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Aussi disponible en français
Throughout 2014-2015, AllerGen accelerated its research productivity, publication rates, knowledge mobilization and commercialization activities, generating global interest in the Network’s research results among stakeholders across sectors.
Corporate Profile

AllerGen NCE Inc. (AllerGen), the Allergy, Genes and Environment Network, is a national research network that aims to reduce the morbidity, mortality and socioeconomic impacts of allergy, asthma, anaphylaxis and related immune diseases.

AllerGen was established in 2004 by Industry Canada through the Networks of Centres of Excellence (NCE) Program to help Canadians address the challenges of living with asthma and allergic disease.

Led by internationally recognized Canadian researchers with expertise across 50 disciplines, AllerGen’s research projects and strategic initiatives employ cross-sectoral, multidisciplinary approaches to accelerate the development of new diagnostic tests, better medications, accessible patient education tools and effective public policies relevant to allergic disease.

In 2014-2015, AllerGen received $4,216,500 in funding from the NCE program. Through strong partnerships, AllerGen secured additional funding from other sources to achieve an annual NCE leveraging ratio of 1:2.17.

Throughout the year, AllerGen engaged 95 Network investigators and collaborated with 133 partner organizations across academia, industry, not-for-profit and government sectors. The Network also trained 353 students, research staff, trainees and new professionals, seeding the next generation of researchers, innovators and clinician-scientists.

2014-2015 At-a-Glance

353 Trainees, young professionals, research associates and technicians
133 Partner organizations across academia, industry, not-for-profit and government sectors
123 Full-time equivalent Network participants
95 Network investigators
38 Active research projects and strategic initiatives

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 to reduce the morbidity, mortality and socioeconomic burden of allergy, asthma and anaphylaxis for the benefit of Canadians and the global community.
Message from the Board Chair and Scientific Director

Throughout 2014-2015, AllerGen accelerated its research productivity, publication rates, knowledge mobilization and commercialization activities, generating global interest in the Network’s research results among stakeholders across sectors.

The Canadian Healthy Infant Longitudinal Development (CHILD) Study has emerged as a valuable resource and model emulated by birth cohort planners around the world. In 2014, CHILD Study researchers published evidence that traffic-related air pollution (TRAP) increases the risk of children becoming sensitized to inhalant and food allergens at one year of age; identified differences in babies’ intestinal bacteria that can help predict future development of food allergies and asthma; and assessed indoor and outdoor environmental exposures for 3,217 Canadian babies—an unprecedented accomplishment for any birth cohort.

The AllerGen Clinical Investigator Collaborative (CIC)—a world leader in Phase II clinical trials for asthma and allergic disease—published groundbreaking findings in the New England Journal of Medicine and Science Translational Medicine that open the door to developing new antibody treatments for people living with asthma.

Also in 2014, Canadian Food Allergy Strategic Team (CanFAST) researchers published the first-ever data estimating the prevalence of food allergy among vulnerable Canadians from low-income, immigrant and Aboriginal populations. This research has vastly improved the characterization of the prevalence and experience of food allergy in Canada, and gives patients, their families, healthcare professionals and policymakers a broader understanding of the health, social and economic burdens of food allergy in this country.

AllerGen investigators in the Gene-Environment Interactions, Biomarkers and Bioinformatics, and Patients, Policy and Public Health Enabling Platforms have generated critical early-life exposure data on epigenetics, maternal/family stress, chemicals and TRAP, which accelerated and enhanced CHILD Study analyses and positioned Canadian investigators for successful grant applications, such as CIHR’s Environment and Health Signature Initiative and Developmental Origins of Health and Disease (DOHaD) program. Working in crossdisciplinary and international teams, these scientists have also generated decision-support data and tools to inform personalized health recommendations and interventions used by individuals, health professionals and policymakers.

AllerGen’s HQP program is one of the Network’s most impactful and immediately transformational accomplishments. Trainees are seizing the full range of the Network’s scientific and “soft skills” development programs to augment their academic training: attending conferences globally, participating in international research exchanges, presenting research posters to, and interacting with, patients, clinicians, and professionals in industry and government. As a result, AllerGen trainees are securing high-value jobs within Canada’s knowledge economy; in 2014-2015 alone, 33 trainees found jobs across sectors in academia, industry/the private sector, government, and healthcare.

The Network’s knowledge mobilization (KMb) strategies continue to respond to “pull” from our stakeholders through an integrated KMb approach to the design of research projects and strategic initiatives. AllerGen is also leveraging key partner-
ships to disseminate research findings through partner organization “hubs,” including Health Canada, Environment Canada, Anaphylaxis Canada, the Asthma Society of Canada, the Canadian Society of Allergy and Clinical Immunology, and national media outlets such as Allergic Living.

AllerGen maintains enduring relationships with priority partners, both in Canada and abroad, who are helping us to achieve the Network’s legacy goals to 2019 and beyond. This year, AllerGen established new international Memoranda of Understanding with Changzhou University (China) and Stanford University (USA) to allow collaborative research and scientific activities, student exchanges and training.

We would like to thank AllerGen’s Board of Directors, Research Management Committee and advisory committee members for their ongoing contributions of time and expertise, which ensure the success of AllerGen and enable its many achievements.

In particular, we wish to thank Dr. Douglas Barber, who retired from AllerGen’s Board of Directors in November 2014, for his valuable contributions over 10 years of service. A founding member of AllerGen’s Board of Directors, Dr. Barber has provided AllerGen, and Canadians, with a decade of commitment, expertise and service towards reducing the morbidity, mortality and socio-economic impact of allergic disease.

We are also delighted to welcome Dr. Pieter Cullis (Professor of Biochemistry and Molecular Biology, The University of British Columbia) and Donald Green (Chair & CEO, Greenfleet Ltd.) to the AllerGen Board of Directors. They will contribute to AllerGen’s strategic impacts in the areas of personalized medicine and commercialization, respectively.

Finally, we extend our sincere thanks to the entire AllerGen community of researchers, trainees, national and global collaborators, stakeholder organizations, research partners and healthcare providers. This year’s accomplishments are a testament to their ongoing commitment and contributions to the achievement of our NCE mandate and mission.

Dr. Howard Bergman, MD, FCFP, FRCPC
Chair, AllerGen Board of Directors, AllerGen NCE Inc.

Dr. Judah Denburg, MD, FRCP(C)
Scientific Director and CEO, AllerGen NCE Inc.
During the Pan Am and Parapan Am Games in July and August 2015, the research team placed AirSENCE monitors around Toronto and displayed the results in an interactive map on their AirSensors website.
"Being able to accurately" measure and map air pollution in real time has interesting implications for individuals, communities and policymakers," adds Dr. Brook, who is also a Senior Research Scientist at Environment Canada.

Air pollution sensors piloted during Pan Am Games

A new device developed by an AllerGen research team at the University of Toronto (U of T) helped athletes, visitors and local residents monitor their exposure to air pollution during the Toronto 2015 Pan Am and Parapan Am Games.

AirSENCE (Air SENsor for Chemicals in the Environment) is a sensing device that measures the air quality health index (AQHI) and estimates concentrations of a number of harmful air pollutants in real time.

AirSENCE was co-developed by AllerGen investigators Dr. Greg Evans, a chemical engineering professor, Dr. Jeffrey Brook, an adjunct professor in the Dalla Lana School of Public Health, and PhD student and AllerGen trainee Natalia Mykhaylova.

During the Pan Am and Parapan Am Games in July and August 2015, the research team placed AirSENCE monitors around Toronto and displayed the results in an interactive map on their AirSensors website. “Website visitors could click on locations to see hourly AQHI readings and the concentrations of key air pollutants over the previous three days,” says Dr. Evans. “Clicking on multiple sites allowed comparisons across locations close to Pan Am venues.”

The tool also allowed users to compare AirSENCE data to air quality readings from the Ontario Ministry of Environment and Climate Change, and from the Southern Ontario Centre for Atmospheric Aerosol Research (SOCAAR).

“AirSENCE devices use an array of 14 sensors to estimate concentrations of five air pollutants: nitrogen oxides, ozone, particulate matter, carbon monoxide and carbon dioxide,” explains Dr. Evans. “This helped residents and visitors at the 2015 Games—especially those with allergies, asthma or other respiratory conditions—to gauge air quality and to plan the timing and location of their activities.”

Drs Evans and Brook began developing the AirSENCE prototype in 2012, as part of the AllerGen-funded project Better Exposure Avoidance Measures (BEAM). The monitor is less expensive and more portable than most commercially available alternatives. By mounting the device outdoors, placing it in homes, or even carrying a handheld version, individuals can obtain information on pollution levels at specific locations.

“In 2016, we will launch AirSENCE devices in Beijing and compare the readings to Canadian
“Ultimately, we believe that AirSENCE will enable users worldwide to measure their personal exposure to outdoor or indoor air pollutants, and to identify and avoid areas where pollution levels are dangerously high.”

“Being able to accurately measure and map air pollution in real time has interesting implications for individuals, communities and policymakers,” adds Dr. Brook, who is also a Senior Research Scientist at Environment Canada. “From the zoning of new schools, daycare centres and retirement homes to decisions about where to purchase a home, this information is critical to reduce both the risk of exacerbations of pre-existing health conditions, like asthma, and of development of chronic disease through long-term exposure.”

Exposure assessment for 3,200 Canadian babies improves capacity to link early-life environment to health

Researchers from the Canadian Healthy Infant Longitudinal Development (CHILD) Study have assessed indoor and outdoor environmental exposures for 3,217 Canadian babies—an unprecedented accomplishment for any birth cohort. The CHILD Study is examining how a child’s environment during pregnancy and in the first years of life interacts with genetics to affect the risk of developing allergies, asthma, type 2 diabetes and other chronic diseases.

As part of the Study, investigators carefully inspected over 3,200 babies’ homes, analyzing exposure to dust, mould, furry pets, chemicals, cleaning products, cooking emissions, second-hand smoke and traffic-related air pollution.

No other study has sampled the home environment of so many participants in such detail, and with the ability to learn about epigenetic changes and the potential role of the microbiome in health and disease.

A paper in the March 2015 Journal of Exposure Science and Environmental Epidemiology outlines which environmental factors were measured and how, and the ways the data might be analyzed further to link exposures to health outcomes from infancy to age five.

The paper provides an initial look at the exposure characteristics of the CHILD Study cohort across four Canadian sites. Among many observations, it found that: 57% of participant families in Edmonton own furry pets versus 40% in Toronto; 32% in Toronto cook with a gas stove compared to 4% in Manitoba; 34% in Vancouver use spray air freshener versus 59% in Manitoba; and 22% of Manitoba CHILD Study mothers are exposed to dust, fumes or chemicals on their skin during the prenatal period, either from work or hobbies.

“Asthma is the most common chronic childhood disease and many cases may be preventable,” says Dr. Tim Takaro, a professor at Simon Fraser University and the paper’s lead author. “The CHILD Study is helping us to gain a better understanding of the link between environment and health, which may help us to intervene early in life to prevent asthma from occurring.”

The CHILD Study—which is both broad in its assessment of risk, and longitudinal, measuring both pre- and post-natal environmental exposures at multiple time points—provides insight into the role of critical “windows” of exposure in relation to immunological, physiological and microbiome development.

“The Study’s size and the rigour with which we assess exposures will increase our capacity to detect associations between environmental factors and health outcomes,” says Dr. Takaro. “We expect it will offer considerable improvement over many other birth cohort studies in assessing the complex contribution of the mother’s and baby’s environment to the development of allergy, asthma, and other chronic diseases.”
Allergy and Asthma Portal opens “digital doors” to the global research community

AllerGen’s Allergy and Asthma Portal (AAP), launched in September 2014, is the world’s most comprehensive database of the genes, proteins, biomolecular interactions and pathways associated with immunity and allergic disease.

The first resource of its kind, the AAP helps scientists understand how allergy, asthma and other immune diseases develop, and, ultimately, how to treat and prevent them.

The AAP is built upon InnateDB, an AllerGen-enabled database that catalogues the network of all known molecular interactions involved in the innate immune response of humans, mice and bovines. The AAP integrates an additional 900 allergy and asthma interactions gleaned from the scientific literature and AllerGen research to produce a highly sophisticated database specifically geared to the study of allergy and asthma.

Both InnateDB and the AAP were developed with AllerGen support by Network investigator Dr. Fiona Brinkman, a professor in the Department of Molecular Biology and Biochemistry at Simon Fraser University. Dr. Brinkman is an expert in bioinformatics—the use of computers to gather, store, analyze and integrate biological and genetic information, which can then be used to study how diseases develop.

Most previously established databases consider molecules and molecular pathways in isolation, rather than as part of a system. The AAP is unique because it catalogs the genes and proteins involved in allergy and asthma, as well as all of their known interactions and connections to other molecules.

“The AAP can help researchers go beyond therapeutic target discovery,” says Dr. Brinkman. “For example, the portal’s unique visualization tools allow researchers to quickly see things like molecular ‘hubs’ in an immune response, which may help tease out the molecular interactions that predict a more severe allergic response or shed light on which groups of patients are more likely to respond to an allergy or asthma therapy, and which ones may need closer follow-up.”

Researchers using the AAP’s parent database, InnateDB, have already made a molecular discovery that led to a new medication, currently undergoing clinical trials, for patients suffering from a severe malaria-induced inflammatory disease—illustrating the potential of the AAP to enable similar advances in the field of asthma and allergy.

Dr. Brinkman has her sights set on expanding the AAP beyond the molecular level. “AllerGen researchers have rich clinical and epidemiological data regarding other key players in the development of allergy and asthma, such as microbes in people’s bodies, and environmental data about where people live in relation to pollution sources,” she points out. “We are assessing this data to see how we can use it to expand and enrich the AAP even further.”

As the AAP maps out more complicated interrelationships, it will become an even more valuable research, discovery and development tool. “Such a powerful tool is crucial, considering its potential for bringing us closer to a true understanding of what allergy and asthma are—and potentially uncovering novel ways in which these conditions can be avoided or controlled,” says Dr. Brinkman.
AllerGen maintains enduring relationships with priority partners, both in Canada and abroad, who are helping us to achieve the Network’s legacy goals to 2019 and beyond.
AllerGen’s Integrated Research Program

AllerGen represents Canada’s largest commitment to date to address the social, economic and health impacts of allergies, asthma and allergic disease.

Led by internationally recognized Canadian researchers with expertise across a wide range of disciplines, the Network’s 38 active research projects and strategic initiatives aim to map a coordinated response to reduce the morbidity, mortality and socioeconomic costs of these illnesses.

Through strong partnerships, AllerGen leveraged its research investments to generate an additional $9.1 million in cash and in-kind support from partner and stakeholder organizations over the year—a leveraging ratio of 1:2.17.

AllerGen’s Integrated Research Strategy

Three Legacy Projects:
- The Canadian Healthy Infant Longitudinal Development (CHILD) Study;
- The Clinical Investigator Collaborative (CIC); and
- The Canadian Food Allergy Strategic Team (CanFAST).

Three Enabling Platforms:
- Gene-Environment Interactions;
- Biomarkers and Bioinformatics; and
- Patients, Policy and Public Health.
The Canadian Healthy Infant Longitudinal Development (CHILD) Study

**Research Leaders:**
Dr. Malcolm Sears, Professor, Division of Respirology, Department of Medicine, McMaster University  
Dr. Padmaja Subbarao, Staff Respirologist, The Hospital for Sick Children; Assistant Professor, Department of Paediatrics, University of Toronto

**Strategic Focus:**
• a unique birth cohort study following over 3,300 Canadian children and their families from pre-birth to age five  
• involves over 40 investigators from 30 disciplines  
• collects immunological, physiological and genetic data; dietary, housing and socioeconomic information  
• through national and international collaborations, the CHILD Study facilitates groundbreaking discoveries about the early-life origins of allergy, asthma and other chronic, non-communicable diseases (NCDs)

The Clinical Investigator Collaborative (CIC)

**Research Leaders:**
Dr. Paul O’Byrne, Professor and Chair, Department of Medicine, McMaster University  
Dr. Parameswaran Nair, Canada Research Chair and Professor of Medicine, Division of Respirology, McMaster University  
Dr. Anne Ellis, Associate Professor and Chair, Division of Allergy and Immunology, Department of Medicine, Queen’s University

**Strategic Focus:**
• a multi-centre, Canadian-based Phase II clinical trials group  
• helps pharmaceutical and biotechnology companies to evaluate new asthma therapies in their product pipeline and identify the most promising molecules for further development  
• supports start-up Canadian biotechnology companies, providing business and commercialization insights on which to base future investment decisions

The Canadian Food Allergy Strategic Team (CanFAST)

**Research Leaders:**
Dr. Jean Marshall, Professor and Head, Microbiology and Immunology, Dalhousie University  
Dr. Ann Clarke, Professor, Division of Rheumatology, Department of Medicine, University of Calgary; The Arthritis Society Chair in Rheumatic Diseases

**Strategic Focus:**
• a highly innovative, nationally networked research team studying food allergy and anaphylaxis  
• contributes to our understanding of the origins, causes, prevalence and treatment of food allergy  
• forms the foundation of a cross-sectoral team working to establish a National Food Allergy Strategy (NFAST) that will prioritize “bundling” and disseminating the best evidence on diagnosis, treatment, and management of food allergy and anaphylaxis to meet the needs of patients and policymakers
Gene-Environment Interactions

**Research Leaders:**
- Dr. Andrew Sandford, PhD, Associate Professor, Department of Medicine, The University of British Columbia
- Dr. Jeffrey Brook, PhD, Senior Scientist, Air Quality Research Branch, Environment Canada; Assistant Professor, Division of Occupational & Environmental Health, Dalla Lana School of Public Health, University of Toronto

**Strategic Focus:**
- A collection of national and international teams focused on genetic, environmental and epigenetic research that promotes advancements in personalized health
- Generates critical early-life exposure data on epigenetics, maternal/family stress, chemicals and traffic-related air pollution
- Aims to discover novel therapies and diagnostics, and facilitate the development of public health interventions and policies relevant to asthma and allergies

**Biomarkers and Bioinformatics**

**Research Leaders:**
- Dr. Kelly McNagny, PhD, Professor, Department of Medical Genetics, Co-Director, The Biomedical Research Centre, The University of British Columbia
- Dr. Dean Befus, PhD, Professor, Division of Pulmonary Medicine, Department of Medicine, University of Alberta
- Dr. John Gordon, PhD, Professor, Division of Respirology, Critical Care & Sleep Medicine, Department of Medicine, University of Saskatchewan

**Strategic Focus:**
- An integrated, world-leading systems-biology approach to the discovery, development and commercialization of diagnostic tests and treatments for asthma and allergies
- Focuses on predicting disease susceptibility, enabling early diagnosis, discriminating disease sub-types, monitoring disease prevention and drug response, and identifying novel therapeutic targets
- Integrates bioinformatics and data to facilitate advanced studies of allergic disease

**Patients, Policy and Public Health**

**Research Leaders:**
- Dr. Allan Becker, MD, Professor and Head, Section of Allergy and Clinical Immunology, Department of Pediatrics & Child Health, University of Manitoba
- Dr. Susan Elliott, PhD, Professor, Department of Geography and Environmental Management, University of Waterloo

**Strategic Focus:**
- A platform integrating interdisciplinary expertise to focus on the translation of AllerGen research that has policy, ethical, legal and/or social implications
- Focuses on knowledge translation and knowledge mobilization to leverage the Network’s research expertise to generate new policies, practices, products and services
- Aims to inform public policy, public health practices, patient and health professional outreach, and educational disease management tools
"We found that anaphylaxis accounted for a substantial number of ED visits, the most common trigger was food, and there is non-adherence to guidelines recommending epinephrine use for all cases of anaphylaxis."
Research Highlights

**New C-CARE findings on anaphylaxis**

Almost half the adults seen in an emergency department (ED) for an anaphylactic reaction are not given epinephrine in or outside of the hospital, according to 2014 findings from AllerGen’s Cross-Canada Anaphylaxis REgistry (C-CARE) project.

“Our study tracked adult ED visits for anaphylaxis at a Montreal hospital over a one-year period,” says Dr. Moshe Ben-Shoshan, a pediatric allergist at Montreal Children’s Hospital and lead investigator for C-CARE. “We found that anaphylaxis accounted for a substantial number of ED visits, the most common trigger was food, and there is non-adherence to guidelines recommending epinephrine use for all cases of anaphylaxis.”

The study’s findings were published in the *International Archives of Allergy and Immunology* in August 2014. Of roughly 37,000 ED visits, 0.26% fulfilled the definition of anaphylaxis. Food was the suspected trigger for over 60% of these anaphylactic reactions, with shellfish being the most common trigger (12.9% of all food-triggered reactions). “In contrast, a C-CARE study conducted in a pediatric ED found that peanut is the major food trigger in children,” says Dr. Ben-Shoshan.

Almost 40% of the adult anaphylactic reactions occurred outside the home and almost half of those in restaurants. “A troubling finding is that epinephrine was not administered in almost half of moderate-to-severe anaphylaxis cases,” adds dermatologist Dr. Yuka Asai, an AllerGen trainee and first author of the paper. “Our results reveal poor adherence to guidelines stipulating the use of epinephrine for anaphylaxis. We believe that this may be related to concerns about the side effects of epinephrine in adults.”

In another C-CARE study published in February 2015, researchers found that the annual incidence of recurrent anaphylaxis in children was 29%. “That rate is higher than previously reported in retrospective studies,” says Dr. Andrew O’Keefe, an allergist from St. John’s, Newfoundland.

“This study highlights that, once diagnosed, children with allergies and their families need to remain vigilant,” he says. “Patients, parents, and families should work with their healthcare providers to ensure that they understand the appropriate use of, and technique to administer, their epinephrine auto-injector in case of an anaphylactic reaction.”

**CIC discoveries offer hope for patients with asthma**

Breakthrough findings from AllerGen’s Clinical Investigator Collaborative (CIC)—a multicentre clinical trials consortium—provide new hope for people living with asthma.

In May 2014, CIC researchers discovered that an antibody can block a specific protein in the lungs and reduce the symptoms of inflammation and bronchoconstriction experienced by those with mild allergic asthma.

The study, published in the *New England Journal of Medicine* (May 2014), was conducted at five CIC sites across the country and involved AllerGen Network researchers Drs Gail Gauvreau and Paul O’Byrne (McMaster University), Louis-Philippe Boulet (Laval University), Donald Cockcroft and Beth Davis (University of Saskatchewan), Mark FitzGerald (The University of British Columbia), and Richard Leigh (University of Calgary).

Epithelial cells in the lungs’ airways produce a protein called thymic stromal lymphopoietin (TSLP) that causes inflammation. This study proved for the first time that airways continually produce TSLP in humans with asthma, and that blocking
TSLP with an antibody can reduce the symptoms triggered by environmental allergens.

“While we studied patients with allergic asthma, this research opens the door to developing new antibody treatments not only for this population, but for those diagnosed with severe asthma as well,” says Dr. O’Byrne, CIC research leader and Chair of the Department of Medicine at McMaster University.

In July 2014, the CIC further demonstrated that a new Genentech drug (quilizumab) successfully reduces the production of an immune system protein, reducing the symptoms of allergic asthma. Quilizumab is a monoclonal antibody that targets a receptor on immature blood cells to block the production of immunoglobulin E (IgE), a key protein involved in the allergic response. While other drugs bind to circulating IgE, quilizumab was developed to deplete the cells responsible for IgE production, according to Dr. Gauvreau, lead author of the study.

“The reduction of IgE in the blood was sustained for at least six months after the last dose of quilizumab, suggesting a long-lasting effect on IgE production,” says Dr. Gauvreau. “These findings may have implications for patients with severe asthma or other diseases which are caused by high levels of circulating IgE.”

The Phase II study was conducted over a two-year period at six Canadian universities and one international site, and published in the July 2, 2014, issue of Science Translational Medicine.

### Diesel exhaust affects genes within hours

Just two hours of exposure to diesel exhaust can cause genetic changes in patients with asthma, according to research from AllerGen investigators at The University of British Columbia (UBC).

The study, published in Particle and Fibre Toxicology in December 2014, found that inhaling diesel exhaust fumes affected the chemical coating of certain genes involved in allergic disease—a process called methylation, which can alter a gene’s function without affecting the underlying DNA.

Drs Christopher Carlsten (Associate Professor of Medicine, Canada Research Chair in Occupational and Environmental Lung Disease) and Michael Kobor (Professor of Medical Genetics, Canada Research Chair in Social Epigenetics) conducted the research, adding to their growing body of work on the relationship between exposure to diesel exhaust and asthma. AllerGen trainees Drs Meaghan Jones and Francesco Sava, and Ruiwei Jiang—the paper’s first author—were also on the research team.

As part of the study, 16 adults with asthma were placed in an enclosed booth at UBC’s Air Pollution Exposure Laboratory (APEL) and asked to ride an exercise bike intermittently over two hours. While they rode, they were exposed to either diluted diesel exhaust—air quality similar to that of a highly polluted city or an underground mine—or filtered, clean air.

“We found that within a matter of hours, exposure to diesel exhaust caused changes to DNA that may have long-term implications,” says Dr. Carlsten.

Epigenetics research has shown that, while genes map out the blueprint of how we develop, genes can be modified—switched on or off, dialled up or down—by environmental factors. Exposure to diesel exhaust, the study found, is one such factor.

With the team’s discovery that genetic changes are triggered within hours after exposure, come the inevitable questions: “How do these changes impact health?” and “Can we reverse these changes or prevent them from occurring?”

Answering these questions is an important next step, according to the researchers. “Over an
individual’s lifetime, an accumulation of short-term epigenetic changes can lead to long-term diseases associated with air pollution,” adds Dr. Carlsten. “By understanding these acute dynamics, we hope to gain insight into longer-term consequences and potential preventive measures.”

The study’s findings were reported extensively by North American media—including Global News, The Globe and Mail, The Vancouver Sun, The Huffington Post, Science Daily and Radio Canada International—as well as by international outlets.

**CHILD Study sheds new light on factors that cause children to develop allergies**

The Canadian Healthy Infant Longitudinal Development (CHILD) Study birth cohort has shed new light on the factors that cause children to develop allergies.

A study led by AllerGen investigator Dr. Michael Brauer and published in *Environmental Health Perspectives* (March 2015), showed that exposure to outdoor air pollution during the first year of life increases the risk of developing allergies to food, mould, pets and pests.

“With allergy rates increasing among children in Canada and elsewhere, we were interested in
determining if traffic-related air pollution (TRAP) might be partially responsible," says Dr. Brauer, a professor in the School of Population and Public Health at The University of British Columbia. “This is the first study to find a link between air pollution and measured allergic sensitization during the first year.”

The researchers collected data from 2,477 children participating in the CHILD Study who were tested at one year of age for sensitivity to common allergens, including cat, dog, dust mite, cockroach, fungus, milk, egg, soy and peanut. TRAP exposure was assessed by modelling nitrogen dioxide (NO2) levels at each child’s home address. Individual exposures were estimated by incorporating changes in air pollution concentrations over time and space, and evaluating the time each child spent away from home, including at daycare.

“We also found that children who attended daycare or who had older siblings were less likely to develop allergic sensitization, suggesting that exposure to other children can be protective,” says AllerGen trainee Dr. Hind Sbihi, the study’s first author.

In a separate study published as the “Editor’s Choice” in Clinical & Experimental Allergy (February 2015), CHILD Study researchers identified differences in babies’ intestinal bacteria that can help predict future development of food allergies and asthma.

The study found that infants with lower bacterial diversity and an elevated ratio of certain gut bacteria at three months are more likely to become sensitized to foods such as milk, egg or peanut by one year of age.

Senior authors and AllerGen investigators Dr. Anita Kozyrskyj (University of Alberta), and Dr. James Scott (University of Toronto), note that gut bacterial patterns during infancy may serve as biomarkers for future disease. “At the end of the day, we want to know if infants who show changes to normal gut bacteria composition will go on to develop food or other allergies, or even asthma,” says Dr. Kozyrskyj.

Dr. Meghan Azad of the University of Manitoba, the study’s first author, believes that the research could eventually help doctors and parents prevent the onset of illness. “Ultimately, we hope to develop new ways of preventing or treating allergies by modifying the gut microbiota,” says Dr. Azad.

National survey finds fewer food allergies among Canadians with low education and new immigrants

New AllerGen research provides a picture of the food allergy landscape in Canada that is more complete than ever before. In September 2014, AllerGen investigators published results of the first nationwide survey to estimate the prevalence of food allergy among vulnerable Canadians, including those with low income, those with low education, new Canadians and individuals of Aboriginal identity.

Data from the study, Surveying Prevalence of Food Allergy in All Canadian Environments (SPAACE), was published in the Journal of Allergy and Clinical Immunology: In Practice. The study surveyed 5,734 Canadian households—representing over 15,000 individuals—and concluded that Canadians with lower education and new Canadians (individuals who immigrated to Canada within the previous 10 years) have fewer food allergies than the general population.

The research was conducted by a team of AllerGen investigators led by Dr. Ann Clarke, a professor in the Department of Medicine at the University of Calgary, and Dr. Susan Elliott, a professor in the
Department of Geography and Environmental Management at the University of Waterloo.

The reasons for the lower prevalence of food allergy among vulnerable Canadians are not clear; at play are a range of factors that the authors believe require further research.

In a subsequent March 2015 publication, SPAACE researchers adjusted the vulnerable population data to provide an estimate of food allergy prevalence for the general Canadian population. They reported overall food allergy prevalence to be 7.5% for all ages, 7.7% for adults and 6.9% for children under 18 years of age.

The SPAACE study’s findings also revealed under-use of epinephrine auto-injectors (EAI) in Canada. Less than half of those surveyed with a diagnosed food allergy—particularly in households with lower educational levels—reported having an EAI prescription, and almost half of those prescribed the device do not carry it.

These findings will help researchers to identify and address gaps in education, healthcare and public policy, and to ensure equal opportunity for all Canadians to receive appropriate care related to food allergies.

Dr. Lianne Soller, an AllerGen trainee and first author of the study, says the research “enables us not only to better characterize the prevalence and experience of food allergy in Canada, but also to understand how the environment may influence its development.”
AllerGen continues to leverage its strong international partnerships to deliver new therapeutics, clinical guidelines, research, programs, and knowledge to diverse global audiences. These partnerships enrich training and skill acquisition opportunities for Network students, new professionals and researchers.
The impact of AllerGen’s research is bolstered by the strength of the Network’s relationships with partner organizations, research collaborators and knowledge users, both in Canada and abroad. These stakeholders play an integral role in shaping and enhancing research outcomes, and in facilitating the mobilization and commercialization of Network technologies, products and services.

In 2014-2015, AllerGen worked with 133 partners, engaging an average of 3.5 partners per research project.

### 2014-2015 Partners List (n=133)

**Universities (n=34)**
- Changzhou University
- Charité-Universitätsmedizin Berlin
- Dalhousie University
- Harvard University
- Karolinska Institute
- Lakehead University
- McGill University
- McMaster University
- Memorial University of Newfoundland
- Northwestern University
- Queen’s University
- Simon Fraser University
- Southern Methodist University
- Sean N. Parker Center for Allergy & Asthma Research—Stanford University
- University of Alberta
- University of Calgary
- University of Copenhagen
- University of Groningen
- University of Manitoba
- University of Nebraska
- University of Ottawa
- University of Saskatchewan
- University of Toronto
- University of Waterloo
- University of Wisconsin
- Utrecht University
- Western University

**Université du Québec à Chicoutimi**
**Université Laval**
**University of Alberta**
**University of Calgary**
**University of Copenhagen**
**University of Groningen**
**University of Manitoba**
**University of Nebraska**
**University of Ottawa**
**University of Saskatchewan**
**University of Toronto**
**University of Waterloo**
**University of Wisconsin**
**Utrecht University**
**Western University**

**Institut universitaire de cardiologie et de pneumologie de Québec (IUCPQ), Quebec City**
**IWK Health Centre, Halifax**
**Kingston General Hospital, Kingston**
**Montreal Children’s Hospital, Montreal**
**St. Joseph’s Healthcare Hamilton**
**St. Michael’s Hospital, Toronto**
**The Hospital for Sick Children, Toronto**
**The McGill University Health Centre, Montreal**

**Hospitals and Health Centres (n=11)**
- Centre Hospitalier universitaire (CHU) Saint-Justine, Montreal
- Hôpital du Sacré-Cœur de Montréal, Montreal
- Hospital Nacional General de Neumología y Medicina Familiar “Dr. Antonio Saldaña,” San Salvador, El Salvador

**Industry (n=34)**
- Adiga Life Sciences Inc.
- AIM Therapeutics Inc.
- ArrowCan Partners Inc.
- AstraZeneca Canada Inc.
- Axikin Pharmaceuticals Inc., USA
- Boehringer-Ingelheim
- Carr-Gordon Limited
- CTI Life Sciences Fund
- CHENOMX Inc.
- David Brener & Associates Inc.
Deborah Danoff Consulting
Greenfleet Ltd.
Kanata Allergy Services Ltd.
Kincora Innovation
Leap Learning Technology Inc.
Lincoln Diagnostics Inc./ALK, USA
Lumira Capital
Mark Bisby Consulting
McDonald’s Restaurants of Canada Limited
Merck Canada Inc.
Norlien Foundation
Northtaste Flavourings Ltd.
Novartis Pharmaceuticals Canada Inc.
Pfizer Canada Inc.
Pro-Bio Associates
Roche Canada
Sanhueza & Associates Inc.
Sanofi Pasteur Ltd.
Shoppers Drug Mart Corporation
Sylviane Duval Consulting
TEC Edmonton
Teva Pharmaceutical Industries Ltd.
Trudell Medical International
TVM Capital

**Provincial Agencies (n=8)**
- Alberta Health Services
- Fonds de recherche du Québec
- Healthy Child Manitoba
- Michael Smith Foundation for Health Research
- Ontario Ministry of Health and Long-Term Care Province of Nova Scotia
- Public Health Ontario
- Research Manitoba

**Non-Profit, Networks and Professional Associations (n=34)**
- Allergy/Asthma Information Association (AAIA)
- American Academy of Allergy, Asthma & Immunology (AAAAI)
- Anaphylaxis Canada
- Association Québécoise des Allergies Alimentaires (AQAA)
- Asthma Society of Canada
- British Columbia Lung Association
- Canadian Allergy, Asthma and Immunology Foundation (CAAIF)
- Canadian Anaphylaxis Initiative
- Canadian Institute for Health Information
- Canadian Lung Association/Canadian Thoracic Society
- Canadian Perinatal Network
- Canadian Respiratory Research Network
- Canadian Society of Allergy and Clinical Immunology (CSACI)
- Cancer Stem Cell Consortium
- Centre for Drug Research and Development (CDRD)
- Centre of Excellence for Prevention of Organ Failure (PROOF)
- Chanchlani Research Centre
- Childhood Asthma Foundation
- Compute Canada
- Dairy Farmers of Canada
- Dietitians of Canada
- Family Physician Airways Group of Canada
- Grand Challenges Canada
- JP Bickell Foundation
- Mitacs
- National Institutes of Health, USA
- Ontario Lung Association
- Quebec Lung Association
- Réseau Québécois de l’asthme et de la MPOC
- Stem Cell Network
- The Banff Centre for Continuing Education
- The DeGroote Family Foundation – William J. Walsh Professorship in Medicine
- The Hospital for Sick Children – SickKids Foundation
- The Sandbox Project

**Research Institutes (n=6)**
- Alberta Centre for Child, Family and Community Research
- Centre de recherche du Centre hospitalier de l’Université de Montréal (CHUM)
- Helmholtz Zentrum München, Germany
- James Hogg Research Centre
- Munich Allergy Research Center (MARC), Germany
- The Children’s Hospital Research Institute of Manitoba
International Partnerships

AllerGen continues to leverage its strong international partnerships to deliver new therapeutics, clinical guidelines, research, programs, and knowledge to diverse global audiences. These partnerships enrich training and skill acquisition opportunities for Network students, new professionals and researchers.

In April 2014, AllerGen signed a Memorandum of Understanding (MOU) with the Institute for Biomedical Engineering and Health Sciences at Changzhou University in China. Led by Dr. Linhong Deng, the Institute is engaged in the research of pathogenesis for asthma and the regulatory mechanisms of airway smooth muscle.

This agreement is AllerGen’s seventh international MOU based on a shared interest in promoting allergy, asthma, and immune disease health research and related capacity building.

AllerGen Institutional Memoranda of Understanding (n=7)

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<thead>
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<th>Country</th>
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<td>Germany</td>
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<tr>
<td>Technische Universität München (TUM) and Helmholtz Zentrum München German Research Centre for Environmental Health</td>
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<td>The Allergie – Centrum – Charité</td>
<td>Germany</td>
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<td>The University of Newcastle</td>
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<tr>
<td>The Priority Research Centre for Asthma and Respiratory Disease</td>
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<tr>
<td>Karolinska Institutet</td>
<td>Sweden</td>
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<tr>
<td>Centre for Allergy Research (CfA)</td>
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<td>Australia</td>
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<td>Changzhou University</td>
<td>China</td>
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<tr>
<td>Institute for Biomedical Engineering and Health Sciences</td>
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<tr>
<td>Sean N. Parker Centre for Allergy &amp; Asthma Research</td>
<td>United States</td>
</tr>
<tr>
<td>Stanford University</td>
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</table>

AllerGen Scientific Director Dr. Judah Denburg meets with officials from Changzhou University, April 29, 2014.
AllerGen-Stanford collaboration to advance food allergy research

In June 2014, AllerGen and Stanford University launched a new collaboration that allows a young Canadian scientist (MD or PhD) with an interest in developing new and safe therapies for food allergies to pursue academic research training with Dr. Kari Nadeau at the Sean N. Parker Center for Allergy & Asthma Research at Stanford University.

The Stanford/AllerGen Research Fellowship Award provides a salary/stipend of up to $50,000 for one year of study. The award is aligned with AllerGen’s strategic goal to contribute to an understanding of the origins, causes, prevalence and treatment of food allergy and to inform the development of improved clinical management strategies and public health measures.

Dr. Nadeau is one of North America’s foremost experts in adult and pediatric allergy. She has pioneered research that desensitizes the immune system by gradually exposing patients to incremental doses of a food allergen over time—a treatment called oral immunotherapy. The Sean N. Parker Center for Allergy & Asthma Research at Stanford is an interdisciplinary research centre named after technology billionaire and principal donor Sean Parker.

“This collaboration is a perfect example of two organizations coming together to help mentor future scientists and physicians in the field of allergy and immunology. We are very excited about our work with AllerGen now and in the future.”

Dr. Kari Nadeau
Stanford University
Sean N. Parker Center for Allergy & Asthma Research
AllerGen partners with Canadian Respiratory Research Network to support new investigators


The CRRN/AllerGen research allowance grant, valued at up to $150,000 over a three-year period, assists new investigators in respiratory research to demonstrate the productivity necessary to secure major funding from national and international granting agencies.

Dr. Meghan Azad, Assistant Professor, Department of Pediatrics and Child Health, University of Manitoba, is the recipient of the inaugural CRRN/AllerGen ERLI Award. Dr. Azad’s research investigates the effect of breastfeeding on asthma development, and explores how these effects are influenced by breast milk composition and maternal characteristics.

“The ERLI award is funding my research projects as a new Principal Investigator and connecting me with AllerGen and CRRN investigators across the country. This support and networking is critical to launching my career as an independent scientist.”

Dr. Meghan Azad
Recipient of inaugural CRRN/AllerGen ERLI Award
“We don’t have all the answers about food allergy, but we know enough to tackle this large and growing public health problem,” says Dr. Susan Elliott, a University of Waterloo professor and head of an AllerGen initiative to develop a National Food Allergy Strategy for Canada. “In terms of addressing food allergies, Canada is at a tipping point.”
Knowledge and Technology Exchange and Exploitation (KTEE)

AllerGen supports high-impact and transformative research, and the translation of this research into tangible benefits for Canadian families, educators, healthcare providers and policymakers dealing with asthma and allergies. AllerGen invests in targeted, strategic knowledge mobilization and commercialization initiatives to improve the relevance, uptake and application of its research results by partner organizations, stakeholders and receptor communities across the country.

Knowledge Mobilization

AllerGen Success Stories

AllerGen has published and distributed eight issues of Success Stories to over 1,200 Network participants, partners and knowledge users since 2010. Written for Canadian families and healthcare providers, Success Stories offers those living and dealing with allergic conditions and related immune diseases practical information about the latest research results.

In addition to diverse topics in the areas of asthma and allergies, Success Stories, available in English and French, features the accomplishments of the Network’s Highly Qualified Personnel.

National Food Allergy Strategy: A “tipping point”

“We don’t have all the answers about food allergy, but we know enough to tackle this large and growing public health problem,” says Dr. Susan Elliott, a University of Waterloo professor and head of an AllerGen initiative to develop a National Food Allergy Strategy for Canada. “In terms of addressing food allergies, Canada is at a tipping point.”

On June 23, 2015, Dr. Elliott hosted a meeting with stakeholders from community and patient groups, government, healthcare, and the pharmaceutical and food industries to kick-start a national dialogue about food allergy. Twenty-two pan-Canadian
The event was co-moderated by AllerGen Scientific Director Dr. Judah Denburg and Dr. Reza Alizadehfar of McGill University.

A National Food Allergy Strategy aims to create widespread awareness of, and capacity to avoid, allergic triggers; improve access to epinephrine auto-injectors in public spaces and schools; and improve diagnosis, treatment and management of food allergy and anaphylaxis in primary-care offices, specialty practices and emergency departments. It also aims to develop a framework for mandatory allergy training for school, daycare and restaurant personnel.

In Fall 2015, Dr. Elliott and Dr. Ann Clarke, an AllerGen researcher and professor at the University of Calgary, will launch AllerGen’s third population survey of food allergies. The survey findings will inform the emerging national strategy and answer the questions: “Is food allergy on the rise?” and “How are the prevalence, perception and experience of food allergy in Canada changing over time?”

**AllerGen hosts Francophone forum on asthma**

In May 2014, AllerGen convened a panel of Montreal’s leading asthma experts in a dynamic public forum about asthma: what provokes it, what exacerbates it, and what can be done to control and prevent it.

This French-language event, the first of its kind to be organized by AllerGen, was held in Mont-Royal, QC, to provide parents, families and educators with an opportunity to learn more about seasonal asthma in children and how to manage it.

Expert speakers included Dr. Francine Ducharme (pediatric allergist, CHU Ste-Justine); Dr. Marie-Josée Francoeur (pediatric allergist, Hôpital Charles LeMoyne, Université de Sherbrooke); Dr. Louis Jacques (prevention and public health specialist, Direction de santé publique de Montréal); and Jocelyne Bouchard (RN/asthma educator, CHU Ste-Justine).

The event was promoted through the Quebec Lung Association, National Asthma Patient Alliance, CHU Ste-Justine, Montreal Children’s Hospital, Hôpital Charles LeMoyne, Quebec Food Allergy Association, and the Quebec Network of Asthma Education Centres.
**The future of personalized health**

The tendency to focus on an individual’s genes as the basis for a “personalized medicine” approach to healthcare does not adequately incorporate the important role of environmental factors in health and disease, according to AllerGen experts in gene-environment interactions, biomarkers and bioinformatics.

“Genes, the environment and personalized medicine,” published by *EMBO reports* in June 2014, proposes a new framework of personalized medicine, one that demonstrates a greater appreciation of environmental factors and their effects on the epigenome and disease risk in order to maximize personal and population health.

“A narrow, DNA-focused view of personalized medicine has become pervasive,” says Dr. Chris Carlsten, who led the AllerGen team that prepared the report. “We believe that genetics should be just one of a suite of personalized tools to achieve healthier living, rather than an all-powerful method to reliably predict future disease.”

Established in 2000, *EMBO reports* publishes advances in molecular biology, assisting scientists around the globe to discover, assess and use research.

*Carlsten et al. Genes, the environment and personalized medicine. EMBO reports, June 6, 2014.*
Are the numbers growing? In which months are anaphylactic emergencies most common? How have prescription patterns for epinephrine auto-injectors changed over time?

A September 2015 fact sheet from the Canadian Institute for Health Information (CIHI) answers these questions using data collected from EDs in several provinces and prescription medication records in British Columbia, Saskatchewan and Manitoba.

In 2014, AllerGen experts Drs Moshe Ben-Shoshan, Ann Clarke and Susan Elliott were invited to collaborate with CIHI to develop the fact sheet, which provides the latest snapshot of Canadian anaphylaxis statistics.

The results are intriguing. For example, visits for allergic reactions represent 1% of all ED visits and have been relatively stable over time; however, visits specifically coded as anaphylaxis have increased 90% between 2006-2007 and 2013-2014.

CIHI is a not-for-profit organization that maintains 27 national databases capturing health information across the country. CIHI fact sheets can be downloaded from the organization’s website.

Workshops aim to attract doctors to allergy and clinical immunology specialty

Canadians are faced with long wait times to see allergists/clinical immunologists, and many communities are under- or un-serviced by these specialists.

Since 2005, AllerGen’s initiatives to promote the subspecialty have contributed to a 34% increase
in allergy/clinical immunology specialists in Canada, and to the establishment of three additional accredited training programs at Canadian medical schools (The University of British Columbia, Dalhousie University, Université de Montréal).

In June 2014, AllerGen hosted Visiting Professor workshops at Memorial University of Newfoundland in St. John’s, NL, to expose medical students and residents in internal medicine and pediatrics to career opportunities within the specialty.

The workshops were led by Visiting Professor Dr. Stuart Turvey, an associate professor of pediatrics at The University of British Columbia, a pediatric immunologist at BC Children’s Hospital, and the Director of Clinical Research at the Child & Family Research Institute. Dr. Turvey is an AllerGen investigator and leads the Vancouver site for the Canadian Healthy Infant Longitudinal Development (CHILD) Study.

The workshops featured case studies in food allergy, anaphylaxis and immunology, and aimed to create a heightened understanding of the growing prevalence of allergic disease, as well as the need to boost allergy and immunology expertise in Canada.

Dr. Andrew O’Keefe, a St. John’s-based allergist and a former AllerGen trainee, joined Dr. Turvey as a workshop co-presenter.

**Student videos highlight “what’s new” in Canadian allergy research**

In early 2015, AllerGen challenged members of its AllerGen Students and New Professionals Network (ASNPN) to create videos highlighting their research in an exciting way and to make their projects accessible to a wide public audience.

AllerGen’s 2015 HQP Video Competition generated 11 unique videos that have received over 6,000 YouTube views. In them, AllerGen HQP describe their research, spanning topics from childhood asthma to the swine flu to underuse of epinephrine.

Their goal? To enhance public awareness of allergic disease research in Canada and to sharpen their own science communication skills in the process.

Videos were evaluated by an expert panel and through public online voting. The creators of the two winning videos each received a cash award of $1,000.

**2015 HQP Video Competition Winners**

**Asthma and H1N1 Swine Flu**

David Ngan  
The University of British Columbia

“It’s rewarding to realize you’ve gained a far larger reach than you could through traditional scientific avenues. My success in the competition led my research centre to recruit me to host workshops on making knowledge translation videos.”

**Epinephrine 4 Life**

Rishma Chooniedass & Saiful Huq  
University of Manitoba

“AllerGen took an important step towards highlighting knowledge translation and its importance in research. It was great to get a glimpse of the many interesting projects from across Canada.”
Commercialization

CIC facilitates drug development and SME success among Canadian biotechnology companies

AllerGen’s Clinical Investigator Collaborative (CIC) has helped pharmaceutical companies, including Genentech, Amgen, Wyeth, Novartis, AstraZeneca, Schering Plough and Pfizer, to evaluate new asthma therapies in their product pipeline and identify the most promising molecules for further development.

Using a unique set of standardized operating procedures (SOPs) that are harmonized across multiple sites, as well as a well-defined clinical model, the CIC conducts Phase II clinical trials that accurately predict whether or not an early-stage drug should be pursued for further development. In 2014, a CIC partnership with Amgen identified one of the most exciting new asthma therapies to date, with findings published in the *New England Journal of Medicine*.

Since 2005, the CIC has undertaken 24 clinical trials with pharmaceutical and biotechnology partners and sold 20 SOP licenses—seven licenses have been sold since 2012 alone.

The CIC provides much more than a “fee-for-service” clinical trials group. It offers academic leadership in drug development research, conducts add-on
experiments to establish the mechanism of action for experimental drugs, and publishes novel data in high-impact, peer-reviewed journals.

The CIC has also facilitated small and medium enterprise (SME) development in Canada by providing start-up Canadian biotechnology companies, including Asmacure, Topigen/Pharmaxis, and AIM Therapeutics, with business and commercialization insights on which they have based investment decisions.

Talking business with scientists: AllerGen’s KTEE Mentorship Program

AllerGen investigators want their research results to translate into real-world benefits for Canadians living with asthma and allergic disease—whether through the commercial development of a new therapeutic or technology, or by bringing new evidence to bear on public policy.

To help researchers achieve these goals, AllerGen enhanced its Knowledge and Technology Exchange and Exploitation (KTEE) Mentorship Program in 2014.

The Mentorship Program is an integral component of AllerGen’s overall commercialization strategy, which aims to identify and exploit commercial opportunities for Network projects and initiatives.

Researchers and their teams consulted KTEE mentors throughout 2014, using a customized online platform to facilitate matchmaking and exchange. In 2015, mentor-delivered webinars on commercialization and knowledge mobilization topics will further support AllerGen researchers to move their ideas to the marketplace—assisting them to patent their products and services, identify potential markets, build business communities, and seek investors.

AllerGen’s Managing Director Dr. Diana Royce presented at the NCE Annual General Meeting in Ottawa, ON, on March 31, 2015. Dr. Royce’s presentation, “Defining and Demonstrating Performance and Impact,” highlighted the use of Key Performance Indicators (KPIs) to support effective decision making and investments.
AllerGen's Travel Awards Program is the Network’s most highly subscribed HQP program. Travel awards facilitate learning, research dissemination, and networking by supporting HQP to participate in national and international conferences, symposia and workshops.
Tomorrow’s Leaders: AllerGen’s Highly Qualified Personnel (HQP)

“For a PhD student there are two critical facets to success: building a network and developing professional skills. AllerGen has provided me with the opportunity to achieve both of them.”

Vivek Gandhi, PhD (c)
AllerGen HQP, University of Alberta

AllerGen’s HQP program is one of the Network’s most impactful and transformational accomplishments, providing skill acquisition and capacity-building opportunities for students beyond the training and mentorship provided within individual research projects and teams.

The HQP program has increased Canada’s research capacity, launching the careers of numerous young investigators and clinician-scientists, and producing highly employable graduates working in diverse sectors.

AllerGen trainees are seizing the full range of the Network’s scientific and “soft skills” development programs to augment their academic training: attending conferences globally; participating in international research exchanges; and presenting research posters to, and interacting with, patients and clinical, industry and government professionals.

**AllerGen Students and New Professionals Network (ASNPN)**

The AllerGen Students and New Professionals Network (ASNPN) is open to trainees (undergraduate students to postdoctoral fellows), research staff and early-career researchers working in the field of allergic disease in Canada. Since 2005, AllerGen has provided education and training to 1,315 trainees, research staff and early career professionals, and invested over $7 million in trainee awards, grants, fellowships and research support.

The ASNPN is governed by an elected Executive Committee, which meets five times per year by teleconference. The ASNPN President sits as an observer on AllerGen’s Research Management Committee (RMC).

In 2014-2015, there were 353 ASNPN members: 282 HQP actively involved in Network research, and 72 students and new professionals working in related research areas.

**AllerGen HQP by Level of Study**

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HQP’s publication productivity breaks new ground

AllerGen’s HQP program supports students’ research skills and career advancement through a consistent emphasis on scientific productivity.

Since 2005, over 1,900 journal articles, specialized publications and posters emerging from AllerGen research have been first-authored by AllerGen trainees, research staff and early-career researchers. Among these, 52% of the peer-reviewed articles appearing in refereed journals have an AllerGen HQP as first author.

In 2014-2015 alone, trainees, research staff and young professionals working on AllerGen-funded research were named as lead author on 24 peer-reviewed articles, resulting in enhanced publication productivity, recognition, and impact.

Dr. Matthew Gold (PhD), an AllerGen HQP at The University of British Columbia (UBC), provides an outstanding example of trainee publication productivity. Dr. Gold has published 18 first-author research papers and reviews, and is the lead author on several pending papers focused on inflammatory and allergic airway disease.

“The number and quality of publications that Dr. Gold has produced as an AllerGen trainee is monumental, and almost unprecedented for such an early-stage career,” comments Dr. Kelly McNagny, his AllerGen supervisor at UBC.

Enhancing expertise with Research Skills Awards

AllerGen’s Research Skills Awards fund individual training opportunities outside local training environments, responding to the specific needs of the Network’s trainees. Awards, matched 1:1 with non-AllerGen funding, provide for advanced research skill acquisition and employment-relevant training.

AllerGen trainees become Network investigators

Dr. Meghan Azad
University of Manitoba

Dr. Elinor Simons
University of Manitoba

Dr. Jeremy Hirota
The University of British Columbia

Drs Meghan Azad and Elinor Simons, University of Manitoba, and Dr. Jeremy Hirota, The University of British Columbia, were approved as Network investigators by AllerGen’s Board of Directors in 2014–2015.

AllerGen’s HQP training program funds young investigators for three years while they transition from postdoctoral positions to independent research programs.
with the world’s top allergy and asthma clinician-scientists and researchers.

In 2014-2015, AllerGen funded seven Research Skills Awards, supporting advanced training in the following areas:
- science communications
- institutional ethnography
- computational methods for studying biological samples
- DNA extraction and sequencing
- role of CD34 in the development of allergic airway inflammatory diseases
- CD34 family proteins and the transgenic mice available to allergic disease
- analysis of next generation sequence data

AllerGen awards third Emerging Clinician-Scientist Research Fellowship

In October 2014, Dr. Marylin Desjardins (McGill University Health Centre-Montreal Children’s Hospital) received the prestigious AllerGen Emerging Clinician-Scientist Research Fellowship. Valued at $250,000, this fellowship addresses the shortage of allergy and clinical immunology expertise in Canada, and advances AllerGen’s goal to support Canadian allergists/clinical immunologists in the pursuit of research training and a combined career as a clinician and academic researcher.

AllerGen’s Emerging Clinician-Scientists: The future of allergy research in Canada

Front row (left to right): Dr. Moshe Ben-Shoshan; AllerGen Scientific Director Dr. Judah Denburg; Dr. Marylin Desjardins; Dr. Philippe Bégin. Back row (left to right): AllerGen Research Leaders Dr. Dean Befus and Dr. Allan Becker.

"With an AllerGen Research Skills Award, I had the opportunity to work with Dr. James Scott at the University of Toronto, which was extremely valuable. I helped his team process fecal samples collected from infants in the CHILD Study. The data will be used for future grant submissions and will inform my postdoctoral research."

Petya Koleva, Postdoctoral Fellow
University of Alberta
Dr. Desjardins’s research focuses on interleukin-21 (IL-21), a protein that plays a key role in stimulating the body’s immune system and antibody production. A better understanding of how IL-21 works, and the role it plays in the development of autoimmune diseases and inflammatory disorders, could contribute to new treatment options for individuals with allergies, asthma and immune deficiencies.

Dr. Desjardins trains under the supervision and mentorship of AllerGen investigator Dr. Bruce Mazer, the Deputy Executive Director/Deputy Chief Scientific Officer of the Research Institute of the McGill University Health Centre and Head of Child Health Research at the Montreal Children’s Hospital.

This is the third Fellowship awarded by the AllerGen network. Dr. Philippe Bégin, from the Centre hospitalier de l’Université de Montréal (CHUM) and the Centre hospitalier universitaire Sainte-Justine (CHU Sainte-Justine), received the fellowship in 2013. Dr. Moshe Ben-Shoshan, a pediatric allergist from McGill University and the Montreal Children’s Hospital, received the inaugural fellowship in 2010 and is now an AllerGen Principal Investigator.

A spotlight on the 2014 Lindau Nobel Laureate Meeting

AllerGen trainee and gut microbiome researcher Dr. Meghan Azad was one of 600 aspiring young researchers from 80 countries to attend the 64th Lindau Nobel Laureate Meeting in Lindau, Germany, from June 29 to July 4, 2014.

The 2014 Laureate Meeting allowed Nobel Prize winners and the world’s brightest young scientists to discuss topics such as global health, challenges to medical care in developing countries, and future research approaches to medicine.

Dr. Azad completed a postdoctoral fellowship in Epidemiology and Pediatrics at the University of Alberta, under the supervision of AllerGen investigator Dr. Anita Kozyrskyj. In July 2014, Dr. Azad became an assistant professor at the University of Manitoba and a research scientist at the Children’s Hospital Research Institute of Manitoba.

Dr. Azad’s research uses samples from AllerGen’s Canadian Healthy Infant Longitudinal Development (CHILD) Study to investigate the impact of antibiotics, breastfeeding and environmental factors on infant gut microbiota and the subsequent development of allergic disease.

““The meeting was an incredible, once-in-a-lifetime opportunity to meet and learn from dozens of Nobel Laureates and accomplished young scientists from around the world! I have now established an international network of new friends and potential collaborators.”

Dr. Meghan Azad
University of Manitoba
Summer studentships prepare trainees for graduate studies

In 2014, AllerGen funded 10 outstanding undergraduate students from nine Canadian universities and related research institutes to work in research teams alongside AllerGen investigators. For each student, AllerGen provided up to $3,000 in support, matched 1:1 by Canadian partner organizations for a total program award value of $60,000.

The Summer Studentship program aims to foster interest in allergic and related immune disease research among students at the undergraduate level, potentially leading to advanced studies and a career in related research or clinical practice. Forty summer studentships have been awarded since 2012.

With additional support through AllerGen’s Travel Awards program, Summer Studentship recipients have presented their research at national and international conferences, such as the American Thoracic Society International Meeting, and published papers in peer-reviewed scientific journals, resulting in a superior undergraduate experience.

“My AllerGen summer studentship allowed me to improve my leadership, critical thinking and presentation skills. I also improved my laboratory techniques in flow cytometry, cell culture and working with mice. These skills will be an asset when pursuing my Master’s degree.”

Julyanne Brassard
4th year B.Sc. student
Université Laval

### AllerGen 2014-2015 Undergraduate Summer Studentships Recipients

<table>
<thead>
<tr>
<th>Institution</th>
<th>AllerGen Funding</th>
<th>Partner Funding</th>
<th>Total Award Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dalhousie University</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Stephanie Legere</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Queen’s University</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Elizabeth Lee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Hospital for Sick Children</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Laura Feldman</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The University of British Columbia</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Angie Lam</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Université du Québec à Chicoutimi</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Anne-Marie Boucher-Lafleur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Université Laval</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Julyanne Brassard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Alberta</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Britt Voaklander</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Calgary</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$9,100</td>
</tr>
<tr>
<td>Giselle Morean</td>
<td>$3,000</td>
<td>$3,000</td>
<td></td>
</tr>
<tr>
<td>Abid Qureshi</td>
<td>$1,550</td>
<td>$1,550</td>
<td></td>
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<tr>
<td>University of Saskatchewan</td>
<td>$3,000</td>
<td>$3,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Bahar Bahrani</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$28,550</td>
<td>$28,550</td>
<td>$57,100</td>
</tr>
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</table>
Travel Awards bring HQP research to the world

AllerGen’s Travel Awards Program is the Network’s most highly subscribed HQP program. Travel awards facilitate learning, research dissemination, and networking by supporting HQP to participate in national and international conferences, symposia and workshops.

Travel awards provide trainees and investigators with an opportunity to share their research results during poster and oral presentations, and to network with leading experts in allergic disease research.

In 2014-2015, AllerGen bestowed 32 awards to support attendance at 10 high-profile conferences, including the American Academy of Allergy, Asthma and Immunology (AAAAI), Collegium Internationale Allergologicum (CIA), and the European Academy of Allergy and Clinical Immunology World Allergy and Asthma Congress (EAACI), among others.

Trainees excel in AllerGen and CSACI poster competitions

From the impact of air pollution on physician office visits to the characterization of IgE receptor expression in asthmatic epithelial cells, AllerGen’s 2014 Poster Competition showcased the outstanding research of Network trainees at a national gathering of Canada’s top allergists and clinical immunologists.

Hosted in partnership with the Canadian Society of Allergy and Clinical Immunology (CSACI) at its Annual Scientific Meeting in Ottawa, ON, (October 23-26, 2014), the competition provided a unique opportunity for AllerGen trainees to share the results of their research with a diverse audience of clinicians and researchers in the field of allergic disease.

The Poster Competition featured two-minute oral presentations, poster viewing and adjudication,
## 2014 AllerGen Poster Competition Award Winners

<table>
<thead>
<tr>
<th>Place</th>
<th>Category</th>
<th>Name</th>
<th>Institution</th>
<th>Supervisor</th>
<th>Abstract Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Master’s</td>
<td>Laura Feldman</td>
<td>The Hospital for Sick Children</td>
<td>Dr. Teresa To</td>
<td>Impact of air pollution on physician office visits for common childhood conditions in Ontario, Canada</td>
</tr>
<tr>
<td>2nd</td>
<td>Master’s</td>
<td>Ali Hosseini</td>
<td>The University of British Columbia</td>
<td>Dr. Chris Carlsten</td>
<td>Co-exposure to allergen and diesel exhaust enhances inflammatory responses in human airway submucosa</td>
</tr>
<tr>
<td>1st</td>
<td>PhD</td>
<td>Amrit Singh</td>
<td>The University of British Columbia</td>
<td>Dr. Scott Tebbutt</td>
<td>Blood biomarkers of the late phase asthmatic response using RNA-Seq</td>
</tr>
<tr>
<td>2nd</td>
<td>PhD</td>
<td>Philippe Bégin</td>
<td>Université de Montréal</td>
<td>Dr. Elie Haddad</td>
<td>Deep TCR repertoire sequencing reveals relative change in peanut specific clonotype in subjects undergoing rush oral immunotherapy</td>
</tr>
<tr>
<td>1st</td>
<td>Open</td>
<td>Pia-Lauren Reece</td>
<td>McMaster University</td>
<td>Dr. Judah Denburg</td>
<td>IL-4 and IL-13 regulate toll-like receptor expression and eosinophil-basophil differentiative function of cord blood CD34+ progenitor cells</td>
</tr>
<tr>
<td>2nd</td>
<td>Open</td>
<td>Gurpreet Singhera</td>
<td>The University of British Columbia</td>
<td>Dr. Del Dorscheid</td>
<td>IgE receptor expression in asthmatic and non-asthmatic airway epithelial cells</td>
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</table>

## 2014 CSACI Poster Competition Award Winners

<table>
<thead>
<tr>
<th>Place</th>
<th>Category</th>
<th>Name</th>
<th>Institution</th>
<th>Supervisor</th>
<th>Abstract Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Food Allergy/Anaphylaxis</td>
<td>Sarah De Schryver</td>
<td>McGill University</td>
<td>Dr. Moshe Ben-Shoshan</td>
<td>C-CARE: Comparing three years of anaphylaxis in children treated at the Montreal Children’s Hospital</td>
</tr>
<tr>
<td>1st</td>
<td>Basic Science/Immunology</td>
<td>Vivek Gandhi</td>
<td>University of Alberta</td>
<td>Dr. Harissios Vliagoftis</td>
<td>Growth factors regulate Proteinase Activated Receptor – 2 (PAR-2) on Airway Epithelium</td>
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<tr>
<td>2nd</td>
<td>Allied Health</td>
<td>Claire Unruh</td>
<td>University of Manitoba</td>
<td>Dr. Allan Becker</td>
<td>Teenagers and Food Allergy Education: A Systematic Review</td>
</tr>
</tbody>
</table>
The 9th Annual AllerGen Trainee Symposium was held in Richmond, BC, from April 30-May 2, 2014. Fifty-one HQP representing 14 academic institutions and related research centres attended. Half of the participants were new to AllerGen and attending the event for the first time.

At the Symposium, a grant review panel workshop provided trainees with an inside look at how scientists from across the country review grant applications for scientific and technical merit. The panel was organized by Dr. Peter Paré, an AllerGen investigator and a professor of Respiratory Medicine and Pathology at The University of British Columbia. The session provided trainees with a unique opportunity to experience the Canadian Institutes of Health Research (CIHR) peer review process, and gain insights that will improve their grant applications and increase their chances of receiving grant support.

The Trainee Symposium also featured a Networking for Success Dinner, as well as Junior and Senior Investigators’ Panels. These events provided trainees with the opportunity to learn from and network with researchers in the field of allergic disease.

AllerGen trainees also competed successfully in the CSACI Poster Competition, winning several awards, including first place honours in the Basic Science/Immunology and Food Allergy/Anaphylaxis categories.


Mock Grant Review Panel a highlight of 2014 Trainee Symposium

and, for the first time, oral presentations were integrated into the CSACI conference plenary and special interest meetings.

AllerGen awards were presented in three categories: Master’s, PhD and Open, which included postdoctoral fellows, research staff and young professionals.
Network delivers highly employable graduates

Since 2005, 182 graduate students and postdoctoral fellows directly involved in AllerGen-funded research projects have found employment across sectors—industry, policy development, healthcare and academia.

In 2014-2015 alone, 33 AllerGen HQP secured employment, making contributions in diverse areas, including:

Industry
Claudia Hui (PhD) is employed as a Scientific Analyst at Bloom Burton & Co in Toronto, ON.

Ruiwei Jiang (M.Sc.) is a Data Scientist at Boeing Canada (Advanced Analytics Group) in Richmond, BC.

Pia Reece (PhD) was hired as a Patent Agent Trainee at SIM & McBurney and SIM, Lowman, Ashton & McKay LLP in Toronto, ON.

Clinical practice
Alicia Pawlowski (M.Sc.) is a Project Coordinator for the Fetal Alcohol Spectrum Disorder (FASD) Research Group at the University of Alberta where she is responsible for researching, designing and writing the best practices for FASD Service Delivery for the Supports and Services Council of Alberta.

Marcelo Menezes (MD, PhD) is employed as a staff respirologist at Ribeirão Preto Medical School Hospital, University of São Paulo – Ribeirão...
Andrew O’Keefe (MD) opened an allergy and immunology clinic in St. John’s, NL, and is accepting referrals for adult and pediatric patients.

Academia

Meghan Azad (PhD) was appointed Assistant Professor at the University of Manitoba and the affiliated George & Fay Yee Centre for Healthcare Innovation.

Jeremy Hirota (PhD) was appointed Assistant Professor in the Division of Respiratory Medicine, Department of Medicine, at The University of British Columbia, and Co-Director of the Chan-Yeung Centre for Occupational and Environmental Respiratory Disease.

Luisa Giles (PhD) is an instructor in the Sports Science Department at Douglas College in New Westminster, BC.
A Snapshot of AllerGen HQP 2014-2015

(n=353)

- Working on related research: 72 (20%)
- Working on AllerGen research projects: 281 (80%)
- Canadian: 318 (90%)
- Foreign: 35 (10%)
- Male: 116 (33%)
- Female: 237 (67%)
- Employed: 183 (55.5%)
- Continuing education: 108 (30.5%)
- Other or Unknown: 38 (11.5%)

AllerGen HQP Graduates 2005-2015 (n=329)

AllerGen HQP Employment by Sector 2009-2015 (n=182)

Trainees, New Professionals, Research Associates and Technicians by Province

<table>
<thead>
<tr>
<th>Province</th>
<th>All (including ASNPN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario</td>
<td>115</td>
</tr>
<tr>
<td>Alberta</td>
<td>75</td>
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<tr>
<td>British Columbia</td>
<td>73</td>
</tr>
<tr>
<td>Quebec</td>
<td>57</td>
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<tr>
<td>Manitoba</td>
<td>18</td>
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<tr>
<td>Saskatchewan</td>
<td>6</td>
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<tr>
<td>Nova Scotia</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>353</td>
</tr>
</tbody>
</table>

Trainees, New Professionals, Research Associates and Technicians by University

<table>
<thead>
<tr>
<th>University</th>
<th>trainees</th>
</tr>
</thead>
<tbody>
<tr>
<td>The University of British Columbia</td>
<td>69</td>
</tr>
<tr>
<td>McMaster University</td>
<td>52</td>
</tr>
<tr>
<td>University of Alberta</td>
<td>42</td>
</tr>
<tr>
<td>University of Calgary</td>
<td>34</td>
</tr>
<tr>
<td>McGill University</td>
<td>28</td>
</tr>
<tr>
<td>Université Laval</td>
<td>19</td>
</tr>
<tr>
<td>University of Manitoba</td>
<td>17</td>
</tr>
<tr>
<td>Queen's University</td>
<td>10</td>
</tr>
<tr>
<td>University of Toronto</td>
<td>10</td>
</tr>
<tr>
<td>University of Saskatchewan</td>
<td>6</td>
</tr>
<tr>
<td>University of Waterloo</td>
<td>5</td>
</tr>
<tr>
<td>Dalhousie University</td>
<td>5</td>
</tr>
<tr>
<td>Université du Québec à Chicoutimi</td>
<td>4</td>
</tr>
<tr>
<td>Simon Fraser University</td>
<td>3</td>
</tr>
<tr>
<td>Université de Montréal</td>
<td>2</td>
</tr>
<tr>
<td>Lakehead University</td>
<td>1</td>
</tr>
<tr>
<td>University of Winnipeg</td>
<td>1</td>
</tr>
<tr>
<td>Outside Canada</td>
<td>4</td>
</tr>
<tr>
<td>Affiliated Institutions &amp; Organizations</td>
<td>41</td>
</tr>
</tbody>
</table>

Total 353 100.0%
Through strong partnerships, AllerGen secured additional funding from other sources to achieve an annual NCE leveraging ratio of 1:2.17.
## Financial Overview

### AllerGen NCE Inc. Financial Summary 2014-2015

#### Revenues (Cash)

<table>
<thead>
<tr>
<th>Category</th>
<th>2014-2015 (Year 10)</th>
<th>Percentage</th>
<th>2013-2014 (Year 9)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCE Award</td>
<td>4,216,500</td>
<td>90.00%</td>
<td>5,604,865</td>
<td>91.09%</td>
</tr>
<tr>
<td>Non-NCE Funds</td>
<td>468,655</td>
<td>10.00%</td>
<td>548,538</td>
<td>8.91%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,685,155</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>6,153,403</strong></td>
<td><strong>100.00%</strong></td>
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</tbody>
</table>

#### Expenditures (Cash)

<table>
<thead>
<tr>
<th>Category</th>
<th>2014-2015 (Year 10)</th>
<th>Percentage</th>
<th>2013-2014 (Year 9)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Programs</td>
<td>3,491,984</td>
<td>65.91%</td>
<td>3,859,854</td>
<td>69.31%</td>
</tr>
<tr>
<td>Networking</td>
<td>144,399</td>
<td>2.73%</td>
<td>210,333</td>
<td>3.78%</td>
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<tr>
<td>Training</td>
<td>394,765</td>
<td>7.45%</td>
<td>315,373</td>
<td>5.66%</td>
</tr>
<tr>
<td>Communications</td>
<td>66,908</td>
<td>1.26%</td>
<td>71,088</td>
<td>1.28%</td>
</tr>
<tr>
<td>Administration</td>
<td>1,199,904</td>
<td>22.65%</td>
<td>1,112,484</td>
<td>19.98%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,297,959</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>5,569,132</strong></td>
<td><strong>100.00%</strong></td>
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</table>

#### Committed Amounts for Future Research

<table>
<thead>
<tr>
<th>Category</th>
<th>2014-2015 (Year 10)</th>
<th>Percentage</th>
<th>2013-2014 (Year 9)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCE</td>
<td>1,072,726</td>
<td>100.00%</td>
<td>1,210,140</td>
<td>100.00%</td>
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</table>

#### All Revenue Sources (Cash and In-Kind) 2014-2015

<table>
<thead>
<tr>
<th>Source</th>
<th>Cash</th>
<th>In-Kind</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCE</td>
<td>4,216,500</td>
<td>–</td>
<td>4,216,500</td>
<td>31.56%</td>
</tr>
<tr>
<td>University</td>
<td>718,340</td>
<td>2,904,849</td>
<td>3,623,189</td>
<td>27.12%</td>
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<tr>
<td>Industry</td>
<td>2,401,020</td>
<td>249,827</td>
<td>2,650,847</td>
<td>19.84%</td>
</tr>
<tr>
<td>Provincial</td>
<td>153,233</td>
<td>564,200</td>
<td>717,433</td>
<td>5.37%</td>
</tr>
<tr>
<td>Federal</td>
<td>422,613</td>
<td>138,900</td>
<td>561,513</td>
<td>4.20%</td>
</tr>
<tr>
<td>Hospital</td>
<td>210,000</td>
<td>340,060</td>
<td>550,060</td>
<td>4.12%</td>
</tr>
<tr>
<td>Not-for-Profit</td>
<td>20,000</td>
<td>525,047</td>
<td>545,047</td>
<td>4.08%</td>
</tr>
<tr>
<td>Other Sources</td>
<td>441,132</td>
<td>53,112</td>
<td>494,244</td>
<td>3.70%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$ 8,582,837</strong></td>
<td><strong>$ 4,775,995</strong></td>
<td><strong>$ 13,358,832</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

In 2014-15, AllerGen’s income from all sources (cash and in-kind) was $13,358,832. Of this amount, AllerGen received a base grant from the NCE in the amount of $4,216,500. AllerGen secured an additional $9,142,232 from other sources. This represents a leveraging of NCE funding at a rate of 1:2.17.
Working in crossdisciplinary and international teams, these scientists have also generated decision-support data and tools to inform personalized health recommendations and interventions used by individuals, health professionals and policymakers.
Network Participants

**Investigators (n=95)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edmond Chan</td>
<td>BC Children’s Hospital</td>
</tr>
<tr>
<td>Heather Castleden</td>
<td>Dalhousie University</td>
</tr>
<tr>
<td>Jean Marshall</td>
<td>Dalhousie University</td>
</tr>
<tr>
<td>Jeff Brook</td>
<td>Environment Canada</td>
</tr>
<tr>
<td>Sébastien La Vieille</td>
<td>Health Canada</td>
</tr>
<tr>
<td>Wade Watson</td>
<td>IWK Health Centre</td>
</tr>
<tr>
<td>Celia Greenwood</td>
<td>McGill University</td>
</tr>
<tr>
<td>Lawrence Joseph</td>
<td>McGill University</td>
</tr>
<tr>
<td>James Martin</td>
<td>McGill University</td>
</tr>
<tr>
<td>Bruce Mazer</td>
<td>McGill University</td>
</tr>
<tr>
<td>Ciriac Piccirillo</td>
<td>McGill University</td>
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<tr>
<td>Moshe Ben-Shoshan</td>
<td>McGill University Health Centre</td>
</tr>
<tr>
<td>Sonia Anand</td>
<td>McMaster University</td>
</tr>
<tr>
<td>Russell de Souza</td>
<td>McMaster University</td>
</tr>
<tr>
<td>Judah Denburg</td>
<td>McMaster University</td>
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<tr>
<td>Gail Gauvreau</td>
<td>McMaster University</td>
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<tr>
<td>Manel Jordana</td>
<td>McMaster University</td>
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<tr>
<td>Paul Keith</td>
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<td>Anthony Levinson</td>
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<td>Joseph Macri</td>
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<td>Parameswaran Nair</td>
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<tr>
<td>Helen Neighbour</td>
<td>McMaster University</td>
</tr>
<tr>
<td>Paul O’Byrne</td>
<td>McMaster University</td>
</tr>
<tr>
<td>Malcolm Sears</td>
<td>McMaster University</td>
</tr>
<tr>
<td>Susan Waserman</td>
<td>McMaster University</td>
</tr>
<tr>
<td>Carlo Marra</td>
<td>Memorial University</td>
</tr>
<tr>
<td>Anne Ellis</td>
<td>Queen’s University</td>
</tr>
<tr>
<td>Ryan Allen</td>
<td>Simon Fraser University</td>
</tr>
<tr>
<td>Fiona Brinkman</td>
<td>Simon Fraser University</td>
</tr>
<tr>
<td>Timothy Takaro</td>
<td>Simon Fraser University</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharon Dell</td>
<td>The Hospital for Sick Children</td>
</tr>
<tr>
<td>Theo Moraes</td>
<td>The Hospital for Sick Children</td>
</tr>
<tr>
<td>Felix Ratjen</td>
<td>The Hospital for Sick Children</td>
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<tr>
<td>Sanja Stanojevic</td>
<td>The Hospital for Sick Children</td>
</tr>
<tr>
<td>Padmaja Subbarao</td>
<td>The Hospital for Sick Children</td>
</tr>
<tr>
<td>Wendy Ungar</td>
<td>The Hospital for Sick Children</td>
</tr>
<tr>
<td>Michael Brauer</td>
<td>The University of British Columbia</td>
</tr>
<tr>
<td>Chris Carlsten</td>
<td>The University of British Columbia</td>
</tr>
<tr>
<td>Denise Daley</td>
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<td>Malcolm King</td>
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Manager, Communications and Knowledge Mobilization

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Graziella Infanti
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HQP and Events Coordinator

April O’Connell
Research Administrator

Marshall Beck
Administrative Coordinator,
Communications and Knowledge Mobilization
AllerGen FAST FACTS
2014-2015

NCE : Non-NCE investment leverage ratio
1 : 2.17

Research Investments 38

Legacy Projects
- Canadian Healthy Infant Longitudinal Development (CHILD) Study
- Clinical Investigator Collaborative (CIC)
- Canadian Food Allergy Strategic Team (CanFAST)

Enabling Platforms
- Biomarkers & Bioinformatics (B&B)
- Gene-Environment Interactions (GxE)
- Patients, Policy and Public Health (PPP)

Strategic Initiatives
- Knowledge Mobilization (KM & C’N)

95 Principal Investigators and Co-Investigators across 46 disciplines

353 Highly Qualified Personnel

123 FTE Network participants

Researchers

133 Partnerships

1315 Total Highly Qualified Personnel (HQP) participants in the Network since 2005

Others (48)
- Industry (34)
- Universities (34)
- Provincial (9)
- Federal (8)