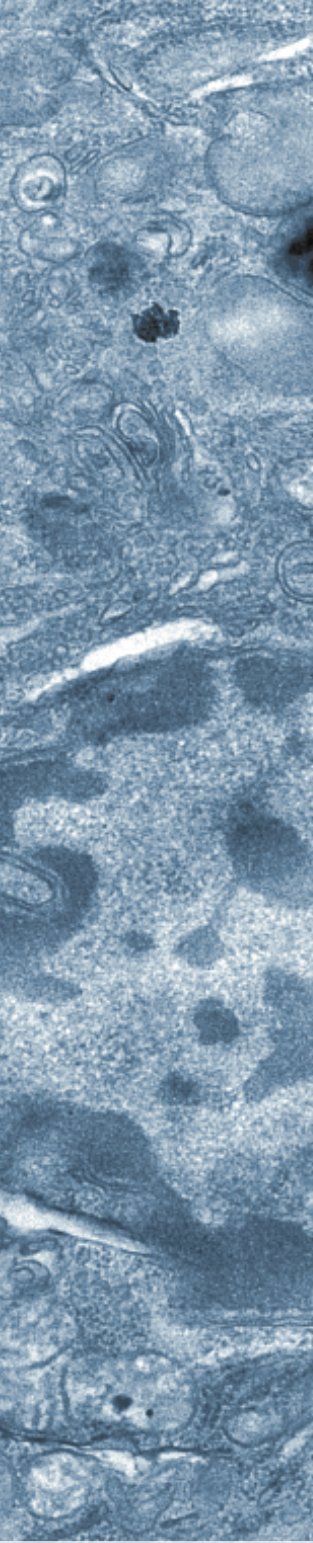




AllerGen



Networks of Centres
of Excellence

Annual Report 2008-2009

AllerGen's Vision:

To create an enduring network of allergy and immune disease experts whose discovery and development efforts contribute to reducing 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.

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Special thanks to Topigen Pharmaceuticals Inc. for use of their electron microscopy photograph of a Wright-Giemsa stained mouse alveola macrophage, which is featured on the cover of this report.

AllerGen NCE Inc. is made possible through funding from the Networks of Centres of Excellence Program. The Networks of Centres Excellence Program is a joint initiative of the Natural Sciences and Engineering Research Council (NSERC), the Canadian Institutes of Health Research (CIHR), the Social Sciences and Humanities Research Council (SSHRC) and Industry Canada.

Board of Directors 2008-2009



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CEO, Graham Scott Strategies Inc.



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ex officio

Dr. Tia Moffat
Senior Program Manager,
NCE Program, Ottawa, ON
ex officio

Message from the Chair and the Scientific Director



Graham Scott
Chair
Board of Directors

As an integrated and fully operational network, AllerGen NCE Inc. has secured funding from the Networks of Centres of Excellence Canada (NCE) Program to 2012, following a successful mid-term review in October 2008. It is, therefore, with immense pride that we present AllerGen's fourth annual report for the period April 1, 2008 to March 31, 2009, highlighting an extremely successful year for this maturing Network.

Thanks must go to everyone who participated in the mid-term review, particularly AllerGen's Board of Directors, Network researchers and Administrative Centre staff, whose combined efforts are the foundation of our success. We also extend our appreciation to the members of the NCE Expert Panel, chaired by Dr. Verna Skanes, who carefully reviewed AllerGen's extensive documentation and provided us with valuable feedback and encouragement.

In March 2009, AllerGen launched its third call for proposals for allergic and related disease research and development initiatives. Proposals for multidisciplinary, networked and partnered programmes of research to be supported by the Network to 2012 were reviewed and adjudicated, and the results of this call for proposals were issued in July 2009. The focus of all the research proposals is on strengthening AllerGen's goal of reducing the impact of allergic and related immune diseases nationally and globally.



Judah Denburg
Scientific Director
and CEO

The Network has successfully established strong partnerships with research, industry, health care and non-profit organizations at the national and international levels. These partnerships have enabled the translation of AllerGen research results into economic and social benefits for Canadians. Through AllerGen's highly successful International Partnership Initiative (IPI), strong ties have been established with similar networks with a reputation for research excellence worldwide. New ties have also been developed with international organizations such as the Humboldt Foundation in Germany and the European Union-funded GABRIEL study for the discovery of the genetic and environmental causes of asthma. It is hoped that the development of partnerships with international organizations will lead to future research and knowledge and technology exchange and exploitation (KTEE) collaborations with a shared goal of reducing the global impact of allergic and related immune diseases.

AllerGen is moving towards a self-supporting Clinical Investigator Collaborative (CIC) and aims to expand its research and clinical trial collaborations globally. Since inception, AllerGen's CIC has established 11 pharmaceutical partnerships worth over \$8 million, generating new jobs and creating economic activity within Canada.

The Network continues to develop Highly Qualified Personnel (HQP) by creating research and capacity building opportunities in a unique, multidisciplinary and multi-sectoral environment. This year AllerGen has a record 254 HQP in the Network, representing a 20% increase in the number of HQP from the previous year.

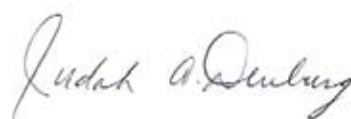
AllerGen's commitment to enabling KTEE has been strengthened by the addition of strategically aligned research projects that aim to influence policy change and improve healthcare. In January 2009, AllerGen also established a Policy, Ethics, Law and Society (PELS) Advisory Committee. The PELS Committee seeks to facilitate the translation of AllerGen research that has policy implications and identify emerging PELS issues that warrant a policy response from the Canadian research community. To achieve this goal, the PELS Committee will draw on the unique interdisciplinary expertise within the AllerGen Network and will endeavour to build enduring links between AllerGen researchers and Canadian policymakers.

None of these results would have been achieved without the strong leadership and direction of the Board of Directors, Network Advisory Committees, Network management and a proficient and professional Administrative Centre team. The AllerGen Administrative Centre has recently been restructured to strengthen capacity in support of the many new initiatives that have emerged from Network partnerships and collaborations.

This year's annual report aims to provide you with a high level overview of AllerGen's achievements 2008-2009. We encourage you to visit the website for greater detail about the Network's activities and accomplishments and welcome any feedback you may have.



Graham Scott
Chair, Board of Directors



Judah Denburg
Scientific Director and CEO

Highlights 2008–2009

NCE Funding Renewal

On Friday November 28, 2008, the Networks of Centres of Excellence (NCE) Program confirmed that AllerGen was successful in its bid to secure the balance of its initial phase of NCE funding for the period 2009–2012.

As a result of the positive outcome of the NCE Mid-term Review, AllerGen will continue to build upon its research investments and efforts to improve the prevention, control and treatment of allergic and related immune diseases and generate social and economic benefits for Canadians.

AllerGen would like to recognize the NCE Expert Panel Members who reviewed the Network's progress for 2004–2008 and its strategic priorities and plans to 2012:

- Dr. Verna Skanes, St John's, NL (*Chair*)
- Philip Bert, Cooperative Research Centre for Asthma and Airways, University of Sydney, Australia
- Dr. Stephen Lazarus, Professor and Interim Chief, Pulmonary and Critical Care Medicine, University of California
- Dr. Soheila Maleki, Research Chemist, US Department of Agriculture
- Dr. Sandra Sulsky, Senior Manager, Epidemiology, ENVIRON

Birth Cohort Progresses

After its successful launch on June 6, 2008, the groundbreaking, multi-site Canadian Healthy Infant Longitudinal Development (CHILD) Study is fully underway after obtaining ethics approval in all four recruitment sites (Toronto, Winnipeg, Edmonton, Vancouver).

The CHILD Study is a longitudinal birth cohort study involving a team of 37 investigators from multiple disciplines, spanning the Network's three programmes of research. The CHILD Study is undertaking a national investigation of the genetic and environmental factors that influence the development of asthma and allergies in children from conception to age five.

A separate Mini-CHILD project, which began in 2007 with eight AllerGen investigators from Ontario and British Columbia, has provided much of the groundwork for the launch of the CHILD Study. Mini-CHILD piloted recruitment procedures, use of new diagnostic tools, indoor environment inspections, psychological assessments and traffic-related air pollution models, resulting in the testing and refinement of effective protocols and methods that are now implemented in the CHILD Study.

The vanguard stage of CHILD (recruitment in late 2008 of some 200 subjects at four centres) is now complete and has been evaluated by the team, who as a result, have refined their methods and questionnaires towards realizing the CHILD Study's full recruitment target of 5,000 mothers.

Food Labelling Research Nearing Completion

The *Surveying Canadians to Assess the Prevalence of Common Food Allergies and Attitudes towards Food Labelling and Risk* (SCAAALAR) study, which was launched on July 23, 2008, has now surveyed almost 9,000 individuals across the country to determine the percentage of Canadians directly or indirectly affected by peanut, tree, fish, shellfish and sesame allergies and to examine the effectiveness of labelling policies by the food industry.

These national telephone surveys led by Drs. Ann Clarke and Susan Elliott are being undertaken in collaboration with nine partners including Health Canada, Agriculture and Agri-Food Canada and l'Association Québécoise des Allergies Alimentaires.

The study, which has received federal funding and generated extensive media attention, will inform Canadian policy makers about the needs for health and educational resources for the prevention, diagnosis and management of allergic diseases.

It is hoped that the SCAAALAR study results, available in late 2009, will help Canadian policy makers ensure that sufficient resources are allocated to help companies develop clear and safe food product labelling practices.

Research Management Committee Membership

Judah Denburg, Allergan NCE Inc. (*Chair*)
 Allan Becker, University of Manitoba
 Dean Befus, University of Alberta
 Louis-Philippe Boulet, Université Laval
 Jeffrey Brook, Environment Canada
 Tim Caulfield, University of Alberta
 Susan Elliott, McMaster University
 Patricia Lorenz, Sedulous Investments
 Paul O'Byrne, McMaster University
 Peter Paré, University of British Columbia
 Mark Raizenne, Public Health Agency of Canada
 Malcolm Sears, McMaster University
 David Shindler, BioDiscovery Toronto Inc.
 Brian Underdown, Lumira Capital Corporation
 Diana Royce, Allergan NCE Inc. (*ex officio*)
 Tia Moffat, Networks of Centres of Excellence (*ex officio*)

Administrative Centre

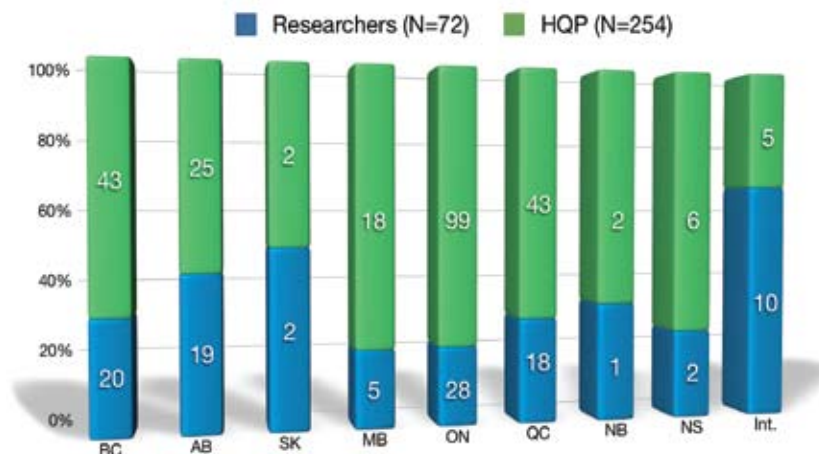
Diana Royce, Managing Director and Chief Operating Officer (COO)
 Liz Dzaman, Network Executive Secretary
 Jessie Ielati, Senior Communications Officer
 Susan Kallsen, Administrative Manager
 Cynthia Miskas, Financial Officer
 Mark Mitchell, Manager, Research and Partnerships
 Melissa Shuker, Strategic Initiatives Coordinator

Network-Supported Intellectual Property Advisory Committee

Diana Royce, Managing Director and Chief Operating Officer (*Chair*)
 Dean Befus, University of Alberta
 Terry Delovitch, Robarts Research Institute
 Judah Denburg, McMaster University
 John-Paul Heale, University of British Columbia
 Patricia Lorenz, Sedulous Investments
 Brian Underdown, Lumira Capital Corporation

Researchers and HQP by Province

Allergan's Network includes 326 Network Researchers, Principal Investigators, Co-investigators, Collaborators and Highly Qualified Personnel (HQP) and is pan-Canadian and international in composition.



Network Research and Knowledge Translation Partners and Collaborators (N=106)

| | |
|-----------------------------------|----|
| Academic Institutions: | 20 |
| Research Institutes: | 18 |
| Hospitals: | 9 |
| Federal/Provincial Organizations: | 12 |
| Associations/Foundation: | 25 |
| Industry Partners: | 22 |

Network Research Funded Projects (N=35)

| | |
|------------------------|----|
| Theme based: | 2 |
| Programmatic projects: | 25 |
| Strategic Initiatives: | 8 |

AllerGen's Strategic Research Priorities and Objectives

AllerGen invests in nationally networked research teams that demonstrate excellence and productivity and that offer unique capacity building opportunities. These research teams build on and extend existing AllerGen and partner investments with potential to accelerate social and economic impact through application of research results to real world problems and challenges faced by partner organisations, sectors of the Canadian economy and/or society.

AllerGen research priorities include three research foci of strategic importance to the generation of new knowledge in the area of allergic and related immune disease. These research foci are as follows:



Jeffrey Brook
Environment Canada



Peter Paré
University of British
Columbia

Programme A:

Gene-Environment Interactions

Research leaders: Jeffrey Brook, *Environment Canada* and Peter Paré, *University of British Columbia*.

AllerGen's Gene-Environment Interactions research programme aims to capitalize on the wealth of data concerning early life phenotypes by pooling data across existing cohorts, focusing on genetic polymorphisms in genes related to early life allergic processes and establishing a new Canadian Allergy & Asthma Birth Cohort. In addition, this programme aims to determine the 'prime-candidate' environmental events and exposures during infancy and early childhood involved in the development and perpetuation of the allergic diathesis, as well as to investigate the interaction of airborne pollutants and allergens, study the role of infection in allergy/asthma and study prevalence and expression of allergy/asthma in specific Canadian populations.

Programme B:

Diagnostics and Therapeutics

Research leaders: Dean Befus, *University of Alberta* and Paul O'Byrne, *McMaster University*

AllerGen's Diagnostics and Therapeutics research programme aims to identify indicators of asthma and allergic disease, develop effective monitoring methods and develop new therapeutics to treat allergy, asthma and immune-related diseases. Programme B also aims to move biomarkers and immune monitoring science out of the laboratory and apply them to the development of new therapies and drug targets in a clinical setting.



Dean Befus
University of Alberta



Paul O'Byrne
McMaster University



Susan Elliott
McMaster University

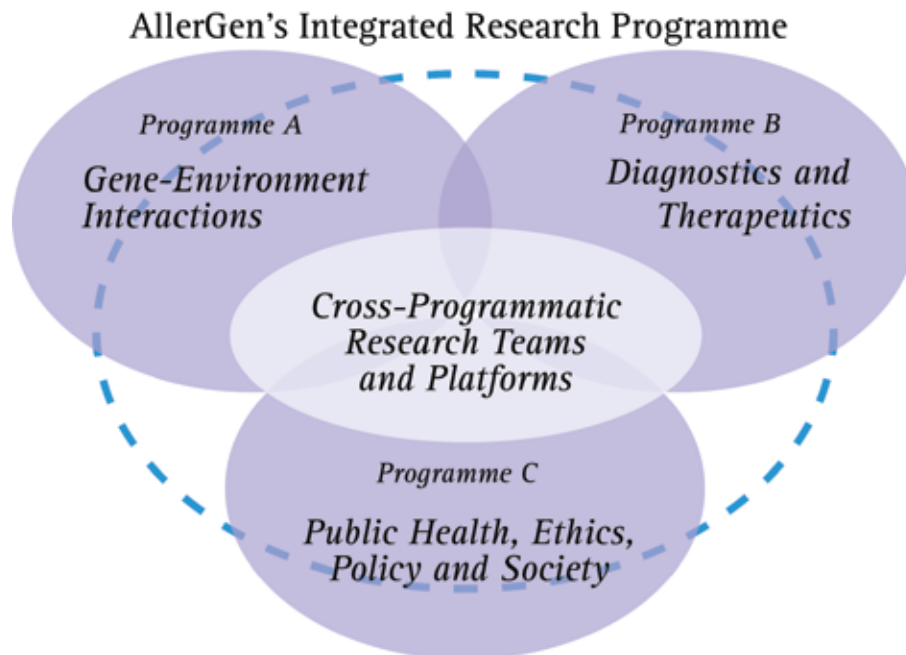


Allan Becker
University of Manitoba

Programme C: Public Health, Ethics, Policy and Society

Research Leaders: Susan Elliott, *McMaster University* and Allan Becker, *University of Manitoba*

AllerGen's Public Health, Ethics, Policy and Society research programme aims to assess current legal frameworks, policies and education systems, as well as prevalence and perception issues to fill knowledge gaps and enable evidence-based policy and practice and improve disease management and public health. The programme 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 practice.



Four cross-programmatic, multidisciplinary research teams fostered by AllerGen since 2005 will continue to be research investment priorities from 2009-2012:

Established Cross-programmatic Teams

- The Canadian Healthy Infant Longitudinal Development (CHILD) Study
- Food Allergy and Anaphylaxis

Emerging Cross-programmatic Teams

- Mind-Body Interactions and Allergic Disease
- Occupational and Work-related Allergy and Asthma

AllerGen's Goal: *To catalyze and support innovative research that contributes to the discovery of the causes of, and ways to prevent, control or eliminate allergic and related immune diseases.*

Cross-programmatic Research Teams in Priority Areas

In fulfillment of the Network's mandate, AllerGen's research projects have evolved into multi-sectoral and multi-disciplinary cross-cutting research teams.

Canadian Healthy Infant Longitudinal Development (CHILD) Study

This multi-year birth cohort study developed from 2005-07 and launched in 2008 is investigating the genetic and environmental factors that influence the development of asthma and allergies in children in order to develop new therapies, medications, prevention and management strategies to control these chronic illnesses. Led by Dr. Malcolm Sears, Professor of Medicine at McMaster University, the CHILD Study is following 5,000 Canadian children from conception through early childhood (age 5) and investigating the roles of indoor and outdoor environmental exposure, infections, nutrition and genetics in the development of asthma and allergies to support new health and environmental policies, programmes and regulations, as well as regulations governing home and building construction. The CHILD Study started recruitment in July 2009 following a successful pilot programme (Vanguard CHILD study) that recruited 200 mothers. Mini-CHILD, which started in 2007, has also piloted several recruitment procedures and questionnaires that have provided much of the groundwork for the launch of the CHILD Study.

- *Psychosocial Assessment and Epigenetics*
E Chen, M Kobor, G Miller, University of British Columbia
- *Environment Assessment of Home Environment*
T Takaro, Simon Fraser University
- *Environmental Assessment of Land Use Regression*
R Allen, Simon Fraser University, M Brauer, University of British Columbia
- *Environmental Assessment of Molecular Genetic Characterization of Microbes in Outdoor and Indoor Air and Dust*
James Scott, University of Toronto

CHILD Study

Director: M Sears, St. Joseph's Healthcare,
McMaster University

Site leaders: PJ Subbarao, The Hospital for Sick Children
A Becker, University of Manitoba

P Mandhane, University of Alberta

S Turvey, University of British Columbia

Research investments 2008-2009

(Programme A: Gene-Environment Interactions)

Mini-CHILD

- *Recruitment*, S Turvey, University of British Columbia
T Kollmann, University of British Columbia
- *Lung Function and Inflammatory Biomarkers*
P Subbarao, The Hospital for Sick Children, Toronto
- *Genetics*, Development of a Microarray Genotyping Chip
S Tebbutt, University of British Columbia

Food Allergies and Anaphylaxis

AllerGen's Food Allergies and Anaphylaxis research investment aims to address the serious and prevalent problem of food allergy and to study the clinical and social implications of these conditions, as well as isolate the mechanisms of action associated with food allergies, with a view to developing more refined diagnostics and treatment strategies and tools. Desired results from AllerGen's multidisciplinary food allergy and anaphylaxis research investments include: enhanced understanding of the underlying genetic and environmental risks and causes of food allergy; improved diagnostics and therapeutics; disease prevention and control strategies; new evidence-based public

policies; and improved health and safety for food allergy sufferers. This research investment is supported by Programmes A, B and C.

Research Investments 2008-2009

- *Identification of genetic predictors of peanut allergy*
C Laprise, Université du Québec à Chicoutimi,
A Sandford, University of British Columbia (A)
- *Canadian Group on Food and Allergy Research (CanGoFar)*
J Marshall, Dalhousie University (B)



Malcolm Sears
Director
CHILD Study



PJ Subbarao
Deputy Director
CHILD Study

- *Surveying Canadians to assess the prevalence of common food allergies and attitudes towards food labelling and risk*
A Clarke, McGill University Health Centre (C)
- *Evaluation of the implementation and effectiveness of statutory and regulatory school-based policies for anaphylaxis risk reduction*
L Cicutto, University of Toronto (C)

- *Building continuity of support for allergic children with asthma and/or anaphylaxis and their families*
M Stewart, University of Alberta (C)

Strategic Initiatives

- *Consumer Preference for Allergen Food Labelling*
C Marra, University of British Columbia (C)
- *E-Learning on anaphylaxis for school teachers and staff*
A Levinson, McMaster University (C)

Mind-Body Interactions and Allergic Disease

AllerGen's Mind-Body Interactions and Allergic Disease research investment focuses on the effect of the environment, including psychosocial and socio-cultural factors from conception onward, as well as epigenetic changes and biological markers involved in the development and expression of allergic diseases, with direct application to the CHILD Study. This research team will examine the connection between brain activity and its potential to trigger asthma and allergies. The long-term aim of AllerGen's Mind-Body Interactions research focus is to develop intervention strategies that may be utilized nationally to decrease the impact of allergic disease. This research investment is supported by Programmes A, B and C.

Research investments 2008-2009

- *Perinatal stress and programming of allergic responses*
J Bienenstock, McMaster University (B)

- *Neuroimaging and environmental suggestibility in asthma*
G MacQueen, University of Calgary (B)
- *Stress allostatic load and risk of allergies and asthma in children of immigrants*
C Soares, McMaster University (C)
- *Stress, asthma and atopy socio-spatial investigations*
A Kozyrskyj, University of Alberta (C)
- *Neuroendocrine regulation of allergic reactions in animal models: Translation to humans*
D Befus, University of Alberta (B)
- *Postpartum Distress and Childhood Asthma*
A Kozyrskyj, University of Alberta and D Daley, University of British Columbia (A)

Occupational and Work-related Allergy and Asthma

AllerGen's Occupational and Work-related Allergy and Asthma research investment focuses on bio-banking and gene-environment interactions in the etiology of occupational asthma, as well as changing practice for prevention and early detection of occupational asthma and allergic diseases in the primary care setting. The aim is to clarify the mechanisms involved in occupational and work-related allergy and asthma, develop Canadian prevalence data and increase the uptake of improved diagnostic and prevention strategies and tools. This research team also aims to identify the economic and social impacts of occupational and work-related allergy and asthma, and develop related policy and practice tools and recommendations. This research investment is supported by Programmes A and C.

Research investments 2008-2009

- *Changing practice for prevention and early detection of occupational asthma and allergic diseases in the primary care setting*
D Lougheed, Queen's University (C)

Strategic Initiative

- *Pan Canadian study of gene-environment interactions in the etiology of occupational Asthma*
N Cherry, University of Alberta (A)

AllerGen Core Research Projects

In addition to cross-programmatic research, there are several research projects funded within AllerGen's three research programmes:

Programme A: Gene-Environment Interactions

Research investments 2008-2009

- *Develop and implement an allergen-gene environment database resource*, D Daley, University of British Columbia
Aim: To develop a database resource that includes pedigree structure, exposure and phenotype information for all subjects in four asthma and/or allergic disease study cohorts. Analysis of the gene-gene and gene-environment interactions in these cohorts will help provide further understanding of these diseases, with results to be shared on a web-based portal.
- *Environmental effects on allergic airway disease*, Jeremy Scott, University of Toronto
Aim: To determine the effect of exposure to coarse ambient particulate pollutants on upper airway symptoms in subjects with seasonal allergic rhinitis and/or asthma. The investigator is also examining whether specific gene-environment interactions are responsible for the development and/or exacerbation of allergic respiratory symptoms. This research should lead to further understanding of how pollutants can induce allergic disease at both the genetic and molecular level.

Strategic Initiatives

- *AllerGen Animations*, S Tebbutt, University of British Columbia
Aim: To develop an innovative animation tool to help engage and educate society about genetics and asthma. One animation was developed to visualize the action of medication on airway smooth muscle cells, taking into account the possible role of genetic variation. An additional animation was developed to more clearly show how genetic variation would be ascertained in future point-of-care diagnostic devices, such as the AllerChip. These animations are intended for use in tertiary scientific/medical education, and for more general lay-audience engagement/education.
- *Pan-Canadian study of gene-environment interactions in the etiology of occupational asthma*, N Cherry, University of Alberta
Aim: To explore the feasibility of establishing and exploiting a pan-Canadian bank of biologic materials from clinically confirmed cases of occupational asthma and from similarly exposed 'controls'. Analysis of these materials could identify factors important in occupational asthma as well as provide an understanding of how these factors contribute to asthma more generally.

Reducing asthma triggers

AllerGen Programme A researcher, Dr. Tim Takaro, Associate Professor, Faculty of Health Sciences at Simon Fraser University, is reminding people to keep moisture out of the home in order to control asthma.

"When moisture builds up indoors, particularly in carpets, moulds, bacteria, dust mites and roaches (which have all been linked to the development of asthma and asthma morbidity) can all proliferate," says Dr. Takaro.

Dr. Takaro is part of AllerGen's CHILD Study, a groundbreaking national birth cohort that tracks 5,000 Canadian infants from pregnancy through to early childhood.

Dr. Takaro and fellow researchers are currently analyzing the immune function in the collected blood samples and measuring environmental asthma triggers in homes of the study participants.

"We know that Canadian children spend 80-90% of their early life indoors. That's why it is extremely important to identify asthma triggers inside the home," says Takaro.

Moisture and dampness, poor ventilation, crowding, pest infestations, residence in multi-unit dwellings, deteriorated carpeting and structural deficits are all indoor triggers of asthma.

"There are several things people can do to reduce asthma triggers in the home, such as keeping dust to a minimum, preventing water intrusion, increasing ventilation, washing bedding and stuffed animals, using hard surface flooring materials, roach bait, rodent traps and not smoking," says Takaro.

"The CHILD Study is placing an innovative focus on traffic pollutants that make their way indoors. It is hoped that results from the home-based environmental assessments of indoor air quality will also influence future home construction policy and practices as well as influence consumer product regulations," says Takaro.



Tim Takaro

Programme B: Diagnostics and Therapeutics

Research investments 2008-2009

- *Ontogeny and genetic polymorphisms of the innate immune system intersecting in atopy*, S Turvey and T Kollmann, University of British Columbia
Aim: To explore the innate immune response to common

environmental triggers at birth and in the first years of life. The researchers will also explore how common genetic variants can impact this innate immune response and how a given innate response affects allergen-specific adaptive responses. Results could provide additional insight into the genetic and environmental basis for the development of allergic disease in early life.

- *An immune phenotyping platform for adaptive immunity, to identify biomarkers of development of allergic disease and impact of therapeutic intervention*, **M Larché**, McMaster University
Aim: To explore how the pattern of innate immune responsiveness in very early life influences the development of atopy. Results could provide additional insight into the immunological mechanisms of allergic disease.
- *Intracellular cytokine production: T-lymphocyte responses to TLR4 in atopic and non-atopic individuals*, **B Mazer and Q Hamid**, McGill University
Aim: To explore immunological pathways that could further our understanding of potential biological markers for atopic children. Results could provide additional insight into the immunological mechanisms of asthma.
- *Hemopoietic stem cells as biomarkers of atopy, airway inflammation and epigenetic memory*, **J Denburg**, McMaster University
Aim: To explore the role played by innate immune cells derived from the bone marrow (progenitors) in allergic inflammation and disease pathogenesis. In particular, results could provide additional insight into the roles that hemopoietic processes play in determining the development of atopy and asthma in early infancy and childhood.
- *Regulation of lung mucosal immune responses by heterologous exposure to multiple infectious and allergic agents*, **Z Xing and M Jordana**, McMaster University
Aim: To explore the impact of heterologous viral/bacterial infections or environmental allergens on immune response and disease outcomes in the respiratory mucosa. This research could provide novel knowledge in the immunopathogenesis of respiratory diseases, ultimately contributing to better management of respiratory diseases and inspire novel intervention strategies.
- *Environmental impact on the epithelial immune barrier in asthma*, **T Bai**, University of British Columbia
Aim: To evaluate the effects of viral infection and particulate matter air pollution on the normal airway epithelial immune barrier function in asthmatic airways. Results could lead to the identification of new molecular mechanisms and therapeutic targets through analysis of the compromised asthmatic airway epithelium.
- *Role of mast cells and eosinophils in allergic inflammation and fibrosis of the lung*, **K McNagny**, University of British Columbia
Aim: To explore the roles played by white blood cells, specifically eosinophils and mast cells, in the pathobiology of hypersensitivity pneumonitis (HP). A major goal of this proposal will be to develop tools that allow a detailed examination of the role of eosinophils and mast cells in HP fibrosis and hyper-responsiveness.
- *Study of the pathogenesis and reversibility of airway damage and repair during chronic mucosal immune responses to environmental allergens*, **JP Lavoie**, Université de Montréal
Aim: To characterize the relationship between the environmental allergen challenge, chronic asthmatic inflammation and airway smooth muscle remodeling in equine heaves. This project aims to establish new experimental research models for the investigation

of pulmonary inflammatory and immune responses, and could define potential new targets for the prevention and therapy of immune-related lung disease.

- *Non-invasive diagnostics: Metabolics for the various phenotypes of asthma*, **D Adamko**, University of Alberta
Aim: To study small molecules and metabolites generated by cellular activity in health and disease, particularly atopic disease. The researchers will conduct a metabolomic evaluation of urine from patients with atopic diseases to help identify physiological inflammatory "signatures" by nuclear magnetic resonance spectroscopy (NMR). Outcomes of this project include the establishment of a NMR-based metabolomics platform for AllerGen researchers, and the creation of metabolic phenotypes for rapid and accurate diagnosis of specific diseases.

Strategic Initiatives

- *Thymic Stromal Lymphopoietin-induced Cord Blood Hemopoietic Progenitors: Biomarkers for the Development of Atopy and Asthma*, **J Denburg**, McMaster University
Aim: To examine the "bone marrow hypothesis" of the development of atopy and asthma. In addition to providing information on etiology, these studies could lead to new diagnostic, preventive and/or therapeutic approaches (or guide existing consensus on therapies) in atopic diseases and asthma.
- *Cross-talk between Airway Epithelial and CD34 Hemopoietic Progenitor Cells Mediated by TSLP and IL-33 in Asthmatic and Normal Individuals*, **G Delespesse**, Université de Montréal
Aim: To further examine whether the production of the TSLP gene and the responsiveness to TSLP are different in normal control and in allergic asthmatic subjects and whether these responses are influenced by the TSLP genotype. These studies have the potential to allow the prediction of the development of allergic asthma in newborns.
- *Functional TSLP genomics in vitro and ex vivo: human epithelial cell production of TSLP in relation to asthma development*, **P Paré**, University of British Columbia
Aim: To determine the predictive value of TSLP gene variants with respect to immunological phenotype. It also aims to determine if this genetic variation impacts the expression of the TSLP gene in response to injurious airway stimuli. Results could provide a better understanding of the TSLP gene in the pathogenesis of asthma and other allergic diseases and could provide a very attractive novel target for therapy.
- *Development of a human phthalate inhalation exposure model*, **C Carlsten**, University of British Columbia
Aim: To develop a well-characterized phthalate particle delivery system for subsequent use in human *in vivo* exposures. The development of an appropriate human exposure model to phthalates will allow us to better characterize this poorly understood apparent asthmagen and, subsequently, to most efficiently and appropriately argue for remediation efforts that will broadly benefit Canadians.

AllerGen researcher aims to identify emotional links to asthma

AllerGen Programme B investigator, Dr. Glenda MacQueen, is exploring behavioural and emotional factors to determine whether or not they influence the onset and severity of asthma as part of AllerGen's Mind-Body Interactions and Allergic Disease research investment.

Dr. MacQueen is Head of the Department of Psychiatry, Alberta Health Services and the University of Calgary. The main aim of the study *Neuroimaging and environmental suggestibility in asthma* is to identify a portion of people with asthma who are susceptible to psychological triggers and asthma-related cues.

"We will be comparing people," said MacQueen, "with moderate asthma who rated as highly suggestible based on a Creative Imagination Scale, with those who rated as suggestion-resistant."

These patients will have their brain activity examined using functional magnetic resonance imaging (fMRI) while asthma-related, emotionally negative and emotionally neutral words are presented to them.

MacQueen added, "It is reasonable to predict that suggestible patients exposed to asthma-associated words might have a different pattern of brain activity than those who are suggestion-resistant. In a previous study, five out of eight suggestible subjects compared with one in nine suggestion-resistant subjects had a fall in respiratory volume in response to inhaled saline and a suggestion that they would experience tightening in their airways."

The trigger may be in the head but MacQueen said the physiological effects are real. Very few studies have examined activity in the central nervous system using neuroimaging techniques in people who have asthma.

"It is possible," she said, "that a portion of patients with asthma are particularly sensitive to asthma-related cues and that this property

of the central nervous system contributes to a decrease in asthma control in that group."

MacQueen stated that this study could have implications for future clinical trials, particularly those containing placebos.

"There are two phases to this study and the first is the screening of numerous asthma patients, to which we have access, thanks to Dr. Paul O'Byrne."

Dr. Paul O'Byrne is one of the leaders of AllerGen's Programme B, Diagnostics and Therapeutics, and also the leader of AllerGen's Clinical Investigator Collaborative, a nationally networked clinical trials group launched in 2005.

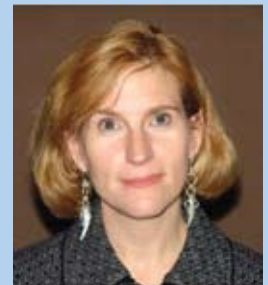
Once MacQueen's patients have been screened and determined highly suggestible or suggestion-resistant, they are then scanned in the fMRI.

"We hope," said MacQueen, "to find out if the brain of a highly suggestible person activates differently to these cues than the brain of a suggestion-resistant person."

MacQueen is interested in patients who do not have well controlled asthma despite efforts from a physician.

"The results," she said, "may be able to help that group of asthma patients who receive appropriate physician care but still have severe asthma, possibly due to triggers such as stress or environmental factors."

"AllerGen has been critical in providing support for this multi-disciplinary study, which will have numerous implications and benefits for asthma research."



Glenda MacQueen

Clinical Investigator Collaborative (CIC)

The CIC has leveraged AllerGen's investment of \$1,564,000 (2005-09) and undertaken collaborative research in partnership with eight biopharmaceutical companies in Canada and internationally: Alexion, Topigen, Boehringer Ingelheim, IVAX, Medimmune, Wyeth, Genentech and Schering Plough. Additional partnerships are in place for 2009 with Altair Therapeutics, Asmacure and Genentech.

To date, the CIC has attracted over \$8.5 million of external funding to Canada in support of clinical trials and related research and has generated revenue of over \$700,000 since its inception. It has also recently initiated an international collaboration with the Karolinska Institute in Sweden.

AllerGen's Clinical Investigator Collaborative (CIC) is an efficient, cost-effective solution to fast-track new therapeutic entities in

allergy and asthma and to enhance knowledge about their mechanisms of action and clinical efficacy. The CIC has been extremely successful throughout 2008 and 2009 partnering with biopharmaceutical and biotechnological industries to establish unique clinical trials with the potential to develop new drugs and therapeutics.

Principal Investigators include:

P O'Byrne and G Gauvreau, McMaster University

L-P Boulet, Université Laval

D Cockcroft, University of Saskatchewan

M FitzGerald, University of British Columbia

I Mayers, University of Alberta

Programme C: Public Health, Ethics, Policy and Society

Research investments 2008–2009

- *The Roaring Adventures of Puff: A school-based asthma education program*, **A Becker**, University of Manitoba
Aim: To establish and evaluate the effectiveness of the *Roaring Adventures of Puff*, a school-based asthma education programme in both urban and rural schools in Manitoba. The researcher expects that over one year, this project will demonstrate a significant impact on asthma morbidity, decreased health care costs, fewer missed school days for children, fewer parent missed work days, and increased quality of life for the children and their families.
- *The development, implementation and evaluation of strategies to promote well-being of children and youth with allergies and/or asthma*, **A Clarke**, McGill University Health Centre, **M Stewart** University of Alberta, **L Cicutto**, University of Toronto
Aim: To study particular aspects of capacity building for children with allergies and/or asthma and their extended communities and provide them with the tools needed to enhance well-being and quality of life. This project could fill the education gap around allergies (particularly food allergy) and asthma.

Strategic initiatives

- *The Respiratory Global Research And Training (GReAT) Network*, **T To**, The Hospital for Sick Children, Toronto
Aim: To develop a network of clinicians and researchers that will be able to fill the knowledge gap in the area of chronic

respiratory disease prevention and management. To reach this goal, the network will provide training to respiratory investigators, collect, process and analyze national and global data to identify trends, gaps and solutions to improve respiratory care and reduce related burden on individuals, families, and society.

- *Parental preferences for asthma control in children*, **W Ungar**, The Hospital for Sick Children Research Institute
Aim: To develop and pilot test a discrete choice experiment (DCE) survey instrument to gauge parents' preferences with regard to which asthma control parameters are important and what trade-offs they would be willing to make between levels of the different parameters. Understanding and comparing the preferences of parents, as well as other stakeholder groups such as respiratory specialists, allergists, family physicians, pediatricians, respiratory technologists, asthma educators, pharmacists and children themselves are critical to designing effective guidelines and asthma management programmes.
- *Severe Asthma Network*, **D Vethanayagam**, University of Alberta
The intent of this project is to develop a combined clinical and research network to improve the clinical management of severe asthmatics with a focus on inflammatory monitoring. This network will ensure that Canada remains competitive in participating in studies which would otherwise be difficult to carry out.

Activities of the Respiratory Global Research And Training (GReAT) Network

AllerGen Programme C investigator, Dr. Teresa To is the Director of the Respiratory Global Research And Training (GReAT) Network, headquartered at the Research Institute at The Hospital for Sick Children in Toronto. The GReAT Network received start-up funding from AllerGen and was officially launched on May 16, 2008.

The GReAT Network is also supported by major Canadian respiratory health professional groups, such as the Government of Ontario, Canadian Thoracic Society, The Lung Association, The Asthma Society of Canada and the Public Health Agency of Canada. The GReAT Network's goal is to provide a unique opportunity for Canada to serve as a host, and lead a coordinated multi-partnered initiative that provides training for the trainers and builds a global capacity for chronic respiratory disease surveillance, evaluation and epidemiologic and health services research.

The first GReAT Network Epidemiology and Surveillance Programme designed and conducted by six faculty members at the University of Toronto, commenced in November 2008 at The Hospital for Sick Children in Toronto (see details at <http://www.sickkids.ca/Research/Respiratory-GREAT-Network/>). A total of five international trainees – Dimas Mateos (Mexico), Harutai Kamalapor (Thailand), Sintra

Sindhurat (Thailand), Marcos Ribeiro (Brazil) and Yavuz Havlucu (Turkey) participated remotely *via* the Internet. The four-month programme consisted of 11 weekly two-hour sessions: eight in-class didactic lectures and three sessions for trainee project presentations with feedback from faculty. The programme had a 100 per cent completion rate. Two of the trainees' projects were accepted for an oral presentation in May 2009 at the American Thoracic Society International Conference in San Diego, CA.

Based on the success of their first year, the GReAT Network faculty are currently planning the second year programme. Open application begins in September 2009. International students are welcome to attend remotely thanks to online forums such as Skype which enables trainees to participate in the weekly two-hour sessions. It is anticipated that more international trainees will participate in the GReAT Network training programme since it can be attended remotely through the world wide web.



Teresa To

AllerGen's Annual Conference Creates New Collaborations

AllerGen hosted its fourth Annual Conference, *Innovation from Cell to Society*⁴ in Canada's majestic capital Ottawa, from February 15-17, 2009. The primary focus of the 2009 Annual Conference was to identify future research opportunities and priorities in collaboration with partner organizations for the next funding period, 2009-2012. Following NCE renewal of AllerGen's funding to 2012, the Network invited proposals for multidisciplinary, networked and partnered programmes of research that it could support towards the achievement of its goal of reducing the impact of allergic and related immune diseases nationally and globally.

The 2009 conference began with welcome remarks from Dr. Ian Graham, Vice-President, Knowledge Translation at the Canadian Institutes of Health Research (CIHR), followed by Dr. Malcolm King, Scientific Director at the CIHR Institute of Aboriginal Peoples' Health, and Dr. David O'Brien, Senior Program Officer at the International Development Research Centre.

The opening key-note presentation was made by Jean-Claude Gavrel, NCE Program Associate Vice-President, who provided an overview of the NCE Program called *Mobilizing Canada's S&T Talent for Canada's Prosperity*. Nora Sobolov, President and CEO of The Canadian Lung Association also made a presentation, and her remarks assisted AllerGen investigators in ascertaining information about research opportunities and potential partnership opportunities with the National Lung Health Framework.

These presentations provided AllerGen investigators with new insights into potential collaborations with a variety of funders and partner organizations with potential to facilitate and accelerate the translation of research results into economic and social benefits for Canadians, including new policies and better health.

Drs. Susan Waserman and Charles Frankish provided conference delegates with an update on collaborative efforts with respect to development of an action plan to ensure the future of the Canadian allergy and clinical immunology specialty, as well as next steps and opportunities for AllerGen and others to contribute to the action plan's implementation.

Research leaders from each of the sites participating in the CHILD Study provided an update on the status of the birth cohort study and on the progress of the Mini-CHILD pilot study.

We were also fortunate to have Kevin McDuffie and Dr. Terry Delovitch contribute to Dr. Diana Royce's overview of the Network-Supported Intellectual Property (NSIP) Advisory Committee and outline how the Committee can provide vital IP advice and assistance to AllerGen researchers.

The newly formed Policy, Ethics, Law and Society (PELS) Advisory Committee was introduced by Co-Chair Dr. Susan Elliott who outlined the Committee's plans to build sustainable links between AllerGen researchers and Canadian policymakers. Dr. Chris Mody provided an update on the Advanced Education and Training Opportunities (AETOC) Advisory Committee and its strategies to increase the pool of highly qualified personnel in Canada who have the knowledge and skills to conduct and apply cutting-edge research in the area of allergy and asthma and related immune disease.

Over two days, investigators had extensive opportunities to liaise with fellow researchers to discuss the upcoming call for proposals. Each research programme area held workshops to discuss the development of programmatically linked research proposals followed by research project-

focused meetings where investigators could consult with other researchers from across the country undertaking similar research and facilitate the assembly of multidisciplinary teams and projects. This process resulted in new opportunities for data sharing and collaboration in the development of new research proposals.

To close the conference, we were joined by Dr. Ulrich Krull, Professor of Bioanalytical Chemistry at the University of Toronto, who is a nationally acclaimed researcher and innovator. Dr. Krull shared with conference delegates his many and varied experiences with knowledge transfer and commercialization in the field of science and technology.

Following the conference, Dr. Susan Elliott hosted a Policy Workshop attended by 38 researchers, trainees, policy makers and elected officials, at which Network research and strategies were presented to facilitate the impact and influence of research on policy making and change. Numerous methods were identified for establishing contact with policy decision makers and as a result, further meetings have been planned among several of the attendees.

We would like to take this opportunity to thank the attendees, presenters and the Research Coordinators who supported this year's AllerGen annual conference.



David O'Brien (IDRC), Ian Graham (CIHR), Judah Denburg (AllerGen NCE), Diana Royce (AllerGen NCE), Graham Scott (Graham Scott Strategies Inc.), Malcolm King (CIHR) and Jean-Claude Gavrel (NCE)

A special thank you to all the sponsors for their generous support of *Innovation from Cell to Society*⁴:

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Network Partners and Collaborators

AllerGen has collaborated with 106 partner organizations nationally and globally

Academic Institutions: 20

Athabasca University
Dalhousie University
Harvard Medical School
Karolinska Institute
McGill University
Queen's University
Simon Fraser University
University of Alberta
University of British Columbia
University of Calgary
Université Laval
University of Manitoba
Université de Montréal
University of New Brunswick
Université du Québec à Chicoutimi
University of Saskatchewan
University of Toronto
University of Washington
University of Western Australia
University of Western Ontario

Hospitals: 9

Atlantic Health Sciences Corp.
Children's Hospital Foundation of Manitoba
Credit Valley Hospital
Hôpital Sainte-Justine, Montréal
Institut universitaire du cardiologie et de pneumologie de Québec
The Hospital for Sick Children, Toronto
Montreal Children's Hospital
Mount Sinai Hospital, Toronto
St. Michael's Hospital, Toronto

Industry: 22

AIM Therapeutics
Alimentary Health
Arkitec Studios
AstraZeneca Canada Inc.
BioDiscovery Toronto Inc.
Boehringer Ingelheim
Ception Therapeutics
Circassia Holdings Ltd.
Food Safety and Quality Magazine
Genentech Inc.
Gennum Corporation

GlaxoSmithKline Inc.
Lumira Capital Corporation
Luzerne Belcan
MatTek Corporation
Novartis Pharma Canada Inc.
Schering-Plough Canada Inc.
Sedulous Investments
Sporometrics Inc.
TEC Edmonton
Tripos, Inc.
Wyeth Pharmaceuticals Inc.

Federal Agencies: 8

Agriculture and Agri-Food Canada
Canada Mortgage and Housing Corporation
Environment Canada
Health Canada Indoor Air Quality Section
Health Canada Bureau of Chemical Safety in the Food Directorate
National Institute of Health
Public Health Agency of Canada
U.S. Environmental Protection Agency

Provincial Agencies: 4

The District 18 School Board (New Brunswick)
Fonds de la recherche en santé du Québec
Winnipeg School Division
Workplace Safety and Insurance Board, Ontario

Research Institutes and Networks: 18

Anaphylaxis Canada
Assisted Human Reproduction Canada
Canadian Allergy, Asthma and Immunology Foundation
Canadian Child Health Clinician Scientist Program
Canadian Institute for Advanced Research
The Canadian Institute for Social Policy (CRISP – New Brunswick)
Centre de recherche du CHUM
COPD and Asthma Network of Alberta
Global Allergy and Asthma European Network (GA²LEN)
Gage Occupational and Environmental Health Unit
Golden Horseshoe Biosciences Network

Helmboltz Zentrum München, Germany
The Hospital for Sick Children Research Institute
McGill University Health Centre
Respiratory Global Research and Training Network (GReAT)
Southern Ontario Centre for Atmospheric Aerosol Research
St. John's Research Institute, India
Women's Health Care Concerns – Brain Body Institute

Associations/Foundations/ Other Bodies: 25

Alberta Strategy to help Manage Asthma & COPD (ASTHMA C)
Alexander von Humboldt Stiftung, Germany
Asthma Allergy Information Association (AAIA)
Canada Foundation for Innovation
Association des allergies alimentaires (AAA)
Asthma Society of Canada
Canadian Lung Association
Canadian Medical Protection Association
Canadian Society of Asthma and Clinical Immunology
Childhood Asthma Foundation
Costello Foundation
Ducks Unlimited Canada
Hamilton Community Foundation
International Union against Tuberculosis and Lung Disease
Ireland Canada University Foundation
The Lung Association Alberta & NWT
Michael Smith Foundation for Health Research
Multiple Sclerosis Society of Canada
National Sanitarium Association
Ontario Lung Association
St. Joseph's Immigrant Women's Centre
Sudbury and District Health Unit
The Royal College of Physicians and Surgeons
World Health Organization – Collaborating Centre for Asthma and Rhinitis
World Health Organization – Global Alliance against Chronic Respiratory Diseases

AllerGen

15

2008-2009

Knowledge & Technology Exchange & Exploitation (KTEE)

AllerGen is committed to KTEE through transmission of information and extensive dialogue between the producers and users of research. Knowledge translation involves careful consideration of the experiences and information needs of stakeholders to enhance the creation of new theory, improve the overall quality of research and facilitate the application of research to practice and policy.

Examples of AllerGen's KTEE efforts:

- New research platforms – e.g., CHILD Study, genetics, biomarkers
- Tools – web-based datasets, on-line peer mentoring
- Processes – CIC Standard Operating Procedures
- Products and services arising from discoveries – diagnostic algorithms; 'personalised' medicine; immune, genetic and epigenetic biomarkers
- Public policy impact – housing, healthcare delivery & health promotion policy

International Partnership Activities

AllerGen has continued to dedicate itself to establishing and maintaining partnerships with allergy, asthma and respiratory health research expert groups from around the world. The NCE-funded International Partnership Initiative (IPI) has enabled AllerGen to position Canada as a world leader in allergic research and extend its reach across the globe to countries such as Sweden, Germany, United Kingdom, China, El Salvador and India.

Highlights from AllerGen's IPI-related activities:

- Following from workshops in the preceding two years, representatives from AllerGen and St. John's Institute in India held a workshop in Kochi, India in November 2008. Examining Canadian and Indian birth cohorts, researchers from both countries are collaborating on projects which assess the impacts of factors including stress, child and maternal nutrition, pulmonary function and BMI on the development of respiratory disease.
- AllerGen researchers participated in the Global Alliance Against Chronic Respiratory Diseases (GARD) meeting held in Istanbul on May 30-31, 2008. The meeting concentrated on the World Health Organization and its global strategy for preventing and controlling non-communicable diseases and proposals for GARD's five-year action plan.
- AllerGen's strong working relationship with the Karolinska Institute based in Stockholm, Sweden, continued to develop as both groups met in Stockholm in November 2008 for a joint research planning symposium entitled *The Future of Allergy and Asthma Research: Working Together to Address Unmet Needs: International Research Priorities in Allergy and Asthma 2009-2019*. The meeting mapped out future research directions for both organizations based on societal need and opportunities for international collaboration with the aim of making significant social and economic impacts in the fields of allergy, asthma, and related immune disease research.
- AllerGen investigators took part in the GA²LEN (Global Allergy and Asthma European Network) European Respiratory Society Research Seminar on Post-Genome Epidemiology in Cernay, France in November 2008. The seminar focused on current epidemiological challenges and the possibility of fostering interdisciplinary approaches to novel research in this area.
- On April 6-30, 2009, El Salvadorian health officials, Miriam Vasquez de Aguilar and Juan Carlos Aguilar Aldana, visited Canada as part

of the AllerGen-International Union Against Tuberculosis and Lung Disease (IUATLD) collaboration. The visit included meetings with AllerGen researchers from the University of Alberta and clinicians at the Edmonton Hospital as well as observing specialty asthma clinics and laboratories in Winnipeg and Calgary. The aim of this visit was for Canadian organizations, academics and researchers to work more effectively with colleagues in low and middle income countries and marginalized communities, to create and enhance opportunities to move towards lung-health solutions. The focus was to implement effective programmes in four lung health areas: TB control programme, tobacco control, asthma management, and treatment of childhood pneumonia.

AAAAI Annual Meeting

AllerGen was represented by several researchers and trainees at the American Academy of Allergy Asthma and Immunology (AAAAI) meeting in Washington, DC, on March 13-17, 2009. Drs. Judah Denburg, Malcolm Sears and Stuart Turvey presented at a symposium organized by Dr. Denburg called *Nature and Nurture in the Development of Allergy and Asthma*.

The session, which provided an overview of AllerGen and the CHILD Study, was chaired by Dr. Sears. Presenters Drs. Denburg and Turvey were joined by Dr. Adnan Custovic from Manchester who is involved with an English birth cohort study called the Manchester Asthma and Allergy Study (MAAS).

EAACI Conference

AllerGen researchers attended the prestigious and world-renowned European Academy of Allergology and Clinical Immunology (EAACI) held in Barcelona, Spain on June 7-11, 2008. This event attracted over 7600 delegates from 100 countries to discuss *Clinical Features of Allergy: From Pediatric to Geriatric*.

Mind-Body Workshop

Drs. Dean Befus and Anita Kozyrskyj hosted a productive Mind-Body research workshop in Winnipeg in December 2008, which helped position AllerGen's Mind-Body researchers for the Network's 2009 call for research proposals and the development of strategic priorities for AllerGen's Mind-Body research programme for the second seven-year funding cycle, 2012-2019.

Gene-Environment Workshop

On March 1-4, 2009 AllerGen investigators Tom Hudson, Denise Daley, Jeff Brook and Peter Paré hosted the highly productive, international Genes and Environment research workshop in Vancouver.

This workshop enabled sharing and comparison of information about birth cohort research protocols and available data and samples. There was also an opportunity for methodological innovations to be shared to facilitate interaction between European and North American groups involved in large studies on asthma and allergy phenotypes.

The workshop was extremely successful in leveraging the many international genetics research relationships generated over the past year through IPI-supported partnerships with GA²LEN and GABRIEL. Numerous birth cohort data-sharing and collaborative research opportunities were identified and will be pursued as a result of this outstanding workshop.

The Future of the Allergy and Clinical Immunology Specialty in Canada

AllerGen partnered with the Canadian Society of Allergy and Clinical Immunology (CSACI) to host a two-day strategic planning workshop on the Future of the Allergy and Clinical Immunology Subspecialty in Canada in Alton, Ontario on May 23-24, 2008. This event was hosted by Dr. Susan Waserman, a Principal Investigator within AllerGen, and Dr. Charles Frankish, President of the CSACI.

The workshop was attended by 23 participants representing Allergists and Clinical Immunologists, Respiriologists, Residency Program Directors and the Royal College of Physicians and Surgeons of Canada. This workshop provided participants with an opportunity to develop a strategy and action plan to raise and solidify the profile of the Allergy and Clinical Immunology (A/CI) specialty and attract high quality applicants to these programmes in Canada.

Working as a group, participants were able to identify four overarching strategic priorities key to the development of an effective strategy and action plan to raise the profile of Allergy and Clinical Immunology in Canada. Key action items for the coming year are:

1. Develop and disseminate a clear value proposition for a career in the A/CI specialty in Canada
2. Identify and promote new models for attraction and recruitment of trainees and academic staff into the A/CI specialty
3. Identify and implement innovative models for A/CI Immunology training, enhanced career development and service provision
4. Develop and implement a marketing and communications plan and related efforts to promote awareness of the A/CI specialty as a career choice.

One of the most enduring benefits of this event was the opportunity for cross-country networking, information-sharing and relationship building amongst specialists who share a common interest in ensuring a vibrant future for the A/CI specialty in Canada.

Policy, Ethics, Law and Society (PELS) Advisory Committee

The AllerGen Policy, Ethics, Law and Society (PELS) Advisory Committee held its inaugural meeting on January 12, 2009 in Toronto.

The need for a PELS Committee was identified by the Board of Directors and Research Management Committee (RMC) at their December 2007 strategic retreat. Establishment of this Committee meets a need for supporting infrastructure and advice for building bridges between researchers and decision-makers across levels and sectors, including government, in Canada.

This Committee is co-chaired by AllerGen's Programme C investigators Timothy Caulfield, Research Director, Health Law Institute, University of Alberta and Susan Elliott, Professor, School of Geography and Earth Sciences, McMaster University.

Committee Members are:

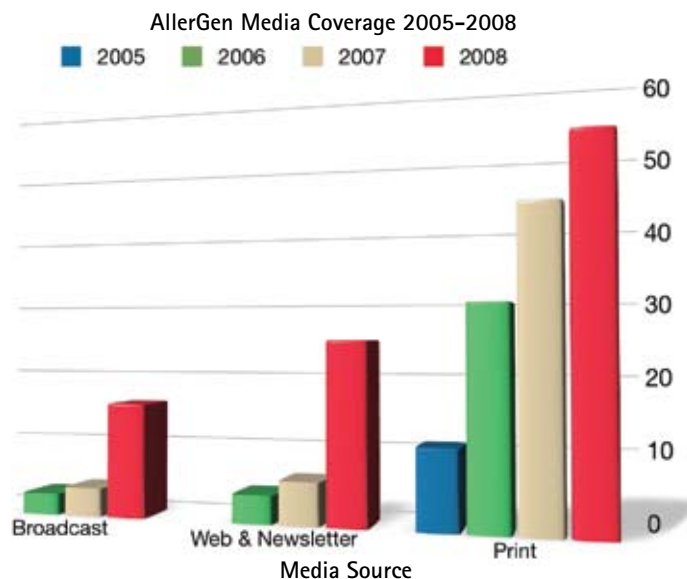
- Michael Abbott, Food Allergen Program Manager, Health Canada, Bureau of Chemical Safety
- Elinor Wilson, President and CEO, Assisted Human Reproduction Canada
- Diane Loughheed, Associate Professor, Department of Medicine, Queen's University

- Lisa Cicutto, Associate Professor, Division of Respiriology, Faculty of Medicine, University of Toronto
- Samuel Godefroy, Director, Bureau of Chemical Safety, Health Canada
- Mark Raizenne, Director General, Public Health Agency of Canada
- Alina Gildiner, Assistant Professor, Department of Political Science, McMaster University
- Christine Hampson, President and CEO, Asthma Society of Canada
- Anthony Levinson, Assistant Professor, Department of Psychiatry & Behavioural Neurosciences, McMaster University

The PELS Committee is a standing advisory committee reporting to AllerGen's RMC and exists to advise and support the RMC in its:

1. Facilitation of the translation of AllerGen research that has clinical, policy, ethical, legal and/or social implications; and
2. Identification of emerging PELS issues that warrant a policy response from the Canadian allergic and immune disease research community.
3. Establishment of enduring links between AllerGen researchers and Canadian clinicians and policymakers.

The PELS Committee has a number of new initiatives planned including a workshop that aims to educate Network investigators on how to optimize the ethical components of nationally networked multi-site research programmes, as well as the development of Knowledge Translation (KT) planning tools tailored for AllerGen researchers. These tools will assist Network Investigators in developing KT plans from the outset of their research projects.



AllerGen has firmly established itself as an international authority on asthma and allergy research. The national and international media regularly seek AllerGen researchers' expert opinion. In 2008, AllerGen researchers were cited in the mainstream media 98 times.

Developing Highly Qualified Personnel

In 2008-2009, Allergan's investments led to unique training, leadership, management and skills development opportunities which were established for students and new professionals, educators and clinicians in the specialty across Canada. Allergan trainees are being integrated into the national and international network of academic, clinical, private sector, public policy and patient advocacy leaders in the field. These opportunities are preparing the next generation to lead social, healthcare and economic advancements in the area of allergy and related immune disease.

Allergan Fellowships and Awards

- Allergan trainees **Jian Zhang**, Post-Doctoral Fellow at the University of British Columbia and **Stephanie MacPherson**, MSc at the University of Manitoba, received funding through Allergan's collaboration with the Canadian Institutes of Health Research (CIHR) Strategic Training Initiatives in Health Research (STIHR) in Allergy and Asthma.
- Allergan established the Canadian Allergy and Immune Diseases Advanced Training Initiative (CAIDATI) Awards. **Matthew Tunis**, PhD, and **Wojciech Dawicki**, Post-Doctoral Fellow, both from Dalhousie University, received a CAIDATI award.
- Allergan has established, in partnership with the Canadian Thoracic Society (CTS) and Canadian Lung Association (CLA), the CTS/CLA/Allergan Clinician Scientist Research Fellowship which is provided to help develop capacity to conduct world class asthma, allergy and immune disease research in Canada. The recipient of this fellowship was **Brandie Walker**, Post-Doctoral Fellow at the University of Calgary.
- In cooperation with MITACS Inc. (Mathematics of Information Technology and Complex Systems NCE), Allergan trainees were offered the opportunity to participate in the ACCELERATE Canada initiative, which provides unique research and training internships in industry, thanks to funding received by MITACS from the Government of Canada through the Industrial R&D Internship Programme and from a number of provincial governments. **Jagdish Gupta**, Carleton University, was the recipient of a three-month internship where he gained exposure and applied skills to industrially-relevant research and developed valuable professional relationships with industry and other non-academic organizations.

Travel Awards

In 2008-2009, Allergan provided 36 trainees with travel awards. Through the Allergan Travel Award Programme, Allergan supports a portion of travel and accommodation costs necessary for Allergan investigators and HQP to attend events (meetings,

symposiums and conferences, etc.) outside of Allergan that will contribute to their professional development in the field of allergic disease.

These events must align with Allergan's mission, values and goals and provide new opportunities for networking, research collaboration, knowledge translation, new skill development and maximizing learning.

- **Pawan Sharma**, PhD student at the University of Manitoba was selected to present his work at the prestigious International Conference of the Indian Pharmacological Society. The conference brought several national and international experts from academia, pharmaceutical industry, national laboratories and regulatory bodies together to deliberate on contemporary issues in basic pharmacology, toxicology and clinical research.
- Six Allergan trainees, **Tillie-Louise Hackett**, Post-Doctoral Fellow at the University of British Columbia, **Pawan Sharma**, PhD student at the University of Manitoba, **Nivedita Khanna**, Post-Doctoral Fellow at the University of Toronto, **Michelle North**, PhD student at the University of Toronto, **Anouk Lavoie-Lamoureux**, PhD student at Université de Montréal and **Mathilde Leclère**, PhD student at Université de Montréal attended the American Thoracic Society International Conference in Toronto, Canada. The conference offered more than 400 sessions and 800 speakers focusing on important scientific and clinical advances in adult and pediatric respiratory medicine.



McMaster University Highly Qualified Personnel Pia-Lauren Reece, Harpreet Gill, Amudhinie Thanendran and Ilan Asher

Annual Conference Student Poster Competition

AllerGen's Fourth Annual Research Conference took place in Ottawa from February 15-17, 2009. Forty-five trainees from nine universities – Université de Montréal, Dalhousie University, University of British Columbia, McMaster University, McGill University, University of Toronto, Queen's University, University of Manitoba and University of Alberta – attended the conference.

The Student Poster Competition took place during the first two days of the conference. Posters were evaluated by both poster judges and conference attendees. AllerGen received 25 high caliber posters and abstracts. Six trainees (two per AllerGen Research Programme), who were judged to have the highest scoring posters, presented their research to conference delegates in the form of an oral presentation.



The Student Poster Competition provided a valuable opportunity for students to share their research, to exchange ideas and to network with other trainees and researchers, clinicians, policy and decision-makers, health care administrators and representatives from business, industry and government.

AllerGen Annual Trainee Symposium

In 2008, the AllerGen Students and New Professionals Network (ASNP) held its Third Annual AllerGen Trainee Symposium in Victoria, British Columbia. The theme for the 2008 symposium was *Science, Society and Beyond*. Trainees were exposed to expert presentations on a variety of subject areas, including effective grant writing and novel funding opportunities, knowledge translation and preparation for dissemination, mentoring and teaching, and balancing personal and professional life. The symposium provided an excellent opportunity for trainees and new professionals to network and discuss their multi-disciplinary projects.

2009 Conference poster award winners (from left)

Moshe Ben-Shoshan, *Montréal Children's Hospital, McGill University*
Michelle North, *University of Toronto*
Lianne Soller, *McGill University Health Centre*
Tillie-Louise Hackett, *iCAPTURE Centre, University of British Columbia*
Zoulfia Allakhverdi, *Centre hospitalier de l'Université de Montréal*
Wojciech Dawicki, *Dalhousie University*

Network Graduates

In 2008–2009, 25 trainees left the Network for employment in government, industry, academic institutions and the public sector. Specifically:

- **Yohan Bossé**, a former McGill University post-doctoral fellow under the supervision of AllerGen investigator Dr. Tom Hudson, is now working as an Assistant Professor in the Faculty of Medicine, Department of Anatomy and Physiology at Université Laval.
- **John Brannan**, a former McMaster University post-doctoral student under the supervision of Dr. Paul O'Byrne, is now a visiting fellow in the Department of Respiratory and Sleep Medicine at Royal Prince Alfred Hospital in New South Wales, Australia.
- **Junia Jawdat**, a former Dalhousie University PhD student under the supervision of Dr. Jean Marshall, is now working as a Research Scientist at King Faisal Specialist Hospital and Research Centre in Saudia Arabia.
- **Sam Harirforoosh**, a former University of Alberta post-doctoral student under the supervision of Dr. Dean Befus, is now working as an Assistant Professor in the Department of Pharmaceutical Sciences at the Bill Gatton College of Pharmacy, East Tennessee State University.
- **Xai Mai**, a former University of Manitoba post-doctoral student under the supervision of Dr. Anita Kozyrskyj, is now working as a Research Scientist with the Norwegian Research Council in Trondheim, Norway.

AllerGen's Goal: *To create new opportunities for the training of HQP in allergy research, patient care, innovation and the health system, and advance professional and lay knowledge about allergic and related immune diseases.*

The role of AllerGen's ASNPN is to promote students and new professionals' participation and engagement in AllerGen, to develop and implement information and knowledge exchange strategies that facilitate professional information sharing among AllerGen's HQP, and to organize and implement training and networking activities that build research and professional skills and capacity in the areas of allergic and related immune disease.

AllerGen ASNPN 2008-2009:

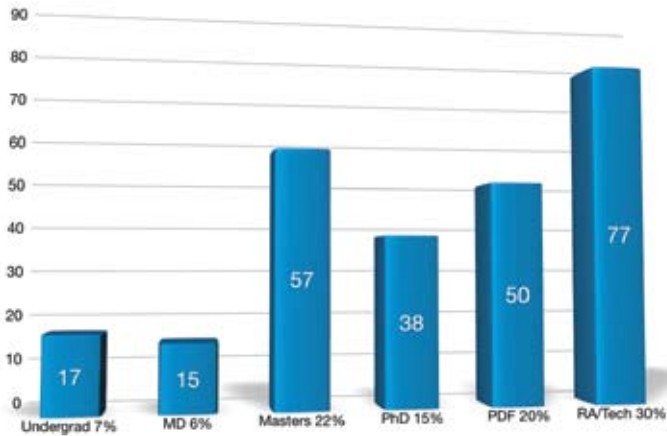
- Michelle North, President, University of Toronto
- Jennifer Protudjer, Vice-President, University of Manitoba
- Victoria Arrandale, University of Toronto
- Steven Maltby, University of British Columbia
- Pawan Sharma, University of Manitoba
- Chris Taplin, University of British Columbia

AllerGen's Advanced Education and Training Opportunities Advisory Committee (AETOAC) advises the Research Management Committee on how to increase the pool of Highly Qualified Personnel, and to recommend programmes that will increase the knowledge, skills and ability available in Canada to conduct and apply cutting-edge research in the areas of allergy, asthma and related immune disease.

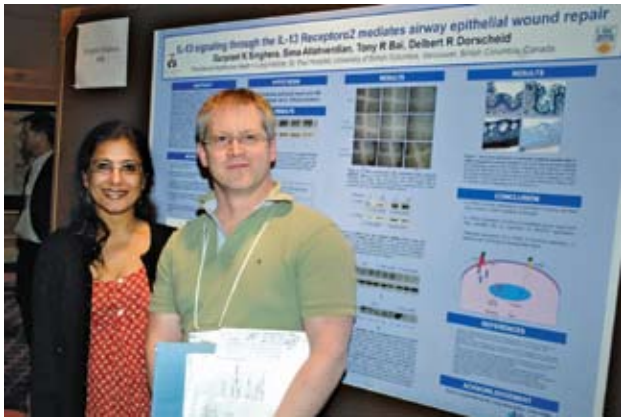
The AETOC Committee members are:

- Chris Mody, *Chair*, University of Calgary
- Thomas Issekutz, Dalhousie University
- Oxana Latycheva, Asthma Society of Canada
- Irvin Mayers, University of Alberta
- Michelle North, University of Toronto & President, ASNPN
- Danuta Radzioch, Montreal General Hospital
- Susan Wasserman, McMaster University
- Judah Denburg, *ex officio*, AllerGen NCE Inc.
- Diana Royce, *ex officio*, AllerGen NCE Inc.

Number of HQP Working on Network Research 2008-2009 (N=254)



Christopher Drudge, *University of Toronto* explains his poster to Diana Royce, *Managing Director of AllerGen NCE Inc.*, during the poster competition at AllerGen's Fourth Annual Conference in Ottawa, February 2009.



Gurpreet Singhera, *University of British Columbia* (left) pictured with her supervisor Del Dorscheid during the poster competition at AllerGen's Fourth Annual Conference in Ottawa, February 2009.

Financial Summary

AllerGen NCE Inc., Financial Summary 2007–2009¹

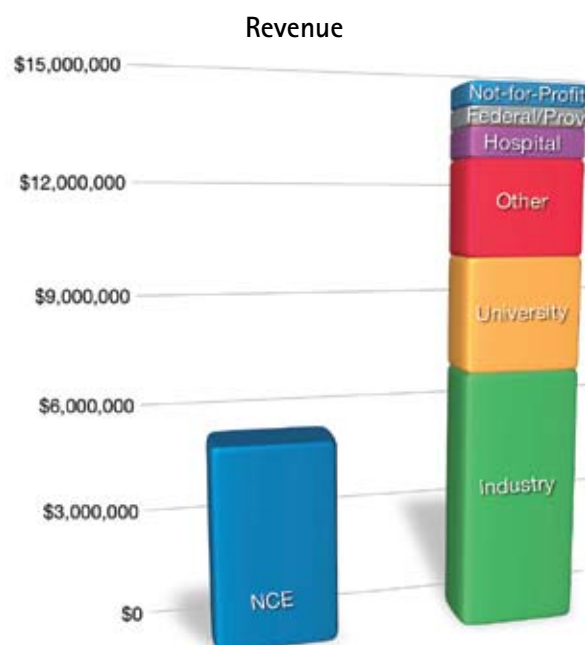
| | 2007–2008 (Year 3) | | 2008–2009 (Year 4) | |
|--|---------------------|---------------|---------------------|---------------|
| REVENUES (Cash and In-Kind) | | | | |
| NCE Award | 5,264,000 | 29.1% | 5,306,000 | 26.7% |
| International Partnership Initiative Award | 828,000 | 4.6% | - | 0.0% |
| IDRC ² Award - St. John's Institute | 138,500 | 0.8% | 110,400 | 0.6% |
| Non-NCE Funds to Administrative Centre* | 2,174,848 | 12.0% | 1,006,242 | 5.0% |
| Non-NCE Funds To Research* | 9,689,999 | 53.5% | 13,484,575 | 67.7% |
| Total Revenues | \$18,095,347 | 100.0% | \$19,907,217 | 100.0% |
| <i>* includes cash and in-kind contributions</i> | | | | |
| EXPENDITURES (Expended and committed cash from the Administrative Centre) | | | | |
| Research Programmes | 2,509,499 | 59.3% | 3,244,679 | 64.1% |
| Networking | 594,879 | 13.1% | 592,531 | 11.7% |
| Strategic Initiatives and Training | 220,814 | 5.2% | 242,374 | 4.8% |
| Communications | 14,487 | 0.3% | 15,161 | 0.3% |
| Administration | 921,901 | 22.1% | 964,988 | 19.1% |
| Total Expenditures | \$4,261,580 | 100.0% | \$5,059,733 | 100.0% |
| <i>Committed Amounts for future research</i> | <i>\$1,932,961</i> | | <i>\$3,496,326</i> | |
| <i>Cash reserves</i> | <i>\$2,306,293</i> | | <i>\$1,569,228</i> | |

¹ An audited financial statement is available from the AllerGen Administrative Centre

² International Development Research Centre

Revenue Sources (Cash and In-Kind) 2008/09

| | Cash | In-Kind | Total |
|--------------------|---------------------|--------------------|---------------------|
| NCE | 5,416,400 | - | 5,416,400 |
| Industry | 6,901,440 | 119,043 | 7,020,483 |
| University | 217,958 | 2,820,053 | 3,038,011 |
| Other Sources | 1,494,090 | 1,038,360 | 2,532,450 |
| Hospital | 217,000 | 559,750 | 776,750 |
| Federal/Provincial | 167,469 | 429,288 | 596,757 |
| Not-for-Profit | 382,866 | 143,500 | 526,366 |
| Total | \$14,797,223 | \$5,109,994 | \$19,907,217 |



AllerGen's Goal: To provide responsible, cost effective and accountable management, administration and support to all aspects of AllerGen's activities.

Network Participants / Participants au Réseau

Researchers / Chercheurs

- Rafeef Abugharbieh, *University of British Columbia*
- Stephanie Ackerman, *University of Illinois at Chicago*
- Darryl Adamko, *University of Alberta*
- Neil Alexis, *University of North Carolina at Chapel Hill*
- Reza Alizadehfar, *McGill University Health Centre/Centre universitaire de santé McGill*
- Marilyn Allen, *Anaphylaxis Canada/Anaphylaxie Canada*
- Ryan Allen, *Simon Fraser University*
- Petra Arck, *McMaster University*
- Stephanie Atkinson, *McMaster University*
- Jehannah Austin, *University of British Columbia*
- Tony Bai, *University of British Columbia*
- Jeremy Beach, *University of Alberta*
- Allan Becker, *University of Manitoba*
- Dean Befus, *University of Alberta*
- Swarnarekha Bhat, *St. John's Research Institute, India/Inde*
- John Bielby, *Western Australia Centre of Pathology and Medicine*
- John Bienenstock, *McMaster University*
- Lucie Blais, *Université de Montréal*
- Louis-Philippe Boulet, *Université Laval*
- Michael Brauer, *University of British Columbia*
- Ryan Brinkman, *University of British Columbia*
- Jeffrey Brook, *Environment Canada/Environnement Canada*
- Igor Burstyn, *University of Alberta*
- Janice Butler, *Newfoundland and Labrador Centre for Health Research*
- Lisa Cameron, *University of Alberta*
- Chris Carlsten, *University of British Columbia*
- Timothy Caulfield, *University of Alberta*
- Jamila Chakir, *Université Laval*
- Edith Chen, *University of British Columbia*
- Nicola Cherry, *University of Alberta*
- Lisa Cicutto, *University of Toronto*
- Ann Clarke, *McGill University Health Centre/Centre universitaire de santé McGill*
- Donald Cockcroft, *University of Saskatchewan*
- Lisa Colizza, *McMaster University*
- Eric Crighton, *University of Ottawa/Université d'Ottawa*
- Michael Cyr, *McMaster University*
- Denise Daley, *University of British Columbia*
- Joe Davison, *University of Calgary*
- Guy Delespesse, *Université de Montréal*
- Sharon Dell, *Hospital for Sick Children*
- Judah Denburg, *McMaster University*
- Francine Deschesnes, *Centre hospitalier de l'Université Laval*
- Delbert Dorscheid, *University of British Columbia*
- George D'Souza, *St. John's Research Institute, India/Inde*
- Francine Ducharme, *Hôpital de Montréal pour Enfants/Montreal Children's Hospital*
- Claire Dufresne, *Association québécoise des allergies alimentaires*
- Marek Duszyk, *University of Alberta*
- Gary Eitzen, *University of Alberta*
- Susan Elliott, *McMaster University*
- Warren Finlay, *University of Alberta*
- Mark FitzGerald, *University of British Columbia*
- Paul Forsythe, *McMaster University*
- Andreas Freitag, *McMaster University*
- Jack Gauldie, *McMaster University*
- Gail Gauvreau, *McMaster University*
- Diane Gold, *Harvard University*
- John Gordon, *University of Saskatchewan*
- Abdel Soussi Gounni, *University of Manitoba*
- Hartmut Grasmann, *University of Toronto*
- Ted Haines, *McMaster University*
- Andrew Halayko, *University of Manitoba*
- Geoffrey Hall, *McMaster University*
- Qutayba Hamid, *McGill University*
- Laurie Harada, *Anaphylaxis Canada/Anaphylaxie Canada*
- Kent HayGlass, *University of Manitoba*
- Richard Hegele, *University of Toronto*
- Dorothy Linn Holness, *St. Michael's Hospital/University of Toronto*
- Patrick Holt, *University of Western Australia, Telethon Institute of Child Health Research*
- Claire Infante-Rivard, *McGill University*
- Mark Inman, *McMaster University*
- Alan James, *Sir Charles Gairdner Hospital, Western Australia*
- Manel Jordana, *McMaster University*
- Lawrence Joseph, *McGill University Health Centre/Centre universitaire de santé McGill*
- Rhoda Kagan, *North York General Hospital*
- Faige Kaplan, *McGill University Health Centre/Centre universitaire de santé McGill*
- Paul Keith, *McMaster University*
- Margaret Kelly, *University of Calgary*
- Darryl Knight, *University of British Columbia*
- Michael Kobor, *University of British Columbia*
- Tobias Kollmann, *University of British Columbia*
- Tulay Koru-Sengul, *McMaster University*
- Petros Koutrakis, *Harvard University*
- Anita Kozyrskyj, *University of Alberta*
- Paul Kubes, *University of Calgary*
- Irena Kudla, *University of Toronto*
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- Paige Lacy, *University of Alberta*
- Catherine Laprise, *Université du Québec à Chicoutimi*
- Mark Larché, *McMaster University*
- Jean-Pierre Lavoie, *Université de Montréal*
- Nicole Letourneau, *University of New Brunswick/Université du Nouveau-Brunswick*
- Anthony Levinson, *McMaster University*
- Tong-Jun Lin, *Dalhousie University*
- Ling Liu, *Health Canada/Santé Canada*
- Wendy Lou, *University of Toronto*
- Diane Lougheed, *Queen's University*
- Jacques Lussier, *Université de Montréal*
- Brian MacNeil, *University of Manitoba*
- Glenda MacQueen, *University of Calgary*
- Piush Mandhane, *University of Alberta*
- Kevin Mardell, *West Elgin Community Health Centre, Ontario*
- Carlo Marra, *University of British Columbia*
- Tom Marrie, *University of Alberta*
- Jean Marshall, *Dalhousie University*
- James Martin, *McGill University*
- Jeff Masuda, *University of British Columbia*
- Ron Matheson, *University of Calgary*
- Irvin Mayers, *University of Alberta*
- Bruce Mazer, *McGill University*
- Shawna McGhan, *University of Alberta*
- Margaret McKinnon, *McMaster University*
- Kelly McNagny, *University of British Columbia*
- Gregory Miller, *University of British Columbia*
- Janice Minard, *Kingston General Hospital*
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- Susan Moisey, *University of Alberta*
- Redwan Moqbel, *University of Alberta*
- Bill Musk, *Sir Charles Gairdner Hospital*
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- Stacey Ritz, *Northern Ontario School of Medicine*
- Brian Rowe, *University of Alberta*
- Andrew Sandford, *University of British Columbia*
- David Scheifele, *British Columbia Children's Hospital*
- Bob Schellenberg, *University of British Columbia*
- James Scott, *University of Toronto*
- Jeremy Scott, *University of Toronto*
- Malcolm Sears, *McMaster University*
- Roma Sehmi, *McMaster University*
- Keith Seifert, *Agriculture and Agri-Food Canada/Agriculture et Agroalimentaire Canada*
- Elizabeth Sellers, *University of Manitoba*
- Chun Seow, *University of British Columbia*
- Sirish Shah, *University of Alberta*
- Susan Sherwin, *Dalhousie University*
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- Richard Summerbell, *Sporometrics Inc.*

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 Stuart Turvey, *University of British Columbia*

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 Timothy Vander Leek, *University of Alberta*
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 Dilini Vethanayagam, *University of Alberta*

Harissios Vliagoftis, *University of Alberta*
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 Susan Waserman, *McMaster University*
 Wade Watson, *Dalhousie University*
 Susan Watt, *University of Toronto*
 William Welch, *University of British Columbia*

Mark Wilkinson, *University of British Columbia*
 Zhou Xing, *McMaster University*
 Moira Chen Yeung, *University of British Columbia*
 Salim Yusuf, *Hamilton General Hospital/McMaster University*
 Ruben Zamar, *University of British Columbia*
 Noe Zamel, *Mount Sinai Hospital, Toronto*

Highly Qualified Personnel / Personnel hautement qualifié

Trainees / Stagiaires

Farnam Ajamian
 Umme Akhtar
 Salman Ali
 Sima Allahverdian
 Zoulfia Allakhverdi
 Sarah Alley
 Menhel Al-Naama
 Amal Al-Garawi
 Hajera Amatullah
 Reshma Amin
 Ofer Amram
 Katherine Arias
 Nancy Arizmendi
 Ian Arnold
 Victoria Arrandale
 Melanie Ashby
 Ilan Asher
 Adrian Baatjes
 Andrée-Anne Banville
 Langelier
 Renata Barreto
 Kendra Barrick
 Jessica Barron
 Philippe Bégin
 Jason Behrmann
 Jami Bennett
 Moshe Ben-Shoshan
 Sacha Bhinder
 Marie Renée Blanchet
 Evelyne Blouin
 Valérie Bougault
 Christian Bruenahl
 Laura Butler
 Pierre Camateros
 Eduardo Campos Alberto
 Lei Cao
 Lucas Castellani

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 Dennis Cho
 Bonni Chow
 Derek K. Chu
 Tatiana de Moura Coelho
 Daniel Cohen
 Julie Dauvillier
 Wojciech Dawicki
 Beth Davis
 Renée Douville
 Lisa Dreger
 Christopher Drudge
 Benny Dua
 Marie-Eve Ducharme
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 Pratibha Dwarkanath
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 Nancy Fenton
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 Kathleen M. Fraser
 Leandro Fritscher
 Joe Fragapane
 Ian Frankish
 Erin Frokwerk
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 Audrey Dunn Galvin
 Agustina Gancia-Godoy
 Émilie Gélinas-Lymburner
 Harpreet Gill
 Ashley Gluchowski
 Matt Gold
 Pol Gomez
 Loie Goronfolah
 Derek Haaland
 Tillie-Louise Hackett
 Jamie Haddon

Oumnia Hajoui
 Christian Harrington
 Daniel Harrington
 Muhannad Hassan
 Yavuz Havlucu
 Jianqing He
 Heather Henley
 Darcy Heron
 Ryan Hoeve
 Shelley Holland
 Hao (Henry) Huang
 Haruki Imaoka
 Ramses Ilaraza
 Yuji Ishimatsu
 Alisha Jabar
 Nelishah Jiwani
 Brianna Julien
 Sarah Kam
 Harutai Kamalapor
 Nitin Kapur
 Khalil Karimi
 Colleen Keast
 Nivedita Khanna
 Katie Killorn
 Christine King
 Marie-Hélène Lambert
 Émilie Lancot-Setlawkwe
 Anouk Lavoie-Lamoureux
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 Kenneth Liew
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 Jasmine Yang
 Aaron Young
 David Zamar
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Chris St. Laurent
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 Ben Tripp
 Hélène Villeneuve
 Tina Walker
 Richard Watson
 Rebecca Wickett
 Xiu Wu
 Nathalie Y
 Rossitta Yung