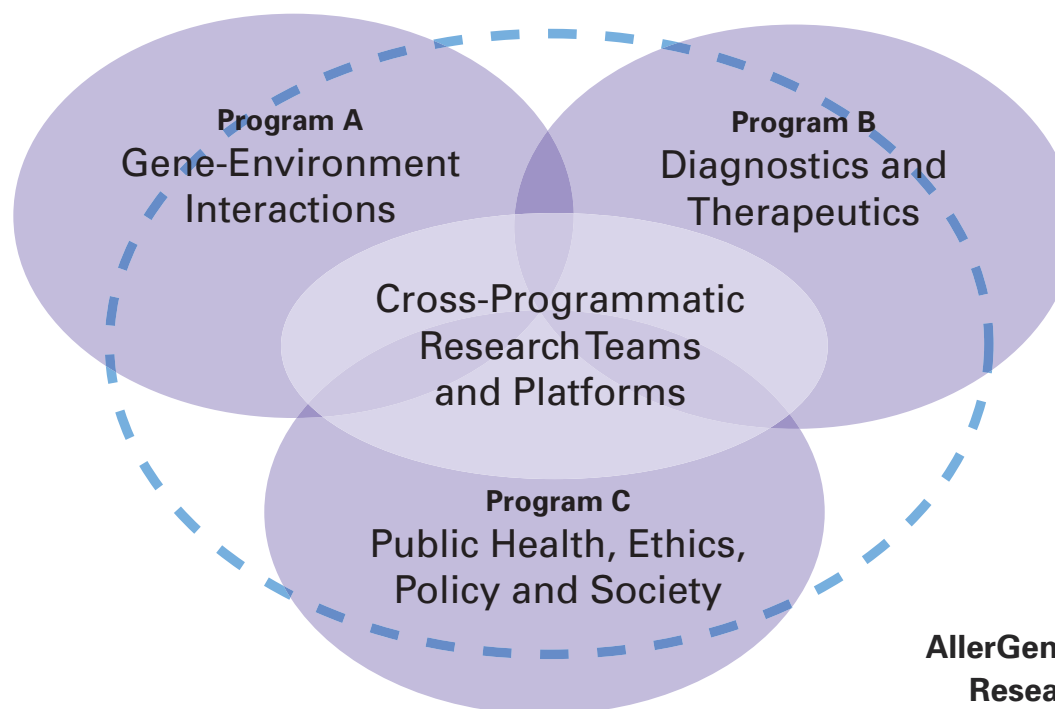
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In line with AllerGen's strategic priorities, and building on established partnerships, AllerGen has supported a broad spectrum of research aimed at accelerating innovation to improve the quality of life of those affected by allergy, asthma, anaphylaxis and other related immune diseases. In each case, AllerGen's integrated research program is led by internationally recognized Canadian researchers with expertise across a wide range of disciplines.

During fiscal 2011-2012, AllerGen invested more than \$6.33 million in allergy, asthma and anaphylaxis research across three priority areas:

- Gene-Environment Interactions;
- Diagnostics and Therapeutics; and
- Public Health, Ethics, Policy and Society.

In 2011-2012, through strong, continuing partnerships, AllerGen has leveraged its research investments, generating an additional \$7.48 million in cash and in-kind support from partner and stakeholder organizations — a leveraging ratio of 1:1.43.



**AllerGen's Integrated Research Program**





Jeffrey Brook, PhD



Andrew Sandford, PhD



Dean Befus, PhD



Paul O'Byrne, MD



Ann Clarke, MD



Susan Elliott, PhD

**Program A:**  
**Gene-Environment Interactions**

**Research Leaders:**

Jeffrey Brook, PhD, Environment Canada,  
University of Toronto

Andrew Sandford, PhD,  
University of British Columbia

**Strategic Focus:**

*Genetics, environmental exposures and gene environment interactions in allergy and asthma*

AllerGen's Gene-Environment Interactions research program aims to capitalize on the wealth of data concerning early life phenotypes by pooling data across existing cohorts and focusing on genetic polymorphisms in genes related to early life allergic processes. In addition, AllerGen's Gene-Environment Interactions research team works to determine the 'prime-candidate' environmental events and exposures during infancy and early childhood involved in the development and perpetuation of a predisposition to allergic disease. It also investigates the interaction of airborne pollutants and allergens, the role of infection in allergy and asthma, and the prevalence and expression of allergy and asthma in specific Canadian populations.

**Program B:**  
**Diagnostics and Therapeutics**

**Research Leaders:**

Dean Befus, PhD, University of Alberta

Paul O'Byrne, MB, FRCP(I), FRCP(C), FRCP(E),  
FRCP(Glasg), McMaster University

**Strategic Focus:**

*Biomarkers, immune monitoring and drug development and discovery*

AllerGen's Diagnostics and Therapeutics research program aims to identify indicators of asthma and allergic disease, develop effective monitoring methods, and test and develop new therapeutics to treat allergy, asthma and other immune-related diseases. AllerGen's Diagnostics and Therapeutics research team also looks to move biomarkers and immune monitoring science out of the laboratory and apply it to the development of new therapies and drug targets in clinical settings.

**Program C:**  
**Public Health, Ethics, Policy and Society**

**Research Leaders:**

Ann Clarke, MD, MSc, FRCP(C),  
McGill University

Susan Elliott, PhD, University of Waterloo

**Strategic Focus:**

*Allergic disease management, education, policy and patients*

AllerGen's Public Health, Ethics, Policy and Society research program assesses current legal frameworks, policies and education systems, as well as prevalence and perception issues. It fills knowledge gaps and enables evidence-based policy and practice to improve disease management and public health. This research team also aims to further the investigation of psychosocial impacts and the health economics of allergic diseases, including food allergy, allergic rhinitis, asthma and anaphylaxis to inform policy and clinical practice.





Malcolm Sears, MB



PJ Subbarao, MD



Jean Marshall, PhD



Diane Lougheed, MD

In addition to supporting the three primary research thrusts outlined above, AllerGen supports the development of four additional cross-programmatic, multidisciplinary research teams.

#### Cross-Programmatic Research Teams and Platforms

##### The Canadian Healthy Infant Longitudinal Development (CHILD) Study

###### Research Leaders:

Malcolm Sears, MB, ChB, FRACP, FAAAAI,  
McMaster University

PJ Subbarao, MD, MSc, FRCP(C),  
University of Toronto

##### Food Allergy and Anaphylaxis

###### Research Leader:

Jean Marshall, PhD, Dalhousie University

##### Mind-Body Interactions and Allergic Disease

###### Research Leader:

Dean Befus, PhD, University of Alberta

##### Occupational and Work-related Allergy and Asthma

###### Research Leader:

Diane Lougheed, MD, MSc, FRCP(C),  
Queen's University

#### Facts and Statistics

##### Research Program Projects: 27

Gene-Environment Interactions	10
Diagnostics and Therapeutics	11
Public Health, Ethics, Policy and Society	6

##### Strategic Initiatives: 8

Knowledge Mobilization	4
Research	4

##### Total Network Publications: 1,391

Publications	1,041
Scientific Posters	350

##### Principal Investigators, Co-Investigators and Collaborators: 190

##### Highly Qualified Personnel (HQP) in Network: 446

HQP working on Network research	323
Other participating students & new professionals	123

##### Full-time Equivalent Network Research Staff: 232

##### Network Research Partners and Stakeholders across Sectors: 180

##### Canadian Academic Research Institutions: 21

##### International Academic Research Partners: 13

##### International Hospitals/Health Centres/ Research Institute Partners: 5

##### Canadian Hospitals/Health Centres/ Research Institutes and Networks: 29

##### Global Reach:

Canadian provinces	7
International collaborating countries	10



2011 . 2012

The growing epidemic of allergies and allergic asthma has several potential explanations. One is that improved sanitation methods and widespread use of antibiotics have reduced childhood exposures to the various gut bacteria and flora proven to be critical to immune system development.



## Research Highlights

### Gene-Environment Interactions

This research team examines relationships between genes and the environment and how they affect allergies and asthma. Examples of work in progress include:

#### **Traffic-related Air Pollution exposure during early life linked to the development of asthma in children**

AllerGen's Traffic-Related Air Pollution (TRAP) project evaluates the generally accepted hypothesis that early life exposure to traffic-related air pollution will contribute to the development of asthma in children, as they are particularly sensitive to toxic inhalants.

Drs Chris Carlsten and Michael Brauer from the University of British Columbia have been working within AllerGen's Gene-Environment Interactions team to recruit infants who are at high-risk for asthma. This cohort — which features children with a first-degree relative having asthma — helped eliminate misclassifications regarding the presence or absence of asthma from the outset of the study. The study began with a regression tool estimation of exposures to nitric oxide, nitrogen oxide, black carbon and fine particulate matter and concluded when a pediatric allergist conducted a

methacholine challenge test to measure bronchial sensitivity and assess asthma at the age of seven.

The team found that among this high-risk group of infants, those living in a high-traffic air pollution area had higher prevalence of new-onset asthma at age seven if exposed to elevated PM 2.5, even at relatively low levels. Even modest exposure to some traffic-related air pollutants during the first year of life can lead to asthma.

These research findings have important implications for public health nationally and internationally, particularly regarding the protection of sensitive populations from ambient traffic-related air pollutants. These findings can also help policy makers develop enforcement strategies within industrial and high-traffic areas to help minimize the negative impacts of traffic-related pollution on health.

#### **Mother's stress pre- and post-birth connected to kids developing asthma and becoming overweight**

Over the past several years, Dr. Anita Kozyrskyj and her team at the University of Alberta have been looking at the connection between maternal stress before and after birth, and the development of childhood asthma and allergies. The original study

was a longitudinal follow-up of a diverse group of children both with and without asthma from the 1995 SAGE (Study of Asthma Genes and the Environment) birth cohort in Manitoba. Results from this team's AllerGen-funded research showed clear links between maternal stress or depression — particularly persistent depression — and the development of childhood asthma. The team also produced an interesting finding regarding childhood obesity.

While it is clear that the over-consumption of sugary foods and low levels of physical activity contribute to childhood obesity worldwide, current studies have uncovered many gaps in our understanding of the underlying causes. Based on evidence that many overweight adults also present with comorbidities and depression, scientists began looking at other factors that may contribute to children gaining weight.

AllerGen's team set out to determine the association between the risk of being overweight at age nine to the risk at age eleven, and correlated those risks to exposure to stress during fetal development, the post-partum period and at school age. The stressors in chronological order from before birth were: smoking during pregnancy, distress in the



mother during the period following birth, and abnormal stress responses in children at school age based on cortisol and cortisol-DHEA (dehydro-epiandrosterone) levels as markers of stress.

Study results indicated that the risk of being overweight later in life was higher amongst those whose mothers had experienced distress during the period immediately after birth. Results also showed higher risk of developing asthma, indicating possible multiple disease development in these individuals. However, these associations varied by gender and presence or absence of asthma.

In animal studies, it has been shown that babies who receive low levels of maternal grooming can produce offspring with higher abdominal fat levels, elevated blood glucose and reduced sensitivity to glucose. In humans, children who are less “cared” for and overfed as a response to infant cues such as crying, which is common in mothers with post-partum depression, are at greater risk of rapid weight gain.

These findings contribute to the growing body of evidence that maternal and family stress during and after pregnancy can have significant impacts on the later-life development of chronic diseases

such as asthma and allergies, as well as weight gain, even in otherwise healthy children.

### **An improved research-oriented storage tool for genetic data**

Scientists around the world are pooling data to increase sample sizes so they are better able to identify genetic associations that advance human health. These global collaborations have resulted in the creation of large databases that require sophisticated tools for data storage, access control, retrieval, manipulation and security.

The team at the James Hogg iCAPTURE Centre, University of British Columbia, led by Dr. Denise Daley, has developed the Biology-related Information Storage Kit (BRISK) to facilitate collaboration and simplify data sharing for Allergen investigators. Its unique strength is that it was designed specifically for clinical investigators, as well as both wet (biology and microbiology) and dry (statistical and administrative) laboratory users.

BRISK is an open-source package of several web-based data management tools that provides the kind of cohesive data integration and management platform demanded by collaborative data sharing. It can handle large databases including data generated in longitudinal and cohort studies.

BRISK has even been used by investigators to retrieve information from high-throughput Genome-wide Association Studies (GWAS) with hundreds of thousands of markers.

BRISK tools help researchers organize, mine and analyze study data through an accessible central hub that enables efficient data sharing and knowledge mobilization. As a result, national and global collaborations have flourished and achieved faster and better research results at reduced cost.

### **Diagnostics and Therapeutics**

Allergen's investment in diagnostic and therapeutic research focuses on identifying indicators for allergies and asthma and the discovery and development of new diagnostic tools and treatments.

### **Lung function in chronic lung disease and the role of female hormones**

Asthma rates before puberty are higher in boys than in girls, but following puberty, more than 60% of adult patients with asthma are women. When asthmatics reach adulthood, the prevalence of asthma is nearly 50% higher in women than in men. At the same time, the severity of asthma symptoms changes during the menstrual cycle and significantly decreases after menopause, suggesting that female hormones may be



influencing lung function, asthma development and severity.

AllerGen Investigator Dr. Delbert Dorscheid and his team at the University of British Columbia reviewed data on the effects of female hormones on inflammatory airway diseases such as asthma. The team noted that female mice exposed to an allergen have an increased allergic response compared to male mice. Observations in humans indicated that the highest rates of emergency department visits for asthma occur during the pre-ovulatory phase of a woman's menstrual cycle. While the cause is unknown, the female hormone and its higher concentration during the menstrual cycle play a role in disease development, recurrence and its severity.

Dr. Dorscheid's team concluded that female sex hormones contribute to inflammatory airway conditions and that further research is required to understand how and why. With the worldwide rise in asthma rates, especially amongst women, this research will enhance our understanding of the role that hormones play in asthma and other lung diseases. This will, in turn, help inform clinical practice in relation to disease symptom management, hormone therapy practices and menopause management.

### **Antibiotic use in early-life and its effect on gut microbiota linked to allergic asthma**

The growing epidemic of allergies and allergic asthma has several potential explanations. One is that improved sanitation methods and widespread use of antibiotics have reduced childhood exposures to the various gut bacteria and flora proven to be critical to immune system development. Interfering with this development by introducing antibiotics to the gut can be linked to atopic disorders such as allergic asthma, likely due to the disruption of healthy gut flora communities and the corresponding reduction in the diversity of "friendly" bacteria.

An AllerGen team from the University of British Columbia, led by Dr. Kelly McNagny, explored the relationship of antibiotics to the development of allergic asthma by using animal models. They treated neonatal mice with clinical doses of two widely used antibiotics and evaluated results in gut flora and the likelihood of allergic asthma development.

The team found that both newborns and adults treated with antibiotics displayed significant changes in the composition of gut microbiota; however, these changes were not identical. They related the risk of developing allergic asthma to

the use of antibiotics early in life, but found that adult treatment had no such relationship and only affected the make-up of gut microbiota.

### **Overview of current asthma biomarkers in asthma diagnosis and management**

Biomarkers are unique disease indicators that — like fingerprints — offer a non-invasive method of identification, in this case of diseases such as allergies and asthma. This type of precision diagnosis can help create personalized treatment plans to slow disease progression, reduce symptoms, maximize treatment effectiveness and increase patient quality of life.

AllerGen investigator Dr. Delbert Dorscheid and his team from the University of British Columbia looked at current and emerging biomarkers of airway inflammation, which can help to identify, monitor and guide treatment for asthmatics. To date, the best treatment for asthma is corticosteroids, which are not only expensive but also variably effective by asthmatic individual, so the ability to use biomarkers in blood, urine, exhaled gases, sputum, serum or exhaled breath condensate to diagnose or treat asthma has great advantages over traditional techniques, which normally require direct access to diseased tissue.



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Traditional techniques also appear to have important limitations. Spirometry, for example, identifies a broad spectrum of asthmatics but cannot differentiate between the various sub-groups. Tissue biopsies and inflammatory cell counting from induced sputum are good determinants of airway inflammation but are invasive, expensive and difficult to standardize and administer.

This is where biomarkers hold promise. Most biomarkers studied to date reveal airway inflammation, but to obtain a clear diagnosis, many other factors need to be assessed and incorporated.

The study concluded that biomarkers will not fully replace traditional diagnostic tools. Rather, they will complement better diagnosis and management

of the progression of disease and deliver more personalized and more effective courses of treatment. This has obvious potential benefits to patients, but also implications for the healthcare system, its practice and costs.

#### **Public Health, Ethics, Policy and Society**

AllerGen invests in research designed to produce innovation in public health, education, ethics, policy, patient care and society. Projects have focused on food allergy, the way allergic diseases are presented in the media, mobilization of research results, the economic burden of asthma and allergic diseases, and the development of online education tools for children and adults.

#### **The effect of anaphylaxis legislation on school environments**

An AllerGen-funded study examined school environments in Ontario as well as unlegislated provinces (British Columbia, Alberta, Quebec, Newfoundland and Labrador) to determine the range of approaches to anaphylaxis prevention and its management. Dr. Lisa Cicutto from the University of Toronto and her team assessed school board policies and compared them against Canadian anaphylaxis guidelines. They also surveyed school personnel and parents of at-risk



**In 2006, the world's first anaphylaxis legislation for schools**, known as Sabrina's Law, was designed to protect Ontario students with life-threatening allergies. Ontario schools now have a legal obligation to protect the welfare of students at risk of anaphylaxis while they are at school. Schools are required to ensure allergen avoidance and the appropriate management of allergic reactions. School staff often lack the knowledge and skills necessary to recognize and treat anaphylactic reactions. In most Canadian provinces, each school board develops its own policies based not on legislation, but on national anaphylaxis guidelines.

children to capture their perspectives on school policies. Lastly, the team assessed the EpiPen techniques of school staff and their readiness for emergency epinephrine administration.

Results revealed that school board policies in legislated settings were significantly more consistent with the Canadian Guidelines for *Preventing and Managing Anaphylaxis* than those in non-legislated provinces, suggesting that legislation like Sabrina's Law helps align school policies with best practices. However, the team observed that whether or not there is legislation, policies were lacking in two important areas. First, in the absence of preautho-

rized parental consent, there was no provision for an employee to administer medication to a student even if the employee believed that the student was experiencing an anaphylactic reaction. Second, there was no statement to protect school staff from liability when taking proactive measures, acting in good faith, to prevent an anaphylactic reaction. Finally, the team's research revealed that less than 35% of all school personnel studied had perfect EpiPen5 administration technique.

This study has important implications for policy development, implementation and adherence. The gaps identified revealed that school personnel

and parents are likely unaware of or not knowledgeable about their own school boards' written anaphylaxis policies. This discovery can guide school board officials in preparing training, communication and policy. Government policy makers now know that better adherence to policies is required and that there is a need for measures to enforce these policies. It is clear that even though legislation exists, laws without proper resources for implementation are not achieving their goals.



### **Demographic predictors of common food allergies**

An AllerGen-funded study, which surveyed more than 9,500 individuals across Canada, has provided the first-ever food allergy prevalence rates amongst Canadian children and adults and was the first study in North America to correlate allergy prevalence with demographic factors including education, immigration status and geography. This is particularly important because it has become evident that environmental and demographic factors — not just genetics — play a role in allergy development. Preliminary findings indicate that about 7% of Canadians self-report at least one food allergy.

The study, led by AllerGen Program Leader Dr. Ann Clarke, Professor at McGill University, was consistent

with other research in showing that peanut, tree nut and sesame allergy were more common in children, while fish and shellfish allergy were more common in adults. The demographic data suggest that higher education levels may be linked with increased risk of food allergy; however, the mechanisms underlying these relationships are not yet well understood. Additionally, all food allergies were less common amongst immigrants, suggesting that those born outside of Canada are less likely to have food allergies.

Several hypotheses attempt to explain these findings. The hygiene hypothesis is generally associated with higher education levels and changes in family lifestyle. Smaller family size, decreased exposure to pets and livestock, fewer

infections during infancy, increased use of antibiotics and vaccinations, and improved sanitation may all help explain why higher education levels are linked to increased risk in developing food allergy. It is also possible that parents with higher education levels are more likely to seek a medical diagnosis after suspecting a food allergy in their child, thus resulting in a higher number of diagnosed cases.

The reduced risk of food allergy amongst immigrants may be attributed to both genetic differences and environmental influences. The correlation may be explained by Western dietary habits and lifestyles including omega-3 deficiency due to lower fish consumption, decreased fresh fruit and vegetable intake, inadequate vitamin D levels, different food processing methods, delayed introduction of certain foods (such as peanuts), and improved sanitation.

This research suggests that demographic factors such as education level, birthplace and location may influence the development of a variety of food allergies. This information is relevant for health and educational resource planning for Canadians, particularly those concentrated in areas of higher risk. Understanding demographic predictors will assist policy makers in developing better prevention guidelines and help patient



advocacy groups tailor audience-specific educational materials for people at risk.

### **Food allergic Canadians' use of epinephrine auto-injectors**

In Canada, the first line response to an anaphylactic reaction, the deadliest form of food allergies, is the use of an Epinephrine Auto-Injector (EAI). A recent paper by an AllerGen trainee and current President of the AllerGen Students and New Professionals Association, Lianne Soller at McGill University, examined trends associated with EAI use by Canadians and related clinician prescribing rates.

Using data from an AllerGen-funded nationwide survey, individual possession of EAI was compared to household education level, household income, marital status, urban location and birthplace of the respondents.

Given that an EAI is the only medication to act against an anaphylactic reaction outside of a hospital setting, this study made an alarming discovery. Only 55% of Canadians who have a physician-diagnosed food allergy possess an EAI. The study also revealed that individuals residing in a "married" household are more likely to possess an EAI. Females, children, individuals living with two or more food allergies, and those who have

been previously treated with epinephrine for an anaphylactic reaction are also more likely to possess and carry an EAI. Single adult males were the least likely to possess and carry an EAI.

While only half of the at-risk group report having the device, a mere half again report that they carry it at all times. This suggests that only about 25% of all individuals who should carry an EAI actually do so. This is significant on many levels, especially since the most at-risk group with the most severe reactions is children.

This information is vital for patient advocacy groups developing educational programs for those living with anaphylaxis, as well as for policy makers developing guidelines and legislation. Healthcare providers would also benefit from more effective education on anaphylaxis management, including proper medication administration techniques and adherence to clinical advice.

## **Strategic Initiatives**

Each year, AllerGen supports time-sensitive, strategic initiatives that enable Network investigators to respond rapidly to new opportunities related to existing projects. In 2011-12, AllerGen invested \$394,591 in eight new Strategic Initiatives across two priority areas:

### **Strategic Initiatives – Research**

**Collaboration between the CHILD Study and SouTh Asian biRth cohOrT (START) Study - \$50,000**

PJ Subbarao, Clinician-Scientist and Pediatric Respiriologist, The Hospital for Sick Children

**Development of sensor arrays for the assessment of exposure to air pollutants - \$20,000**

Greg Evans, Professor, University of Toronto

**Method for measuring phthalate concentrations representative of exposure - \$32,900**

Miriam Diamond, Professor, University of Toronto

**Molecular interactions and ontologies for allergy and asthma - \$27,372**

Fiona Brinkman, Professor, Simon Fraser University

### **Strategic initiatives – Knowledge Translation**

**Enhancing Roaring Adventures of Puff (RAP) for First Nations Communities - \$50,000**

Dean Befus, Professor, University of Alberta

**Respiratory health awareness community outreach and engagement of First Nations community in Alberta: Pilot Intervention - \$45,000**

Miriam Stewart, Professor, University of Alberta

**Sustainable Online Support for Children - \$49,679**

Miriam Stewart, Professor, University of Alberta

**Using and abusing evidence in science and health policy - \$40,000**

Timothy Caulfield, Professor, University of Alberta

2011 . 2012

For the first time, the AllerGen conference was an *Accredited Group Learning Activity* as defined by the Maintenance of Certification Program of the Royal College of Physicians and Surgeons of Canada, and approved by the Canadian Society of Allergy and Clinical Immunology (CSACI). Continuing Medical Education (CME) accreditation made this event even more attractive to family doctors and clinician-scientists.



## *Innovation from cell to society*<sup>7</sup> – Allergan's Annual Research Conference



**Toronto, Ontario** was the host city for Allergan's Seventh Annual Research Conference, *Innovation from cell to society*<sup>7</sup>, which took place February 5-7, 2012.

Allergan's Annual Research Conference is an important means of disseminating and mobilizing Network research. It also provides an exclusive opportunity for Allergan investigators, collaborators, trainees and new professionals to network and share research outcomes with partners and stakeholders, including policy-makers, patient advocacy groups, healthcare providers and representatives from industry, government and the clinical, academic and not-for-profit sectors. In addition to presentations by Network Investigators, Allergan's conference features global experts invited to share their insights and perspectives on new research, commercialization and the knowledge mobilization strategies that inform Network priorities.

Allergan Investigator Dr. Sharon Dell, Associate Professor in the Department of Pediatrics & Institute of Health Policy, Management and Evaluation, University of Toronto and Senior Associate Scientist, Division of Respiratory Medicine at the Hospital for Sick Children, chaired the 2012 Conference Program Planning Committee. Dr. Teresa To, Professor at the Dalla Lana School of Public Health, University of Toronto and Senior Scientist, Child Health Evaluative Sciences at the Hospital for Sick Children, chaired the HQP Sub-Committee.

The theme of *Innovation from cell to society*<sup>7</sup> was birth cohort research, with special focus on Allergan's CHILD Study. The opening keynote session featured Dr. John Henderson from the University of Bristol, who shared his experience



**Jean-Claude Gavrel, Executive Vice-President, Network Centres of Excellence and Graham Scott, Chair, Allergan Board of Directors**





**Dr. Marc Ouellette, Scientific Director, CIHR Institute of Infection and Immunity**

as co-Director of the Avon Longitudinal Study of Parents and Children (ALSPAC), including key findings and lessons learned from a networked, birth cohort approach to research on childhood asthma and allergies in the United Kingdom.

Dr. Malcolm Sears offered a Canadian perspective on birth cohort research in a keynote address titled, *The CHILD Study: Directions, Drivers and Destination*. Additional CHILD Study investigators reported on CHILD Study findings related to the role of viral infections, lung function, and the outcomes of dietary assessments on the

development of allergy and asthma in early life. In addition, CHILD Study results arising from research partnerships with Health Canada and Environment Canada were presented in a panel involving partner representatives. Ethical issues affecting cohort research were discussed by Prof. Tim Caulfield, Faculty of Law and School of Public Health, University of Alberta. The Microbiome research team, led by Dr. Anita Kozyrskyj, Associate Professor, Faculty of Medicine and Dentistry at the University of Alberta, shared preliminary results arising from her team's study of the impacts of infant diet and the environment on infant intestinal microbiota. AllerGen's Clinical Investigator Collaborative presented an overview of their clinical trials in asthma leading to drug discovery.

An asthma education session, focused on engaging Aboriginal families affected by allergies and asthma, was moderated by Cheryl Connors, Executive Director of the Canadian Network for Respiratory Care (CNRC). The session shared best practices in knowledge translation and mobilization, and offered lessons learned from the successful school-based *Roaring Adventures of Puff* (RAP) asthma education program.

A panel discussion on *Research Benefiting Patients: future research priorities and opportunities*

discussed parental preferences for asthma control in children and social exclusion in youth living with anaphylaxis. It explored issues from the perspectives of a clinician, scientist, parent and patient advocacy group representative.

A conference highlight was an interactive lunch-time session by Clean Air Champions – an AllerGen partner organization that showcased the *Air Aware* program. This interactive presentation highlighted the challenges and opportunities of raising awareness among sports coaches, athletes, youth, parents and administrators about the important



**Dr. Shoo Lee, Scientific Director, CIHR Institute of Human Development, Child and Youth Health**

connections between asthma, allergy, air pollution and active lifestyles.

Roger Martin, Chairman, Institute for Competitiveness and Prosperity and Dean of the Rotman School of Management at the University of Toronto, closed the conference by sharing his vision of *Innovation in Canada – Opportunities and Challenges 2012 and Beyond*. He discussed the difference between invention and innovation and identified what Canadian researchers and educators can do to promote innovation and an innovation-oriented culture.

### AllerGen Student Poster Competition

Fifty-four trainees and new professionals representing 14 universities and affiliated institutions participated in AllerGen's 2011-2012 Poster Competition. In total, \$2,800 in cash prizes was awarded to the trainees presenting the top posters.



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### Conference Sponsors and Supporters

**AllerGen's 7th annual *Innovation from cell to society* conference was made possible through partnerships with the following organizations:**

#### Gold Sponsors

GlaxoSmithKline  
Merck Canada  
Pfizer Canada

#### Silver Sponsors

McMaster University  
Novartis Pharmaceutical Canada

#### Bronze Sponsors

Boehringer-Ingelheim  
Maple Leaf Foods  
Michael Smith Foundation for Health Research  
Nycomed: a Takeda Company  
Roche Canada  
Sun Butter – Red River Commodities

**In addition, in-kind support was provided by:**

*Allergic Living* magazine  
Anaphylaxis Canada  
Asthma Society of Canada  
Canadian Allergy Asthma and Immunology Foundation  
Canadian Lung Association  
Canadian Network for Respiratory Health  
Canadian Society of Allergy and Clinical Immunology  
Canadian Thoracic Society  
Clean Air Champions  
National Asthma Patient Alliance  
The Sandbox Project  
UBC James Hogg Research Centre



2011 . 2012

**AllerGen has been active in establishing a knowledge mobilization community in asthma and allergic disease that did not exist prior to the formation of the Network.**



## Network Partners, Collaborators and Knowledge Users



**Since its inception, AllerGen has developed and nurtured partnerships** with academic institutions, federal and provincial agencies, the private sector, patient advocacy groups and international collaborators. AllerGen has also been active in establishing a knowledge mobilization community in asthma and allergic disease that did not exist prior to the formation of the Network.

AllerGen's research portfolio involves an average of 100 research partners per year. In 2011-12, AllerGen involved 180 organizations in Network activities including research, knowledge mobilization, commercialization and capacity building. The average AllerGen-funded project involves approximately three Canadian and/or international partners.

### **Universities: 34**

#### **(21 Canadian, 13 International)**

American University  
Athabasca University  
Charité Universitätsmedizin Berlin  
Dalhousie University  
Harbin Institute of Technology - China University  
Indiana University  
Karolinska Institute  
McGill University  
McMaster University  
Oxford University  
Queen's University  
Simon Fraser University  
Université de Montréal  
Université du Québec à Chicoutimi  
Université Laval  
University of Alberta

University of Arizona  
University of British Columbia  
University of Calgary  
University of Groningen  
University of Guelph  
University of Manchester  
University of Manitoba  
University of New Brunswick  
University of Newcastle  
University of North Carolina at Chapel Hill  
University of Ottawa  
University of Saskatchewan  
University of Toronto  
University of Victoria  
University of Waterloo  
University of Western Australia  
Utrecht University  
Western University

**Hospitals: 8**

Centre de recherche du CHUM  
– Hôpital Saint-Luc  
Hôpital du Sacré-Coeur de Montréal  
Hôpital Sainte-Justine  
Hospital for Sick Children  
Kingston General Hospital  
Mount Sinai Hospital, Toronto  
St. Joseph's Hospital, Hamilton  
St. Michael's Hospital, Toronto

**Industry: 31**

Adiga Life Sciences  
Advaxis, Inc.  
AIM Therapeutics  
Amgen Inc.  
Asmacure  
AstraZeneca  
Boehringer Ingelheim Canada  
CHENOMX Inc.  
Club Penguin™ Disney Online Studies  
Canada Inc.  
Genentech  
GlaxoSmithKline Inc.  
Graham Scott Strategies Inc.  
HealthDiary Inc.  
Intelliware Development Inc.  
Kincora Innovation  
Lincoln Diagnostics Inc.  
Lumira Capital

Maple Leaf Canada  
Mark Bisby Consultant  
MedImmune Inc  
Merck Frosst Canada Inc.  
Novartis Pharma Canada Inc.  
Nycomed Canada  
Pfizer Canada Inc.  
Pharmaxis  
Pro-Bio Associates Innovation Consultants  
Roche Canada  
Stem Cell Technologies  
Sun Butter  
Suzanne Tough Consultation  
TEC Edmonton

**Federal Agencies: 5**

Assisted Human Reproduction Canada  
Canada Mortgage and Housing Corporation  
Environment Canada  
Health Canada  
Health Canada - First Nations and  
Inuit Health Branch  
Health Canada - Food Directorate  
Public Health Agency of Canada

**Provincial Agencies: 5**

Alberta Cancer Foundation  
Alberta Health Services  
Alberta Innovates

Genome Alberta  
Ontario Ministry of Health and Long-Term Care

**Non-Profit (Professional Associations,  
Community-based and Charitable  
Organizations): 43**

Aboriginal Communities:

Blue Quills First Nations College  
Enoch Cree Nation  
Eskasoni First Nation  
First Nations Family Caring Society  
Kihiew Asiniy Education Centre, Saddle Lake  
Kitaskinaw Education Authority  
Mannawanis Native Friendship Centre  
Society  
Membertou First Nation  
Onchaminahos School, Saddle Lake  
Potloteck First Nation  
Saddle Lake First Nation  
Siksika First Nation  
Treaty 7 Management Corporation  
Tui'kn Partnership  
Wagmatcook First Nation  
Wah-Koh-to-Win Child Care Society  
Wahkotowin (Kinship) Society  
Waycobah First Nation  
Whitefish Lake First Nation (Goodfish Lake)  
Yellowhead Tribal Council

Alberta Asthma Centre  
Alberta Breathes

Alberta Lung Association  
 American Thoracic Society  
 Anaphylaxis Canada  
 Assembly of Manitoba Chiefs  
 Association des Allergies Alimentaires (AAA)  
 Asthma Allergy Information Association (AAIA)  
 Asthma Society of Canada  
 Boys and Girls Club Saddle Lake  
 British Columbia Lung Association  
 Canadian Association of Geographers  
 Canadian Breast Cancer Foundation  
 Canadian Lung Association/Canadian Thoracic Society  
 Centre for Addiction and Mental Health  
 Clean Air Champions  
 Creating Hope Society  
 Inner City Youth Development Association  
 International Health Economics Association  
 Lung Association of Nova Scotia  
 Ontario Lung Association  
 The Lung Association  
 The Sandbox Project

**Other (Research Institutes, International Organizations, Networks, Private Donors and School Boards): 48**

Agriculture and Food Development Authority, Ireland  
 Alberta Centre for Child, Family & Community Research

Atlantic Aboriginal Health Research Program  
 Canadian Allergy, Asthma and Immunology Foundation (CAAIF)  
 Canadian Foundation for Innovation  
 Canadian Network for Respiratory Care (CNRC)  
 Canadian Society for Epidemiology and Biostatistics  
 Canadian Society of Allergy, Asthma and Clinical Immunology (CSACI)  
 Cancer Stem Cell Consortium (CSCC)  
 Centre for Drug Research and Development (CDRD)  
 Centre of Excellence for the Prevention of Organ Failure (PROOF)  
 Childhood Asthma Foundation  
 Children's Asthma Education Centre  
 Compute Canada  
 Coopérative des paramédics de l'Outaouais  
 COPD and Asthma Network of Alberta  
 CORE: Collaboration for Outcomes Research & Evaluation  
 Delton Public School Edmonton  
 Dr. Cheryl Cuddeford, Family Physician  
 Dr. Loretta Fiorillo, Family Physician  
 Dreamspeakers on Tour  
 Fonds de la recherche en santé du Québec (FRSQ)  
 Giovanni & Concetta Guglietti Family Foundation  
 Harry Medovy House  
 Healthy Child Manitoba  
 Helmholtz-Zentrum München, Germany

iCAPTURE Centre  
 Institut universitaire du cardiologie et de pneumologie de Québec (IUCPQ)  
 IWK Health Centre  
 Jim LaPlante The Family Center  
 Manitoba ACADRE-NEAHR Network  
 Manitoba Institute of Child Health  
 Mitacs  
 McGill University Health Centre  
 Meadowood Centre, Winnipeg  
 Michael Smith Foundation for Health Research (MSFHR)  
 Munich Allergy Research Center (MARC), Germany  
 National Asthma Patient Alliance (NAPA)  
 National Institute of Arthritis and Musculoskeletal and Skin Diseases  
 Network Environments for Aboriginal Health Research (NEAHR)  
 Norlien Foundation  
 Northern Alberta Institute of Technology  
 Ontario Institute for Cancer Research (OICR)  
 Ontario K-NET  
 Stem Cell Network  
 Urgences-santé Québec  
 Winnipeg Health Sciences Centre  
 Winnipeg School Division





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### **AllerGen's Partners and Stakeholders Attest to the Network's Value**

In support of AllerGen's NCE renewal bid, 110 letters of support were provided by partner and stakeholder organizations from industry, federal and provincial governments, international partners, research centres, hospitals, patient groups and professional societies totaling a cash and in-kind commitment of over \$45.3 million. This represents a leveraging ratio of 1:2.24 in relation to the NCE funding award received on March 23, 2012.

Part of AllerGen's success is attributable to its *networked way of working*. Over the years, researchers and collaborators have developed strong partnerships that return benefits to the whole network by employing multi-sectoral and multi-disciplinary approaches to the way research and knowledge mobilization activities are undertaken.

During fall 2010, AllerGen held a series of regional stakeholder consultation meetings at locations across Canada including Vancouver, Edmonton, Toronto, Burlington, Ottawa and Montreal. These meetings directly engaged Network stakeholders in the development of AllerGen's strategic plan to 2019.

### International Partnerships

Over the past seven years, approximately 20% of AllerGen's partnerships have been with organizations outside Canada. Through the NCE International Partnerships Initiative (IPI), AllerGen launched five new international collaborations with counterpart networks and centres of excellence renowned for their world-class research and knowledge translation abilities. Currently, AllerGen has collaborations with teams in ten countries including Australia, China, Germany, India, Ireland, Japan, the Netherlands, Sweden, the United Kingdom and the United States of America.

One of AllerGen's goals is to continue fostering national and international partnerships. Over the past year, AllerGen has built on the momentum of these successful relationships and collaborations. Featured highlights include:

#### **International AllerGen Consortium Convenes in Sweden for Gene-Environment Interactions Workshop**

Over the last several years, AllerGen and its investigators and trainees have benefited from a strong partnership with the Karolinska Institute in Sweden. On August 29-30, 2011, the National Institute of Environmental Medicine at the Karolinska



**Prof. Göran Pershagen and Dr. Erik Melén, Institute of Environmental Medicine (IMM), Karolinska Institute**

Institute hosted a two-day workshop for collaborators within the international AllerGen consortium.

This workshop focused on gene-environment (GxE) interactions using genome-wide data and was aligned with the AllerGen-funded *Traffic pollution, Asthma and Genetics* (TAG) project, led by AllerGen Investigators Drs. Michael Brauer and Christopher Carlsten from the University of British Columbia. This event also facilitated networking and strengthened relationships between researchers and trainees engaged in the TAG project.

Workshop objectives included dissemination of knowledge, sharing of applications and methodologies amongst research experts in fields related to genetics, allergic and immune-related diseases

and epidemiology. The two-day event focused on relevant GxE interactions including statistical methods to assess interaction effects, genes, smoking and lung function, applications of GxE interactions in cardiovascular diseases and GxE analysis. This event also allowed for an internal meeting of selected international participants including students and faculty from the Karolinska Institute, AllerGen investigators, trainees and Administrative Centre staff with international collaborators in the consortium from Helmholtz-Zentrum München, University of Düsseldorf (both in Germany), and the University of Groningen and Utrecht University in the Netherlands.

#### **AllerGen signs capacity building MOUs with Australia, Germany and Sweden**

AllerGen is committed to creating new capacity building programs that enrich training and skill acquisition opportunities available for AllerGen students, new professionals and researchers.

Effective Canadian and global networking has led to new partnerships and the signing of Memoranda of Understanding (MOU) with the University of Newcastle in Australia and The Allergie-Centrum-Charité at Charité - Universitätsmedizin Berlin, Munich Allergy Research Center (MARC) -



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Technische Universität München (TUM), and Helmholtz Zentrum München in Germany. These new partnerships provide increased opportunities for international networking, research collaboration and knowledge exchange. Associated MOUs build on the strength of the Network's long and suc-

cessful partnership with the Karolinska Institute in Sweden.

#### **Canadian Trainees Gain International Experience**

Normally, students and new professionals have limited access to international capacity building

opportunities. However, AllerGen, building upon its successful international laboratory and trainee exchange programs developed in the context of the AllerGen NCE International Partnership Initiative Award, offers the next generation of researchers and clinicians a range of global experiences. AllerGen trainees are not only exposed to visiting international professorships and speakers, but are also given the opportunity to work and learn abroad.

Over the past year, AllerGen trainees gaining international experience include:

- Jennifer Protudjer, PhD,  
Karolinska Institutet, Stockholm, Sweden  
Supervisor:  
Catarina Almqvist Malmros, MD,  
Associate Professor, Department of  
Medical Epidemiology and Biostatistics.
- Elaine Fuertes, PhD (c), MSc,  
Helmholtz-Zentrum München,  
German Research Centre for  
Environmental Health  
Supervisor:  
Joachim Heinrich, PhD,  
Institute of Epidemiology,  
Helmholtz-Zentrum München,  
German Research Center for  
Environmental Health.

- Steven Maltby, PhD,  
University of Newcastle,  
Callaghan, NSW, Australia  
Supervisor:  
Professor Paul Foster, PhD,  
School of Biomedical Sciences and  
Pharmacy and Director of the Priority  
Research Centre for Asthma and  
Respiratory Disease.
- Irene Fung, MD,  
Children's Hospital of Philadelphia Clinical  
Immunology and Allergy Fellowship  
Supervisor:  
Jonathan Spergel, MD, PhD,  
Chief, Allergy Section; Co-Director,  
Centre for Pediatric Eosinophilic Disorders,  
and Associate Professor of Pediatrics,  
Perelman School of Medicine,  
University of Pennsylvania.

**AllerGen Trainee Wins Research  
Assistantship and Admission to PhD  
Program in Sweden**

AllerGen trainee, Huan Shu, supervised by Network Investigator Dr. Tim Takaro, Associate Professor, Faculty of Health Sciences, Simon Fraser University, won a Research Assistantship competition and admission to the PhD program at Karlstad

University in Sweden. Huan Shu has finished her Masters of Science degree and she will be working with prolific phthalate investigator, Dr. Carl Bornheg, to gain valuable experience and knowledge. This opportunity will provide her with a unique opportunity to gain international expertise and will enhance networking and research collaboration between Sweden, AllerGen and the CHILD Study.

**Advancing Science Internationally**

Over the years, AllerGen has partnered with international researchers and collaborators to share knowledge and advance science on a global scale. AllerGen received 13 letters of support from members of the international research community, confirming their commitment to sustained research and capacity building collaboration with the Network. Globally networked initiatives include:

- A genome-wide asthma study consortium undertaken in collaboration with the Institut national de la santé et de la recherche médicale in France and the University of Bristol in England;
- Participation in the CHILD Study Scientific Advisory Board by Professor Peter Sly, Queensland Children's Medical Research



**Huan Shu, MSc, and Dr. Tim Takaro,  
Simon Fraser University**

Institute in Australia and Dr. Fernando Martinez from the University of Arizona, USA;

- Collaborative research with the University of North Carolina's School of Medicine on air pollution in the airways;
- Development of asthma education tools for use by AllerGen partners in El Salvador; and,
- International training agreements.

AllerGen also worked closely with European partners in the area of food allergy prevalence in Canada as compared to European countries.



2011 . 2012

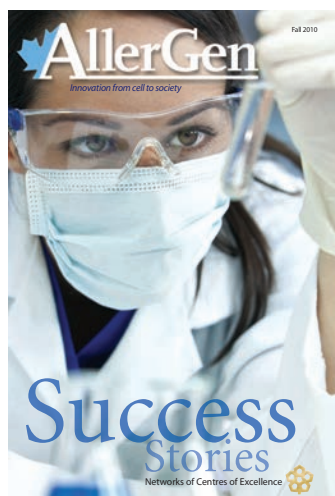
**Effective KTEE and knowledge mobilization strategies are critical to successful dissemination of Network research results and ensuring that the social and economic value of AllerGen's national and international networking and research are realized.**



## Knowledge and Technology Exchange and Exploitation (KTEE)



**AllerGen is committed to KTEE and knowledge mobilization** and continuously engages and shares results with Network partners and stakeholders, including not-for-profit allergy, asthma, anaphylaxis and related immune diseases organizations; clinicians and healthcare professionals; asthma educators; the general public; policy makers and other decision makers.



### **AllerGen Success Stories**

AllerGen *Success Stories* is a quarterly publication that offers lay and research audiences access to AllerGen's cutting-edge research results. This publication is available on AllerGen's website or by

request in hard copy and is designed to make AllerGen research results accessible to the public. It offers those living with asthma and allergic diseases, along with their families and friends, practical information about how the latest allergy and asthma research

conducted in Canada can be applied to their disease management practices in everyday settings.

Over the past year, AllerGen published three volumes of *Success Stories* and they were mailed to more than 1,200 Network participants, research partners and knowledge users.

Stories included:

#### Allergic Disease:

- Unlocking the Secrets of Mind-Body Connections to Revolutionize Inflammatory and Allergic Disease Diagnosis, Treatment and Prevention
- The Global Search for Allergy and Asthma Genes: Genetic Testing, Counselling and Novel Therapies on the Horizon
- Predicting Allergies and Asthma in Babies: Pioneering Canadian Scientists Discover that Stem Cells are “Crystal Balls”

#### Asthma:

- Teaching Kids with Asthma How to Take Charge of Their Health
- Urine Samples Advance Asthma Diagnosis and Help Patients “Breathe Easy”
- The Front Lines: Studying Asthma During Early Childhood Development
- When is Your Child’s Wheeze a Sign of Asthma? Canadian Researchers Establish New Diagnostic Tests for Infants and Young Children

- Asthma in the Workplace: Looking to Ease the Burden through Identification and Prevention

#### Environment:

- Mapping Air Pollution to Predict Asthma
- Internationally Acclaimed Canadian Scientists Discover How Airway Cells Respond to Viruses and Air Pollution: Is a Revolutionary New Drug for Airway Diseases on the Horizon?

#### eLearning:

- Using the World-Wide Web to Drive Asthma Genes Research Forward at High Speed
- A New Generation of e-Learning Tools for Asthma Education
- Using the Internet to Improve Education and Support for Canadian Children, Teens, and Parents Affected by Asthma and Allergies

#### Policy:

- AllerGen Food Allergy and Food Labelling Research Team Supports Policy Updates to Enhance the Protection of Food-Allergic Consumers

#### Other:

- Adults Raised in Poor Socioeconomic Circumstances Show Increased Susceptibility to Chronic Disease.

Since 2005, AllerGen investigators have produced 397 peer-reviewed publications, 168 non-refereed

publications, 476 specialized publications, and 350 scientific posters, for a total of 1,391 publications.

#### AllerGen Publications 2011-12

<b>Refereed Contributions</b>	<b>85</b>
Articles in Refereed Publications	72
Other Refereed Contributions	13
Non-Refereed Contributions	29
<b>Specialized Publications</b>	<b>57</b>
<b>All 2011-2012 Publications</b>	<b>171</b>
Posters	124

Between April 2011 and March 2012, AllerGen researchers produced 171 new publications (refereed, non-refereed and specialized). Of that number, 85 were refereed publications, published in leading academic journals.

#### Online Learning Tool Wins Two Awards from the Canadian Society for Training and Development

In November 2011, the Canadian Society for Training and Development (CSTD) recognized AllerGen and its collaboration with Anaphylaxis Canada, the Canadian Society of Allergy and Clinical Immunology (CSACI), and Leap Learning Technologies (a Canadian start-up company based in Hamilton, ON) for the online education program *How to C.A.R.E. for*



*Students at Risk of Anaphylaxis: What Educators Need to Know.*

This online training course, which aims to increase anaphylaxis education among school personnel, was recognized with two prestigious award at the CSTD's annual awards ceremony.



- **"Gold"** for Training Excellence in E-Learning, and
- **"Winner"** of Best Practices in Workplace Learning.

This online tool was developed collaboratively by AllerGen Investigator Dr. Anthony Levinson, MD, FRCPC, Associate Professor and Director of e-Learning Innovation for the Michael G. DeGroote School of Medicine, McMaster University, in partnership with Anaphylaxis Canada, led by



**From left: Dr. Anthony Levinson, Laurie Harada, Dr. Susan Waserman and Dr. Diana Royce receiving the Gold Award for Training Excellence in E-Learning.**

Laurie Harada, Executive Director, and CASCI, led by President Dr. Stu Carr. AllerGen congratulates this team for its efforts to develop and disseminate effective patient-oriented knowledge mobilization tools.

#### **AllerGen in the Media**

AllerGen's communication strategy targets diverse national, international, external, internal, scientific

and lay public audiences. In 2011-12, AllerGen experienced a steady stream of visitors to its website, with a peak of 931 unique visitors in a single month. In addition, AllerGen researchers were featured in the media on 20 occasions.

#### **Commercialization and Industry Partnerships**

AllerGen's research program supports translational projects aimed at generating commercial products



<b>AllerGen in the Media — Selected Stories</b>	
<b>24-May-11</b>	<b>CBC News – Online - Daniel Schwartz</b> “The four seasons of hay fever - Pollen from trees, grass and weeds and mold spores responsible”
<b>26-May-11</b>	<b>CBC News – Online - Daniel Schwartz</b> “Allergies: why we get them”
<b>02-May-11</b>	<b>Nature Medicine – Online - Mike May</b> “Drug companies hope to breathe life into asthma pipeline”
<b>31-Aug-11</b>	<b>Vancouver Sun – Print - Laura Kane</b> “Parents’ stress alters children’s genes”
<b>12-Sep-11</b>	<b>CBC News – Online - Mark Gollom</b> “Doctors slam alternative medicine proposal”
<b>30-Sep-11</b>	<b>The National – Online - Tom Blackwell</b> “Alternative medicine ‘unscientific,’ study warns”
<b>14-Oct-11</b>	<b>Toronto Star – Online - Emily Jackson</b> “London-area school board pans imitation peanut butter”
<b>03-Jan-12</b>	<b>National Post - Tom Blackwell</b> “The downside of a good education: food allergies”
<b>04-Jan-12</b>	<b>GlobalNews.ca - Carmen Chai</b> “Food allergies nearly twice as common among well-educated: study”
<b>05-Jan-12</b>	<b>Discovery.ca</b> “More Education May Mean More Food Allergies”
<b>08-Mar-12</b>	<b>CIHR Website</b> “Research Profile – The Asthma Lottery”
<b>23-Mar-12</b>	<b>MarketWatch.com</b> “Government of Canada Helps Battle Allergic Diseases Through Innovation”
<b>24-Mar-12</b>	<b>The Hamilton Spectator - Carmela Fragomeni</b> “\$36m nothing to sneeze at - McMaster-based allergy researchers get federal boost”
<b>29-Mar-12</b>	<b>Research Money - Ron Freedman</b> “AllerGen renewed for another seven years to continue battle against allergy epidemic”

and services that have the potential to improve healthcare practices, inform patient decision-making for clinicians, improve workplace productivity, reduce risk and increase quality of life for Canadians.

The identification, protection, commercialization, translation and mobilization of Network-supported intellectual property are fundamental to AllerGen’s success. Each research investment that AllerGen makes is undertaken following a critical assessment of the “value-added” of Network support, the degree of “pull” from the user sector that supports the research and a clearly identified need for results.

Examples of AllerGen-supported commercialization initiatives include:

#### **Respirlyte Inc.**

Atopic or allergic diseases are common chronic illnesses. Asthma is the most frequent chronic clinical childhood condition and the number one reason for pediatric emergency admissions in Canadian hospitals. The tissues of people with atopic diseases become inflamed and treatment often requires anti-inflammatory drugs like inhaled or oral corticosteroids. These medications can have a number of unwanted side-effects. Further, deciding when to treat or when to increase the dose of corticosteroids is more difficult for

doctors when asthma control is less than optimal. For example, young children with asthma are often unable to perform tests to measure their lung function. To have a clear diagnosis or measure of inflammation, a biopsy can be performed. However, this is potentially dangerous and painful. Other less invasive tests are available, but they are less accurate, and are not suited for the average doctor's office.

Based on this urgent need for a better test, especially one that could be used within a typical doctor's office, AllerGen Investigator Dr. Darryl Adamko, Associate Professor at the University of Saskatchewan, developed a novel method to diagnose asthma using a combination of urine samples and Nuclear Magnetic Resonance (NMR) analyses. Dr. Adamko's research findings indicated that the urine metabolites of children and adults with lung inflammation will reflect changes in the disease.

Respirlyte Inc. is a privately-held, discovery-stage company located in Edmonton, Alberta. Incorporated in 2011, the company develops respiratory diagnostic assays through the use of metabolomics-based technologies.



**AllerGen investigator, Dr. Darryl Adamko, MD, at work.**

Dr. Adamko's research team is studying humans with different allergic diseases (*i.e.*, asthma or allergic rhinitis) to determine the feasibility of developing a non-invasive test to correctly diagnose people with allergic disease (including asthma) compared to healthy people. Respirlyte's market

competitiveness is rooted in the fact that urine tests will not only diagnose allergic diseases better than available techniques, but will also help physicians better adjust treatment schedules for patients to ensure that optimal amounts of medication are administered.



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### AIM Therapeutics

In 2011, Dr. Dean Befus, Professor at the University of Alberta, discovered that the nervous system controls production of an anti-inflammatory protein in a model of allergic asthma. He investigated the effects of this anti-inflammatory compound in several disease models, developed experimental drugs and tested their pathways in humans.

With major funding from AllerGen NCE and AIM Therapeutics Inc., Dr. Befus' research team identified a novel salivary gland peptide with anti-inflammatory activity that could inform the treatment of asthma. AIM 102, a lead drug derived from knowledge of its pathway, was demonstrated

effective in preclinical models of asthma and Phase I clinical studies were successfully completed.

The outcome of this research is expected to lead to rapid advances in applications to treat allergic and other inflammatory diseases, which is necessary to attract capital and further commercialization of innovative therapeutic approaches to asthma management.

AIM 102 offers a potentially safer and more convenient treatment for moderate to severe asthma, one of the most prevalent chronic diseases in major markets. AIM 102 is the first of a new class of oral, non-steroidal, immune

modulating anti-inflammatory drugs. In the future, AIM Therapeutics plans dosing AIM 102 in a multi-site Phase II clinical trial in collaboration with the Clinical Investigator Collaborative (CIC) of AllerGen.

### Adiga Life Sciences Inc.

In 2010-2011 AllerGen was involved in the establishment of Adiga Life Sciences Inc., a joint venture between McMaster University and Circassia Ltd., a clinical-stage biopharmaceutical company located in the UK, to commercialize intellectual property.

Dr. Mark Larché, Professor, Division of Clinical Immunology & Allergy and a Canada Research Chair in Allergy & Immune Tolerance at McMaster University, spearheaded Adiga's work related to the identification of key T-cell epitopes, which helped to bring novel allergic rhinitis vaccines to the marketplace.

Building on the success of this partnership, Dr. Anne Ellis, AllerGen Investigator and Assistant Professor at Queen's University, performed clinical trials in allergic rhinitis (AR) at the Environmental Exposure Unit at the Kingston General Hospital and Queen's University. This large scale AR clinical trial model utilized a controlled nasal allergen challenge

(NAC). Together with Dr. Helen Neighbour, an AllerGen investigator at McMaster University, she has secured a partnership with Adiga Life Sciences. This emerging partnership builds upon initial AllerGen-funded research aimed at performing clinical trials that test new therapeutics in the treatment of AR. The outcomes of this initial investment informed the optimization of NAC protocols which may serve as the Standard Operating Procedures (SOP) for AR within the scope of the Clinical Investigator Collaborative (CIC) led by Dr. Paul O'Byrne, McMaster University.

This initial success in matching the AR-CIC to an industry partner indicates that this collaborative and its SOPs represent useful clinical research tools for industry partners with novel therapeutics requiring proof-of-concept evaluations. These SOPs will help partner organizations determine clinical effectiveness and identify novel diagnostic biomarkers of allergic inflammation, allergic rhinitis and asthma. This is a unique niche in which Canada is poised to become a global leader.

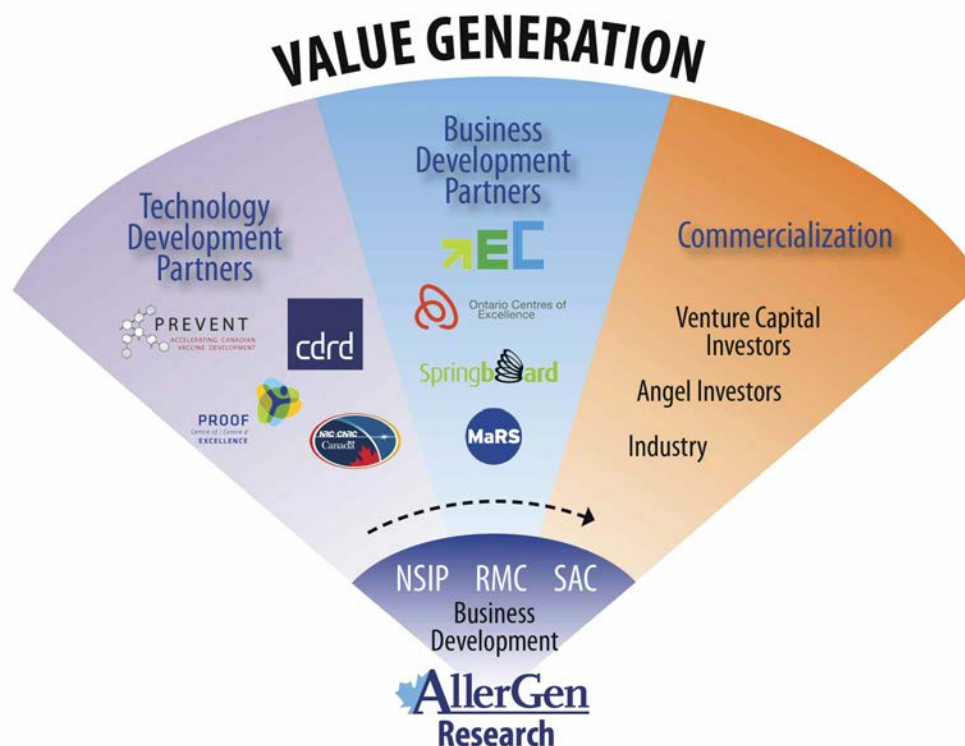
Moving forward, Dr. Ellis' research team will explore opportunities to develop a national platform and SOPs for industry-partnered clinical trials of novel therapeutics in allergic rhinitis by validating novel,

"patient-centred" biomarkers of allergic airways diseases, including rhinitis and asthma.

#### AllerGen's Path to Commercialization

AllerGen encourages its investigators to think like entrepreneurs and leave a legacy of research results that can become commercially useful and/or improve the lives of Canadians as well as asthma

and allergy sufferers globally. AllerGen has made considerable investments in fast-tracking the establishment of new companies and incubating start-up companies. By assisting in the development and commercialization of inventions, AllerGen helps make its researchers' "spin-offs" sustainable.



AllerGen Strategy to Accelerate Commercialization through partnership



2011 . 2012

Since 2005, 190 AllerGen trainees have graduated from their respective programs. Forty-eight percent are employed in one of four sectors: University (49%), Industry (33%), Government (12%), and Hospital (6%).

## Tomorrow's Leaders: AllerGen's Highly Qualified Personnel (HQP)



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**AllerGen creates value-added opportunities** for the training, education and professional development of HQP, students and new professionals who strengthen Canada's knowledge base, innovative capacity and work-force productivity.

AllerGen's capacity building initiatives offer world-class programs and unique opportunities for Network trainees, young professionals, research associates and technicians.

Since 2005, 190 AllerGen trainees have graduated from their respective programs. Forty-eight percent are employed in one of four sectors: University (49%), Industry (33%), Government (12%), and Hospital (6%). Forty-one percent are continuing their education. The remaining 11% are in transition.

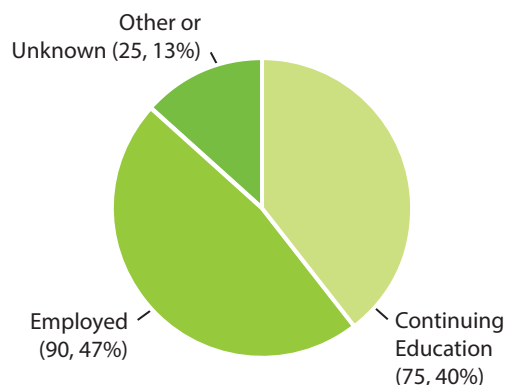
### AllerGen Students and New Professionals Network (ASPN)

The ASPN comprises students (undergraduate to postdoctoral fellow), research associates, technicians and new professionals beginning their careers in allergy and asthma research. Trainees

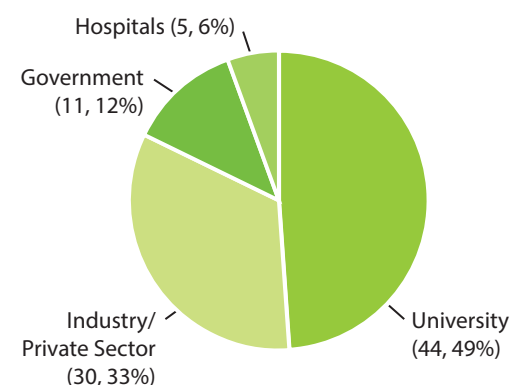
working on an AllerGen-funded project and AllerGen award recipients automatically become AllerGen HQP and part of the ASPN Network. Individuals not directly working on an AllerGen

project may apply to become an ASPN member and access the associated benefits. Currently there are 446 ASPN members – 323 active HQP involved in network research, plus 123 new

**AllerGen HQP Graduates  
2005-2012 (n=190)**



**AllerGen HQP Employment by Sector  
2005-2012 (n=90)**



AllerGen 2011-2012 CAIDATI Winners		
Institution	AllerGen Funding	Total Award Value
Dalhousie University	\$ 2,980	\$ 5,960
McGill University	\$ 17,500	\$ 35,000
McMaster University	\$ 44,120	\$ 88,240
Queen's University	\$ 35,000	\$ 70,000
The Hospital for Sick Children	\$ 17,500	\$ 35,000
University of Alberta	\$ 20,000	\$ 40,000
University of British Columbia	\$ 37,980	\$ 75,960



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professionals and students not directly involved in AllerGen projects, who are participating in AllerGen networking and professional development opportunities.

#### CAIDATI Awards

Over the past year, 11 outstanding students from seven academic institutions across Canada were selected to receive AllerGen's CAIDATI awards. AllerGen issued \$175,080 in student support for research with potential to reduce the morbidity, mortality and socio-economic burden of allergic and related immune diseases. This funding was matched 1:1 by partner organizations from across Canada for a total award value of \$350,160. The students awarded AllerGen-matched funding attended the following institutions:

#### Dalhousie University

##### Oral Exposure to a TLR2 Agonist Interferes with Oral Tolerance Induction to PB in a TLR-2 Dependent Manner

Trainee: Kaitlyn Carson

AllerGen Contribution .....\$2,980

Total Award Value .....\$5,960

Supervisor: J. Marshall, Professor and Head Microbiology & Immunology

#### McGill University

##### Genetic Dissection of Phenotypes Defining Susceptibility to Allergic Asthma: Airways Hyperresponsiveness and Atopy

Trainee: Cynthia Kanagaratham

AllerGen Contribution .....\$17,500

Total Award Value .....\$35,000

Supervisor: D. Radzioch, Professor, Experimental Medicine, Department of Human Genetics

#### McMaster University

##### Early Life Microbial Influence and the Imprinting of Allergic or Tolerance Phenotypes

Trainee: Katherine Arias

AllerGen Contribution .....\$26,620

Total Award Value .....\$53,240

Supervisor: M. Jordana, Professor, Pathology and Molecular Medicine; Head, Respiratory Diseases and Allergy Division Centre for Gene Therapeutics; Tier 1 Canada Research Chair in Immunobiology of Respiratory Diseases and Allergy



**Queen's University****The Role of T regulatory Cells in Allergic Asthma**

Trainee: Michelle North

AllerGen Contribution .....\$35,000

Total Award Value .....\$70,000

Supervisor: A. Ellis, Assistant Professor,  
Department of Biomedical and Molecular  
Sciences; Associate Professor of Medicine,  
Microbiology and Immunology**The Hospital for Sick Children****How Does the Timing of Home  
Environmental Tobacco Smoke and  
Particulate Exposure during Childhood  
Affect the Age of Asthma Development**

Trainee: Elinor Simons

AllerGen Contribution .....\$17,500

Total Award Value .....\$35,000

Supervisor: T. To, Senior Scientist, Child Health  
Evaluative Sciences; Professor Dalla Lana  
Graduate School of Public Health, Institute  
of Health Policy and Management and  
Evaluation, Institute of Medical Sciences**University of Alberta****The Impact of Antibiotic Use, Caesarean  
Section Delivery and Formula Feeding  
on Infant Microbiota**

Trainee: Meghan Azad

AllerGen Contribution .....\$20,000

Total Award Value .....\$40,000

Supervisor: A. Kozyrskyj, Research Chair,  
Maternal-Child Health and the Environment;  
Associate Professor in the Department of  
Pediatrics, Faculty of Medicine**University of British Columbia****Traffic-Related Air Pollution as a Risk Factor  
for Childhood Allergic Rhinitis, And the Role  
Played By Genetic Variability**

Trainee: Elaine Fuertes

AllerGen Contribution .....\$17,500

Total Award Value .....\$35,000

Supervisor: M. Brauer, Professor, School of  
Population and Public Health, Faculty of  
Medicine, Department of Medicine &  
Atmospheric Science ProgrammeSupervisor: C. Carlsten, Assistant Professor and  
Chair in Occupational and Environmental  
Lung Disease**Functional Genomics in Asthma and Allergy**

Trainee: Karolyn Hsu

AllerGen Contribution .....\$8,750

Total Award Value .....\$17,500

Supervisor: S. Turvey, Senior Clinician Scientist,  
CFRI; Associate Director, Clinical, CFRI;  
Associate Professor, Division of Infectious  
and Immunological Diseases, Department  
of Pediatrics**Gene Expression in Airway Smooth Cells  
of Asthmatic and Non-Asthmatic Lungs  
via Microarray Analysis and Targeted  
Gene Expression**

Trainee: Chris Pascoe

AllerGen Contribution .....\$8,750

Total Award Value .....\$17,500

Supervisor: P. Pare, Director, McDonald  
Research Laboratories/iCAPTURE;  
Professor, Department of Medicine, U.B.C.  
McDonald Research Laboratory / The  
iCAPTURE Centre**How CLA Treatment Can Modulate  
Lipid Raft Formation Affecting RSV-Induced  
Inflammation**

Trainee: Janet Xu

AllerGen Contribution .....\$2,980

Total Award Value .....\$5,960

Supervisor: D. Dorscheid, Associate Professor  
of Medicine, The James Hogg Research  
Centre, Institute for Heart + Lung Health  
St. Paul's Hospital**Total****AllerGen Contribution .....\$175,080****Total Award Value.....\$350,160****AllerGen Travel Awards**Over the past fiscal year, AllerGen funded 26 travel  
applications, supporting 18 trainees to participate  
in 13 national and international events. Travel awards  
were issued to the following trainees:**American Academy of Allergy, Asthma  
and Immunology (AAAAI)****(March 2-6, 2012), San Francisco, CA**

McMaster University - Delia Heroux, Pia-Lauren

Reece, Steven Smith, Claudia Hui

Queen's University - Michelle North

**American Thoracic Society Annual General  
Meeting (May 13-18, 2011), Denver, CO**

McMaster University - Alba Llop

University of Alberta - Meghan Azad

University of British Columbia - Jianqing He,  
Sarah Kam



**Anaphylaxis Canada Spring Conference  
(May 7, 2011), Toronto, ON**

McMaster University - Bonnie Chow

**Association of Clinical Research Professionals  
Annual Conference (April 30 - May 3, 2011),  
Seattle, WA**

McMaster University - Heather Campbell,  
Karen Howie

**Canadian Association of Geographers Annual  
Meeting (May 31-June 4, 2011), Calgary, AB**

McMaster University - Daniel Harrington

**Canadian Respiratory Conference  
(April 28-30, 2011), Niagara Falls, ON**

University of Toronto - Michelle North

**Injury and Repair Mechanisms in Chronic  
Airways Disease International Conference  
(April 6-8, 2011), London, UK**

University of Manitoba - Pawan Sharma

**International Eosinophil Society Research  
Symposium (June 21-25, 2011),  
Quebec City, QC**

McMaster University - Claudia Hui, Steven Smith,  
Pia-Lauren Reece  
University of British Columbia - Steven Maltby

**International Human Microbiome Congress  
(March 19-21, 2012), Paris, France**

University of Toronto - Tedd Konya

**International Medical Geographers Symposium  
(July 10-15, 2011), Durham, UK**

McMaster University - Bonnie Chow,  
Daniel Harrington

**International Society for Environmental  
Epidemiology Conference**

**(September 13-16, 2011), Barcelona, Spain**  
University of British Columbia - Elaine Fuertes

**International Society for Exposure Science  
Annual Meeting (October 23-27, 2011),  
Baltimore, MD**

University of British Columbia - Rongrong Wang

**Spring School of Population Genomics and  
Genetic Epidemiology (May 30-June 3, 2011),  
Montreal, QC**

University of British Columbia - Elaine Fuertes

**AllerGen - Michael Smith Foundation for  
Health Research (MSFHR) Trainee Awards**

In December 2010, AllerGen and MSFHR signed a MOU to jointly fund applicants who qualify for MSFHR's Trainee Award Competitions. This partnership leverages provincial research funding in British Columbia to support additional research trainees within the AllerGen Network. AllerGen's British Columbian genetics, environment, microbiome and biomarkers research team forms a major research cluster within the Network.

Drs. Jeremy Hirota and Francesco Sava were recipients of the 2011 MSFHR/AllerGen Post-doctoral Fellow Research Trainee Awards. Dr. Hirota is studying the role of the airway epithelium NLRP3 inflammasome in asthma pathogenesis

with AllerGen Principal Investigator, Dr. Darryl Knight at the James Hogg iCAPTURE Centre, University of British Columbia. Dr. Sava is conducting research on diesel exhaust as an adjuvant to allergen-mediated oxidative stress and immune response in the asthmatic lung at Vancouver General Hospital with AllerGen Principal Investigator, Dr. Christopher Carlsten.

**Fonds de recherche du Québec-Santé (FRQS)  
Clinician-Scientist Award**

AllerGen has signed a partnership agreement with the Fonds de recherche du Québec - Santé (FRQS) to jointly support Clinical Research Scholars - Junior 1 Career Awards. The award is designed to facilitate the recruitment of qualified clinical researchers who would like to begin or continue independent careers in health-care research and ensure that high-calibre clinician-scientists are available to meet the needs of universities, hospitals and industry. Research projects must be within the scope of AllerGen's research mandate to be eligible for support.

In 2011, two applications were reviewed; however, they were outside the scope of AllerGen's research mandate and not eligible for AllerGen support.

### Mitacs Internships and Trainee Capacity Building Opportunities

AllerGen was the first NCE to develop a MOU formalizing its partnership with Mathematics of Information Technology and Complex Systems (Mitacs). Mitacs offers several programs relevant to AllerGen trainees including the *Accelerate Internship* program for which AllerGen offers matching financial support. Four-month and eight-month internships are available at the graduate and postdoctoral levels, working with supervising professors and industry to help ensure that the research innovations developed in Canadian universities are utilized by Canadian companies. With the addition of a non-industry health pilot initiative, government and not-for-profit agencies are also eligible for internship placements.

### AllerGen Trainees Take Top Honours at the 2011 Canadian Society for Allergy and Clinical Immunology (CSACI) Annual Scientific Meeting Poster Competition

**Meghan Azad**, a postdoctoral fellow from the University of Alberta, won first place in the Best Poster Awards - Asthma and Allergic Rhinitis category at the CSACI Annual Scientific Meeting in Quebec City, QC in 2011 for her poster titled *Maternal diabetes amplifies the influence of*

*maternal asthma and smoke exposure on the development of asthma in offspring.*

**Claudia Hui**, a PhD candidate from McMaster University, won second place in the Best Poster Awards - Basic science/Clinical Immunology category for her poster titled *Effects of thymic stromal lymphopoietin on cord blood progenitor cell differentiation and hemopoietic cytokine receptor expression.*

**Philippe Bégin**, a Clinical Immunology and Allergy Fellow-in-Training from the Université de Montréal, won first place in the Case Reports Category at the CSACI 2011 Annual Scientific Meeting for his case study titled *A large cohort of primary familial cryofibrinogenemia originates from the Magdalen Islands.*

In addition, AllerGen and CSACI co-sponsored a Young Allergy Professionals Networking Reception hosted by AllerGen investigator, Dr. Anne Ellis, Assistant Professor at Queen's University. The reception provided a unique networking opportunity for allergists in training, prominent practitioners and AllerGen researchers. It also offered AllerGen an opportunity to promote its many training opportunities to future Canadian Clinical Immunology and Allergy sub-specialists.

### AllerGen Annual Conference – Student Poster Competition

The AllerGen student poster competition takes place each year in conjunction with the annual *Innovation from cell to society* research conference. The 2012 competition took place at the Royal York Hotel in Toronto, Ontario. Fifty-four trainees and new professionals representing 14 universities and affiliated institutions participated. The trainees were judged on the “what, so what and now what” of their research during one-minute lightning round “elevator pitches,” plus subsequent poster adjudication. The top two poster presenters in each research program area advanced and made 10-minute oral presentations the following day. In support of AllerGen's commitment to attracting the top undergraduate students to the Network, for the first time, the top two undergraduate posters were recognized with cash awards and certificates. In total, \$2,800 was awarded to poster competition winners.

## AllerGen Student Poster Award Winners 2012



Top Row from left: M. Azad, H. Shu, and M. Alton. Front Row from left: K. Carson, L. Soller, J. Yang, and B. Lo

### Undergraduate (Top Two Scores)

**Megan Alton**, McGill University,  
*Postpartum Depression: An Independent Predictor of Wheeze in Preschool Girls*  
Supervised by Dr. Anita Kozyrskyj.

**Kaitlyn Carson**, Dalhousie University,  
*The Effect of Toll-Like Receptor Activation During the Induction of Oral Tolerance in Mice*  
Supervised by Dr. Jean Marshall.

### Program A: Gene-Environment Interactions

**1st Place: Meghan Azad**, University of Alberta,  
*Exclusive Breastfeeding Protects Against Clostridium Difficile Colonization by Promoting Lower Relative Abundance of Lachnospiraceae in Gut Microbiota: Implications for Atopic Disease?*, supervised by Dr. Anita Kozyrskyj.

**2nd Place: Huan Shu**, Simon Fraser University,  
*Potential Sources of Phthalate Exposure in the Vancouver CHILD Study at Three Months of Age*, supervised by Dr. Tim Takaro.

### Program B: Diagnostics and Therapeutics

**1st Place: Jasemine Yang**, University of British Columbia,  
*Characterization of IL-13 Receptors in the Asthmatic Airway epithelium*, supervised by Dr. Delbert Dorscheid.

**2nd Place: Bernard Lo**, University of British Columbia,  
*The Function of CD34 in Pulmonary Fibrosis*, supervised by Dr. Kelly McNagny.

### Program C: Public Health, Ethics, Policy and Society

**1st Place: Lianne Soller**, McGill University,  
*The Prevalence of Food Allergy Among Aboriginals in Canada*, supervised by Dr. Ann Clarke.

**2nd Place: Bonnie Chow**, University of Waterloo,  
*Determinants of Purchasing Behaviours of Allergy Affected Canadian Consumers: A Mixed Methods Approach*, supervised supervised by Dr. Susan Elliott.

### AllerGen Annual Trainee Symposium

The Sixth Annual Trainee Symposium was held in Halifax, Nova Scotia from June 5 to 7, 2011. Forty-four trainees participated in this ASNPN-organized event, which featured professional development in areas not typically offered within their regular clinical or academic training programs.

The symposium featured talks by experts in several fields of interest to researchers-in-training including knowledge translation, strategic planning, mentoring, grant writing, research ethics and oral presentation skills. The symposium also included a career panel featuring government and academic speakers and a presentation about *Allergy Testing: The Underbelly of Alternate Medicine* by Greg Rex, MD, specialist in Pediatric Allergy and Clinical Immunology, IWK Health Centre, Halifax, Nova Scotia.

### AllerGen Emerging Clinician-Scientist Research Fellowship Award

The goal of the *AllerGen Emerging Clinician-Scientist Research Fellowship* is to enable Canadian Clinical Immunologists and Allergists to pursue allergy, asthma and/or anaphylaxis academic research training immediately following their Clinical Immunology and Allergy sub-specialty clinical training in order to:



**From left: Dr. Teresa To, Conference Planning HQP Sub-Committee Chair, Dr. Sharon Dell, Conference Planning Committee Chair, Dr. Judah Denburg, AllerGen Scientific Director and Bonnie Chow, AllerGen trainee poster award winner**

- Strengthen the academic capacity of Canadian Clinical Immunology and Allergy sub-specialists,
- Increase Canadian capacity for translational Clinical Immunology and Allergy research, and
- Facilitate enhanced patient care through excellence in basic and clinical allergy and related immune disease research.

Eligible candidates are Canadian citizens or permanent residents who are clinicians enrolled in or who have completed Clinical Immunology and Allergy sub-specialty training at a Canadian academic health sciences centre. Candidates may apply 18 months prior to and 18 months after completion of their Clinical Immunology and Allergy sub-specialty training.





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Preference is given to applicants whose host institution can confirm that the applicant has been identified for a junior faculty position following successful completion of the Fellowship and/or provincial follow-on research funding.

### Network Graduates and Employment

Individual accomplishments of AllerGen graduates over the past year include:

**Jianqing He** is now Assistant Professor at the Chengu University in China. Prior to this appointment, he was a postdoctoral fellow supervised by AllerGen researcher Dr. Chris Carlsten, University of British Columbia.

After completing his postdoctoral fellowship under the supervision of AllerGen program leader and Principal Investigator Dr. Dean Befus, University

of Alberta, **Rene Dery** secured employment as a Research Scientist and Alberta Innovates R&D Associate at Paladin Biosciences, a division of Paladin Labs Inc.

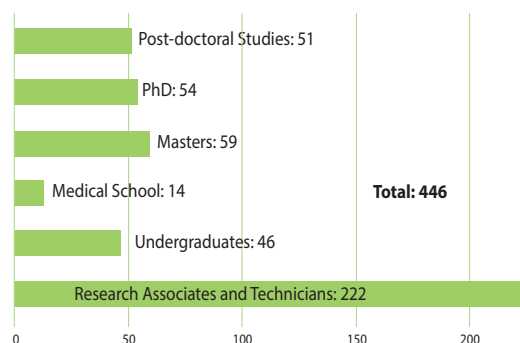
**Nicole Gregory** is employed as a Marine Planner at the North Coast-Skeena First Nations Stewardship Society in Prince Rupert, BC. Prior to completing her Masters degree at Dalhousie University, she worked under the supervision of AllerGen Investigator Dr. Heather Castleden on the AllerGen project *Engaging Aboriginal families affected by allergies and asthma*.

**Tracy Pitt** is now a practicing clinician in Toronto. She completed her Allergy and Clinical Immunology training at the University of Manitoba and is a member of the Canadian Society of Allergy and Clinical Immunology; the American College of Allergy, Asthma & Immunology; and the American Academy of Allergy, Asthma & Immunology where she serves as an Anaphylaxis Committee member. Dr. Pitt worked on AllerGen-funded projects under the supervision of AllerGen Investigators Drs. Allan Becker (University of Manitoba) and PJ Subbarao (University of Toronto/Hospital for Sick Children).

## A Snapshot of AllerGen HQP 2011-2012

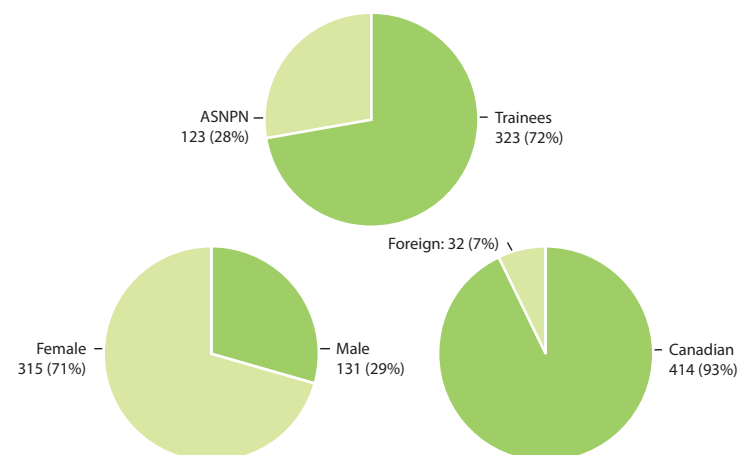
Trainees, New Professionals, ASNPN Members, Research Associates and Technicians by Province		
Ontario	163	36.75%
British Columbia	86	19%
Alberta	77	17%
Quebec	51	11.5%
Manitoba	42	9.5%
Nova Scotia	16	3.5%
Outside Canada	5	1%
Saskatchewan	3	0.75%
New Brunswick	3	0.75%
<b>Total</b>	<b>446</b>	<b>100%</b>

### Level of Study

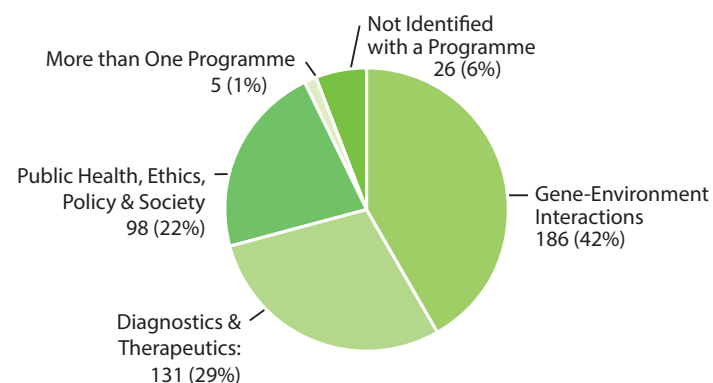


Trainees, New Professionals, ASNPN Members, Research Associates and Technicians by University		
University of British Columbia	81	18%
McMaster University	78	17.5%
University of Alberta	67	15%
University of Toronto	52	11.5%
University of Manitoba	40	9%
McGill University	27	6%
Queen's University	22	5%
Dalhousie University	16	3.5%
Université Laval	14	3%
Affiliated Institutions and Organizations	11	2.5%
University of Calgary	9	2%
Université de Montréal	8	1.75%
Outside Canada	5	1.25%
Simon Fraser University	4	1%
University of New Brunswick	3	0.75%
University of Saskatchewan	3	0.75%
Université du Québec à Chicoutimi	2	0.50%
University of Waterloo	2	0.50%
University of Guelph	1	0.25%
University of Western Ontario	1	0.25%
<b>Total</b>	<b>446</b>	<b>100%</b>

## Trainees, New Professionals, Research Associates and Technicians and ASNPN Members: 446



### Trainees by Research Program



2011 . 2012

**AllerGen has deepened existing international research relationships and increased the global capacity building opportunities it has developed for Network trainees.**



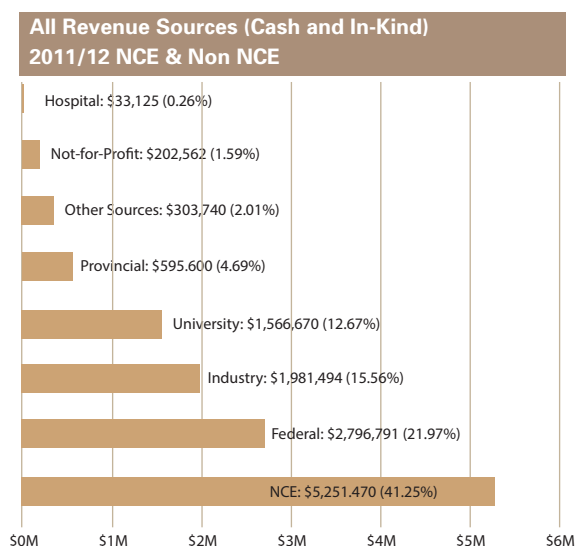
# Financial Overview

## AllerGen NCE Inc. Financial Summary 2011- 2012

	2010-2011 (Year 6)	Percentage	2011-2012 (Year 7)	Percentage
<b>Revenues (Cash and In-Kind)</b>				
NCE Award	5,216,500	33.9%	5,251,470	87%
Health Canada Funding (CMP 3)	1,489,599	9.7%	193,504	3%
Non-NCE Funds to Administrative Centre*	118,075	0.8%	129,892	2%
Non-NCE Funds To Research*	8,578,927	55.7%	484,753	8%
	<b>15,403,101</b>	<b>100.0%</b>	<b>6,059,619</b>	<b>100%</b>
<b>Expenditures (Cash)</b>				
Research Programs	4,629,009	65.4%	6,331,284	71%
Networking	638,628	9.0%	803,713	9%
Strategic Initiatives and Training	290,040	4.1%	270,258	3%
Communications	14,664	0.2%	14,151	0%
Administration	1,508,509	21.3%	1,480,132	17%
	<b>7,080,849</b>	<b>100.0%</b>	<b>8,899,537</b>	<b>100%</b>
Committed Amounts for Future research	5,461,316		1,474,270	
Cash reserves	-887,421		259,706	

All Revenue Sources (Cash and In-Kind) 2011/12 NCE and Non NCE				
	Cash	In-Kind	Total	Percentage
NCE (41.25%)	5,251,470	-	5,251,470	41.25%
Federal (21.97%)	2,787,941	8,850	2,796,791	21.97%
Industry (15.56%)	1,840,119	141,375	1,981,494	15.56%
University (12.31%)	151,670	1,415,000	1,566,670	12.31%
Provincial (4.68%)	68,000	527,600	595,600	4.68%
Other Sources (2.39%)	135,740	168,000	303,740	2.39%
Not-for-Profit (1.59%)	81,462	121,100	202,562	1.59%
Hospital (0.26%)	500	32,625	33,125	0.26%
<b>Total</b>	<b>\$ 10,316,902</b>	<b>\$ 2,414,550</b>	<b>\$ 12,731,452</b>	<b>100%</b>

\* Includes cash and in-kind contributions



In 2011-12, AllerGen's income from all sources (cash and in-kind) was \$12,731,452. Of this amount, \$5,251,470 was provided as a base grant from the NCE directorate.

For every dollar that AllerGen received from the NCE program in 2011-12, an additional \$1.43 was secured from other sources.

This represents a total leveraging of \$ 7,479,982 on the NCE base grant of \$ 5,251,470



2011 . 2012

The Canadian Group on Food Allergy Research (CanGoFAR) has continued to build on two previous AllerGen-funded studies that aim to determine food allergy prevalence amongst Canadians.





## Network Participants 2011-2012

### Researchers and Collaborators (n=190)

Name	Affiliation	Name	Affiliation
Pascal Hickey	Adiga Life Sciences	Sharon Dell	Hospital for Sick Children
David Lynn	Agriculture and Food Development Authority (Ireland)	Colin McKerlie	Hospital for Sick Children
Shawna McGhan	Alberta Asthma Centre	Theo Moraes	Hospital for Sick Children
Mary Lewis Allen	Allergy, Asthma Information Association (AAIA)	Felix Ratjen	Hospital for Sick Children
Lilly Byrtus	Allergy, Asthma Information Association (AAIA)	Susan Richardson	Hospital for Sick Children
Matthew Nisbet	American University	Padmaja Subbarao	Hospital for Sick Children
Laurie Harada	Anaphylaxis Canada	Teresa To	Hospital for Sick Children
Yvon Cormier	Asmacure	Wendy Ungar	Hospital for Sick Children
Diane Dubord	Association Québécoise des Allergies Alimentaires (AQAA)	Cheryl Cuddeford	Independent Practice
Oxana Latycheva	Asthma Society of Canada	Eric Meslin	Indiana University
Zave Chad	Canadian Allergy, Asthma and Immunology Foundation	Glen Johnson	Intelliware Development Inc
Alan James	Canadian Society for Epidemiology and Biostatistics	Wade Watson	IWK Health Centre
Arturas Petronis	Centre for Addiction and Mental Health	Barbro Dahlén	Karolinska Institute
Tom Pfeifer	Centre for Drug Research and Development	Sven-Erik Dahlén	Karolinska Institute
Maike Pincus	Charité Universitätsmedizin Berlin	Goran Pershagen	Karolinska Institute
Ulrich Wahn	Charité Universitätsmedizin Berlin	Jennifer Olajos-Clow	Kingston General Hospital
Karen Mason	Club Penguin™ Disney Online Studies Canada	John Webb	Maple Leaf Canada
Heather Castleden	Dalhousie University	Moshe Ben-Shoshan	McGill University
Jean Marshall	Dalhousie University	Ann Clarke	McGill University
Jeff Brook	Environment Canada	Scott Delaney	McGill University
Lisa Howard	GlaxoSmithKline	Harley Eisman	McGill University
Sheila Dubois	Health Canada	Qutayba Hamid	McGill University
Sébastien La Vieille	Health Canada	Lawrence Joseph	McGill University
John Salminen	Health Canada	Bruce Mazer	McGill University
Sheryl Tittlemier	Health Canada	Danuta Radzioch	McGill University
Hari Vijay	Health Canada	Petra Arck	McMaster University
Chris Sarin	Health Canada - First Nations and Inuit Health Branch	Stephanie Atkinson	McMaster University
Samuel Godefroy	Health Canada - Food Directorate	John Bienenstock	McMaster University
Joachim Heinrich	Helmholtz Zentrum München	Judah Denburg	McMaster University
Judy Morris	Hôpital du Sacré-Coeur de Montréal	Paul Forsythe	McMaster University
		Andreas Freitag	McMaster University
		Sarah Garside	McMaster University

<b>Name</b>	<b>Affiliation</b>
Gail Gauvreau	McMaster University
Ted Haines	McMaster University
Mark Inman	McMaster University
Manel Jordana	McMaster University
Paul Keith	McMaster University
Mark Larché	McMaster University
Anthony Levinson	McMaster University
Joseph Macri	McMaster University
Andrea Marrin	McMaster University
Kathy McCoy	McMaster University
Ann McKibbin	McMaster University
Helen Neighbour	McMaster University
Paul O'Byrne	McMaster University
Malcolm Sears	McMaster University
Koon Teo	McMaster University
Susan Waserman	McMaster University
Michel Djandji	Merck Frosst Canada Inc.
Juan Rivera	National Institute of Arthritis and Musculoskeletal and Skin Diseases
Nancy Garvey	Ontario Ministry of Health and Long-Term Care
Jane Kaye	Oxford University
Roger Deeley	Queen's University
Anne Ellis	Queen's University
Diane Loughheed	Queen's University
John McCans	Queen's University
Jodan Ratz	Queen's University
George Agnes	Simon Fraser University
Ryan Allen	Simon Fraser University
Fiona Brinkman	Simon Fraser University
Tim Takaro	Simon Fraser University
Randy Yatscoff	TEC Edmonton
Debbie Smith	The Lung Association

<b>Name</b>	<b>Affiliation</b>
Christine Hampson	The Sandbox Project
Lucie Blais	Université de Montréal
Guy Delespesse	Université de Montréal
Bartha Knoppers	Université de Montréal
Catherine Lemièrre	Université de Montréal
Jean-Luc Malo	Université de Montréal
Catherine Laprise	Université du Québec à Chicoutimi
Louis-Philippe Boulet	Université Laval
Jamila Chakir	Université Laval
Johanne Cote	Université Laval
Michel Laviolette	Université Laval
France Légaré	Université Laval
Joanne Milot	Université Laval
Dean Befus	University of Alberta
Mohit Bhutani	University of Alberta
Lisa Cameron	University of Alberta
Timothy Caulfield	University of Alberta
Philip F. Halloran	University of Alberta
Malcolm King	University of Alberta
Anita Kozyrskyj	University of Alberta
Paige Lacy	University of Alberta
Piush Mandhane	University of Alberta
Irvin Mayers	University of Alberta
Devidas Menon	University of Alberta
Bruce Ritchie	University of Alberta
Brian Rowe	University of Alberta
Bronwyn Shoush	University of Alberta
Miriam Stewart	University of Alberta
Brian Sykes	University of Alberta
Dilini Vethanayagam	University of Alberta
Harissios Vliagoftis	University of Alberta
Michael Brauer	University of British Columbia

<b>Name</b>	<b>Affiliation</b>
Ryan Brinkman	University of British Columbia
Chris Carlsten	University of British Columbia
Moiria Chan-Yeung	University of British Columbia
Denise Daley	University of British Columbia
Del Dorschied	University of British Columbia
Joshua Eades	University of British Columbia
Mark FitzGerald	University of British Columbia
Michael Kobor	University of British Columbia
Tobias Kollmann	University of British Columbia
Wan Lam	University of British Columbia
Larry Lynd	University of British Columbia
Michael Macdonald	University of British Columbia
Carlo Marra	University of British Columbia
Kelly McNagny	University of British Columbia
Greg Miller	University of British Columbia
Timothy Murphy	University of British Columbia
Peter Paré	University of British Columbia
Andrew Sandford	University of British Columbia
Patrick Tang	University of British Columbia
Scott Tebbutt	University of British Columbia
Stuart Turvey	University of British Columbia
Robert Cowie	University of Calgary
Stephen Field	University of Calgary
Richard Leigh	University of Calgary
Ronald Mathison	University of Calgary
Marjan Kerkhof	University of Groningen
Gerard H. Koppelman	University of Groningen
Adnan Custovic	University of Manchester
Allan Becker	University of Manitoba
Marni Brownell	University of Manitoba
Mariette Chartier	University of Manitoba
Kent HayGlass	University of Manitoba
Jeffrey Masuda	University of Manitoba

<b>Name</b>	<b>Affiliation</b>
Redwan Moqbel	University of Manitoba
Gustaaf Sevenhuysen	University of Manitoba
Nicole Letourneau	University of New Brunswick
Neil Taylor	University of North Carolina at Chapel Hill
Sharon Berthelet	University of Ottawa
Eric Crighton	University of Ottawa
Darryl Adamko	University of Saskatchewan
Donald Cockcroft	University of Saskatchewan
Wojciech Dawicki	University of Saskatchewan
John Gordon	University of Saskatchewan
Lisa Cicutto	University of Toronto
Miriam Diamond	University of Toronto
Greg Evans	University of Toronto
Richard Hegele	University of Toronto
Linn Holness	University of Toronto
Irena Kudla	University of Toronto
Gary Liss	University of Toronto
Wendy Wen-Yi Lou	University of Toronto
James Scott	University of Toronto
Jeremy Scott	University of Toronto
Frances Silverman	University of Toronto
Susan Tarlo	University of Toronto
Ross Upshur	University of Toronto
Peter Vadas	University of Toronto
Kathi J. Wilson	University of Toronto
Christoph Borchers	University of Victoria
Susan Elliott	University of Waterloo
Nancy Fenton	University of Waterloo
Susan Prescott	University of Western Australia
Colette Lachaine	Urgences-santé Québec
Jocelyn Moisan	Urgences-santé Québec
Bert Brunekreef	Utrecht University



<b>Researchers and Collaborators by University and other Canadian and International Organizations</b>		
	<b>#</b>	<b>%</b>
McMaster University	23	12%
University of British Columbia	22	12%
University of Alberta	18	10%
University of Toronto	15	8%
McGill University	8	4%
University of Manitoba	7	4%
Université Laval	6	3%
Université de Montréal	5	3%
Queen's University	4	2%
Simon Fraser University	4	2%
University of Calgary	4	2%
University of Saskatchewan	4	2%
Dalhousie University	2	1%
University of Ottawa	2	1%
University of Waterloo	2	1%
Université du Québec à Chicoutimi	1	1%
University of New Brunswick	1	1%
University of Victoria	1	1%
All Canadian Institutions	129	68%
<b>All Canadian Institutions</b>	<b>129</b>	<b>68%</b>
<b>Other Canadian Organizations and Institutions</b>	<b>45</b>	<b>24%</b>
<b>International Collaborators</b>	<b>15</b>	<b>8%</b>
<b>TOTALS</b>	<b>189</b>	<b>100%</b>

#### **Participating AllerGen Network Members (n=23)**

Dalhousie University  
 Centre de recherche du CHUM  
 Environment Canada  
 Hôpital du Sacré-Cœur de Montréal  
 Institut universitaire de cardiologie  
 et de pneumologie de Québec  
 McGill University  
 McMaster University  
 Queen's University  
 Simon Fraser University  
 St. John's Research Institute, India  
 St. Joseph's Healthcare, Hamilton  
 St. Michael's Hospital, Toronto  
 The Hospital for Sick Children  
 The McGill University Health Centre  
 (MUHC)  
 Université du Québec à Chicoutimi  
 University of Alberta  
 University of British Columbia  
 University of Calgary  
 University of Guelph  
 University of Manitoba  
 University of Saskatchewan  
 University of Toronto  
 University of Waterloo

**Canadian Hospitals/  
Research Institutes/Networks: 29**

Alberta Centre for Child, Family  
& Community Research  
Atlantic Aboriginal Health Research Program  
Canadian Institutes of Health Research  
Canadian Network for Respiratory Care  
Canadian Society for Epidemiology and  
Biostatistics  
Centre de recherche du CHUM  
– Hôpital Saint-Luc  
Centre for Addiction and Mental Health  
Centre for Drug Research and Development  
Centre of Excellence for the Prevention  
of Organ Failure  
COPD and Asthma Network of Alberta  
CORE: Collaboration for Outcomes  
Research & Evaluation  
Hôpital du Sacré-Coeur de Montréal  
Hôpital Sainte-Justine  
Hospital for Sick Children  
iCapture Centre  
Institut universitaire de cardiologie  
et de pneumologie de Québec  
IWK Health Centre  
Kingston General Hospital  
Manitoba ACADRE-NEAHR Network  
Manitoba Institute of Child Health  
McGill University Health Centre  
Mount Sinai Hospital, Toronto  
Network Environments Aboriginal Health  
Research (NEAHR)  
Northern Alberta Institute of Technology  
Ontario Institute for Cancer Research  
St. Joseph's Hospital, Hamilton  
St. Michael's Hospital, Toronto  
Urgences-santé Québec  
Winnipeg Health Sciences Centre

**2011-2012 Highly Qualified Personnel and Research Staff**

Zainab Abdurrahman	Suzanne Beaudin
Loubna Akhabir	Pierrick Bedouch
Umme Akhtar	Philippe Bégin
Ayham Al Afif	Glenda Bendiak
Scott Aldersey	Moshe Ben-Shoshan
Amal Al-Garawi	Mylène Bertrand
Moshin Ali	Sacha Bhinder
Zoulfia Allakhverdi	Cai Bing
Sheka Aloyouni	Agatha Blancas
Megan Alton	Amber Blood
Leanne Ambrose	Roxanne Blood
Nelly Amenyogbe	Martine Bordeleau
Reshma Amin	Marie-Eve Boulay
Farzian Aminuddin	Rami Boulvi
Ofer Amram	Lisa Bourque Bearskin
Sharon Anderson	Graeme Bredo
Katherine Arias	Meghan Brown
Narcy Arizmendi	Christian Bruenahl
Victoria Arrandale	May Brydges
Saeed Arsani	Sarah Burke
Muhammad Asaduzzaman	Vanessa Byrne
Yuka Asai	Pierre Camateros
Jennifer Asanin-Dean	Heather Campbell
Ghazal Assadin	Maureen Campbell
Meghan Azad	Lei Cao
Adrian Baatjes	Maureen Cardinal
Prithy Babu	Theresa Cardinal
Salma Bahreinian	Sylvie Carette
Susan Balkovec	Kaitlyn Carson
Kendra Barrick	Sam Carter
Shirley Beauchamp	Beatriz Castaneda

Shamanta Chandran  
 Jessie Chau  
 Sri Chaudhuri  
 Carol Chen  
 Rupinder Chera  
 Joyce Chikuma  
 Rishma Chooniedass  
 Bonnie Chow  
 Derek Chu  
 Daniel Cohen  
 Matthew Cooney  
 Sara Courtis  
 Fiona Cowley  
 Melanie Cowley  
 Heather Cruickshank  
 Melanie Courtot  
 Matthew Dahl  
 Beth Davis  
 Pearl Davis  
 Carlo De Olim Rugginenti  
 Erin DeBruin  
 Kara DeCorby  
 Suzanne Deeb  
 Kristie DeHaan  
 Shauna Denis  
 Annick Des Cormiers  
 Francine Deschesnes  
 Anthony DiDomizio  
 Maureen Dobbins  
 Suzanne Dostaler  
 Maureen Douglas  
 Renée Douville

Jenna Drabble  
 Susan Du  
 Benny Dua  
 Aimee Dubeau  
 Luanna Dulaba  
 Curtis Dumonaceux  
 Joanne Duncan  
 Stacey Dunn  
 Judy Durocher  
 Ann Efthimiadis  
 Tempest Emery  
 Gina Faigen  
 Kelsey Falk  
 Connette Falkson  
 Nancy Fenton  
 Katherine Fisher  
 Laura Fitzgerald  
 Ranulu Fonseka  
 Ambris Ford  
 Edgardo Fortuno  
 Joe Fragapane  
 Julie Francis  
 Kathleen Fraser  
 Deanna French  
 Shannon French  
 Mara Fridell  
 Erin Frohwerk  
 Elaine Fuertes  
 Irene Fung  
 Sara Fung  
 Melissa Gabruck  
 Myriam Gagné

Christa Gardner  
 Nicole Garzia  
 Émilie Gelinas-Lymburner  
 Brenda Gerwing  
 Deanna Gilbert  
 Luisa Giles  
 Kulvinder Gill  
 Cathy Gillespie  
 Matthew Gold  
 Elaine Gong  
 Dawn GooGoo  
 Emma Goosey  
 Sara Gordon  
 Justina Greene  
 Nicole Gregory  
 Rajdip Grewal  
 Maja Grubisic  
 Deanna Gunson  
 Tillie Louise Hackett  
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 Ian Haidl  
 John Halfe  
 Steve Hancock  
 Henry Hao  
 Daniel Harrington  
 Carrie Hartman  
 Ryan Hartman  
 Jianqing He  
 Leah Heldman  
 Delia Heroux  
 Angie Hillaby  
 Jeremy Hirota

Alison Hirukawa  
 Barnaby Hobsbawn  
 Jeremy Hobson  
 Kirsten Hoeve  
 Jennifer Hogg  
 Qi Hong  
 Doug Houlbrook  
 Karen Howie  
 Carolyn Hsu  
 Henry Huang  
 Adam Hughes  
 Michael Hughes  
 Claudia Hui  
 Linda Hui  
 Kristin Hunt  
 Saiful Huq  
 Robyn Hyde-Lay  
 Ramses Ilarraza  
 Haruki Imaoka  
 Moe Islam  
 Roberta Jackson  
 Caitlin Jago  
 Renee Jensen  
 C-H Jeong  
 Shelby Johnson  
 Fiona Jones  
 Jimmy Joy  
 Dellanee Kahlke  
 Sarah Kam  
 Cynthia Kanagaratham  
 Kim Kara  
 Khalil Karimi

Barbara Karlen  
 Michael Kariwo  
 Colleen Keast  
 Amir Khakban  
 Nivedita Khanna  
 Katie Killorn  
 Alyssa Kim  
 Emma Kim  
 Takashi Kinoshita  
 Olivia Kitt  
 Melanie Kjarsgaard  
 Carissa Klassen  
 Matt Klassen  
 Stacey Klassen  
 Megan Knoll  
 Linda Knox  
 Jordan Koe  
 Lizzy Koidattu  
 Joshua Kong  
 Tedd Konya  
 Matthew Kowgler  
 Jacklyn Koyama  
 Joyce Kum  
 Jennifer Kwan  
 Erika Ladouceur  
 Natasha Lalji  
 Salma Lalji  
 Kim Lambert  
 Marie-Helene Lambert  
 Amanda Lau  
 Alexandra Lauzier  
 Anouk Lavoie-Lamoureux

Mathilde Leclère  
 Amie Lee  
 Louise Lee  
 Diana Lefebvre  
 Jerry Legierski  
 Johane Lepage  
 Claire Lepine  
 Andrew Leung  
 Alba Llop-Guevara  
 Bernard Lo  
 Raymond Lo  
 Brenda Loewen  
 Ingrid Loewen  
 Mark Loewen  
 Carley Logan  
 Steven Long  
 Larisa Lotoski  
 Lionel Loubaki  
 Stephanie Lu  
 Jing Luo  
 Danielle Lustgarten  
 Emily Maclean  
 Elaina MacIntyre  
 Fiona Mackenzie  
 Meaghan MacNutt  
 Stephanie Macpherson  
 Ruth MacRedmond  
 Anne-Marie Madore  
 Travis Magill  
 Sally Maguet  
 Fatihma Mahammadi  
 Edward Makwarimba

Crystal Malone  
 Bianca Malouf  
 Steven Maltby  
 Robby Mamonluk  
 Paolo Mangahas  
 David Marchant  
 Nico Marr  
 Dawn Marshall  
 Lexie Martin  
 Amir Hossaine Massoud  
 Zubin Master  
 Peter Mastrangelo  
 J Masuda  
 Mary Ann Mauro  
 Suzanne McCollum  
 Caitlin McGarry  
 Shawna McGhan  
 Marilyn McGillis  
 Karen McLean  
 Kellie McLean  
 Kathleen McLean  
 Mike McNeill  
 Susan Menzies  
 Pascal Mercier  
 Christopher Mill  
 Joanne Milot  
 Jessica Miniaci  
 Andréanne Morin  
 Blake Murdoch  
 Natalia Mykhaylova  
 Kristan Nagy  
 Deanna Nakonechny

Geeta Nathan  
 Kathleen Nelligan  
 Nha Nguyen Luu  
 Michelle North  
 Dominik Nowak  
 Catie Obminski  
 George Obminski  
 Megan O'Connor  
 Jennifer O'Hara  
 Sharon Oldford  
 John Paul Oliveria  
 Vanessa Omana  
 Maggie Ong  
 Hong Ouyang  
 Julie Park  
 Christopher Pascoe  
 Amit Patel  
 Athena Paul  
 Alicia Pawlowski  
 Aaron Peck  
 Faye Pedersen  
 Miki Peer  
 Maria Penner  
 Tierza Penner  
 Gabriel Pépin  
 Boris Perelman  
 Emma Perkins  
 Akira Peters  
 Anne Philipneri  
 Tracy Pitt  
 Giuseppe Pontoriero  
 Audrey Poon



David Préfontaine  
Philippe Prince  
Jennifer Protudjer  
Mandy Pui  
Vanessa Quach  
Christen Rachul  
Nadia Rampersad  
Jodan Ratz  
Pia Reece  
Marcos Ribeiro  
Nola Ries  
Emily Rousseau  
Roxanne Rousseau  
Lilla Roy  
Jian Ruan  
Shannon Russell  
Sina Rusta-Sallehy  
Mohsen Sadatsafavi  
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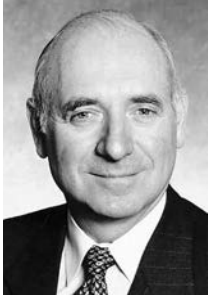
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