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2024 CANADA GAIRDNER AWARDS RECOGNIZE WORLD-RENOWNED SCIENTISTS FOR

TRANSFORMATIVE CONTRIBUTIONS TO RESEARCH IMPACTING HUMAN HEALTH

EMBARGOED UNTIL APRIL 11, 2024 at 12 AM ET

TORONTO, ON (April 11, 2024) – The Gairdner Foundation is pleased to announce the 2024 Canada Gairdner Award laureates, recognizing some of the world’s most significant biomedical and global health research and discoveries.

“Canada is a world leader in science and innovation, and it is crucial to recognize the hard work done by its scientific community to make the world around us better. The 2024 Canada Gairdner Awards recipients’ contributions to science and research are truly exemplary, standing out on the global stage. The work of these laureates will most definitely improve the health of people in Canada and around the world. Congratulations to this year’s recipients!”

*- The Honourable François-Philippe Champagne, Minister of Innovation, Science and Industry*

“Congratulations to the recipients of the 2024 Canada Gairdner Awards who are being recognized for scientific discoveries that have transformed biomedical science, medicine, and global health. I’d like to give special mention to the Canadian recipients of this year’s Canada Gairdner Momentum Awards, Dr. Meghan Azad and Dr. Christian Landry. The outstanding work of these researchers will have a profound and lasting impact on the health of people in Canada and around the world.”

*– The Honourable Mark Holland, Minister of Health*

“The Gairdner Awardees showcase the world’s best science and innovation to improve human health. This year is no exception. Join us to get to know these exceptional individuals and their passions.”

*- Rémi Quirion, Scientifique en chef du Québec Président des CA des Fonds de recherche du Québec, partenaires de la Fondation Gairdner*

**2024 Canada Gairdner International Award**

The five 2024 Canada Gairdner International Award laureates are recognized for

seminal discoveries or contributions to biomedical science:

Zelig Eshhar, PhD

Weizmann Institute of Science, Rehovot, Israel

Michel Sadelain, MD, PhD

Director, Center for Cell Engineering, Stephen and Barbara Friedman Chair, Sloan Kettering Institute, Memorial Sloan Kettering Cancer Center, New York, NY, USA

*Awarded “For seminal contributions to the conception, development and application of CD19-CAR T cell therapy for cancer.”*

**The Work:**

Chimeric antigen receptor (CAR) T cell therapy is a type of cancer immunotherapy. It uses immune cells, called T cells, that are genetically altered in the lab to enable them to locate and destroy cancer cells.

Both Eshhar’s and Sadelain’s trailblazing research into CAR T cell engineering spans many decades. Their combined efforts defined the pathway for the future of cellular immunotherapy to treat cancer.

Eshhar has focused his career around the genetic engineering of T cells. These studies led him to predict that combining the killing machinery of cytotoxic T cells with an antibody’s specificity and high affinity to a target, would lead to new T cell-based therapies. He developed the first chimeric antigen receptor system in the 1980s and introduced it into T cells armed with an anti-tumor specificity. Eshhar went on to demonstrate the ability of such CAR T cells to successfully treat cancer in animal models. Sadelain began investigating what would eventually be referred to as CAR T cell therapy in the late 1980s, publishing his first abstract on successful T-cell engineering in 1992. Over the next decade, Sadelain and his team improved upon Eshhar’s design and by 2002 built the first truly effective CAR T cells, paving the way for their clinical use. Key to this breakthrough was the demonstration that CD19, a molecule on white blood cells, could serve as an effective target for CAR T cells in blood-borne cancers.

These second-generation CAR T cells were able to survive, proliferate and kill cancer cells in the lab, which established the feasibility and proof of concept for producing genetically instructed, targeted immune responses. In 2003, Sadelain and his colleagues published a seminal research paper showing that human CD19-directed CAR T cells could eradicate leukemia cells in a mouse model. Soon afterwards, clinical trials led by different groups, including Dr. Sadelain’s, demonstrated that the tumor burden in refractory chronic lymphocytic leukemia and adult and pediatric acute lymphoblastic leukemia could be successfully reduced and eventually become undetectable. The first CAR T cell therapies, targeting CD19, were approved by the U.S. Food and Drug Administration in 2017 for use in children and young adults with refractory acute leukemias and certain refractory lymphomas.

**The Impact:**

Currently, CAR T cell products have been approved worldwide for multiple indications, including large B-cell lymphoma, B-cell acute lymphoblastic leukemia, mantle cell lymphoma and follicular lymphoma. CAR T cell therapy has revolutionized the treatment landscape of relapsed and refractory B-cell malignancies. In contrast to conventional cytotoxic chemotherapy or immunotherapy with monoclonal antibodies, CAR T-cell therapy can induce durable and complete responses after a single treatment course. Such responses stem from the ability of CAR T cells to expand in vivo and persist for several months or years, which leads to continuous therapeutic efficacy and tumor control.

Efforts are underway to expand the repertoire of cancers that can be treated by CAR T cells through identifying new target antigens in solid tumors. The success of CAR T cells has also fueled interest in expanding their application beyond cancer. CAR T cells are demonstrating high response rates in autoimmune diseases and are being investigated as potential treatments for additional disorders, including fibrosis, senescence-associated pathologies and infectious diseases.

The next set of 2024 Canada Gairdner International Award laureates are:

Shankar Balasubramanian, FRS

Herchel Smith Professor of Medicinal Chemistry, Yusuf Hamied Department of Chemistry, University of Cambridge

David Klenerman, FRS, FmedSci

Professor of Biophysical Chemistry, Yusuf Hamied Department of Chemistry, University of Cambridge

Pascal Mayer, PhD

CEO and Co-founder of Alphanosos; Honorary Chair at the Institute for Advanced Study of the University of Strasbourg (USIAS)

*Awarded “For the fundamental and applied research that led to a revolutionary and affordable method to sequence DNA on a massive scale, which has dramatically accelerated discoveries in the life sciences and medicine”*

**The Work:**

Balasubramanian, Klenerman and Mayer are recognized for developing the underlying methodologies that led to Solexa-Illumina Next Generation DNA Sequencing (NGS), a technology that has enhanced our basic understanding of life, converting biosciences into ‘big science’ by enabling fast, accurate, low-cost and large-scale genome sequencing – the process of determining the complete DNA sequence of an organism.

Balasubramanian and Klenerman’s original work involved methods to observe a single molecule of DNA polymerase incorporating fluorescently labelled DNA monomers onto a growing strand of DNA hybridised to an immobilised template. They had the vision to see how this science could be extended and applied to sequencing a vast array of immobilised DNA molecules in a way that would bring huge benefits of scale, speed and cost. They co-founded the company Solexa, later acquired by Illumina, to make the technology available to the world. Mayer conceived and performed the initial development of 'DNA colony-based massively parallel sequencing by synthesis', initially at Glaxo-Wellcome’s and Serono’s research institutes in Geneva, and finally at a spin-off company, Manteia Predictive Medicine, where he was Chief Scientific Officer. This cluster technology is a key component of the Solexa-Illumina massively parallel sequencing technology. Manteia and its intellectual property were acquired in 2004 by Solexa. NGS has had – and continues to have – a transformative impact in the fields of genomics, biology and medicine. It has allowed a million-fold improvement in speed and cost when compared to the first sequencing of the human genome. In 2000, sequencing of one human genome took over 10 years and cost more than a billion dollars; today, the entire genome of multiple humans can be sequenced in a single day at a cost of less than $1,000. More than a million human genomes have been sequenced, and continue to be sequenced at scale each year, as well as genomes of animals, plants, bacteria and viruses, providing unprecedented insights into genome variation across the planet.

**The Impact:**

NGS has had an enormous impact on life sciences. Many aspects of the basic research into mechanisms in living systems now routinely involve high-throughput sequencing of DNA or RNA as the primary readout. Clinical research is undergoing a revolution via the application of genome sequencing, and genomic applications more generally, to discover the underlying causes and markers of diseases, along with substantial new knowledge on the genetic causes and signatures of cancers. There is a wave of new clinical diagnostics emerging for cancers, rare genetic diseases and infectious diseases enabled by NGS of patient samples that now includes minimally invasive blood sampling. During the COVID-19 pandemic, NGS was essential to the rapid understanding of the viral cause of the disease, and then in identifying and monitoring the spread of new variants. Without this technique, progress towards developing vaccines and other interventions would have been slow. It is difficult to overstate the importance and impact of NGS. It has initiated a revolution in biology, enabling the revelation of unsuspected genetic diversity in humans and their pathogens, with major implications, from cell and microbiome biology to ecology, forensics and personalized medicine.

**2024 John Dirks Canada Gairdner Global Health Award**

The 2024 John Dirks Canada Gairdner Global Health Award laureate is recognized for

outstanding achievements in global health research:

Gagandeep Kang, FRS

Adjunct Professor, Christian Medical College, Vellore, India; Director, Enteric, Diagnostics, Genomics and Epidemiology, Bill and Melinda Gates Foundation

*Awarded “For extensive cohort-based epidemiological, environmental and clinical trial research on enteric diseases in children and their effects on life course, with significant impact on vaccine development and health policy in India and internationally.”*

**The Work:**

Gagandeep Kang received her training in medicine and microbiology at the Christian Medical College (CMC), Vellore, in southern India. She is Professor of Microbiology at CMC, where her research group has established substantial community-based birth cohort studies addressing childhood enteric infections, growth, and development for over 20 years. Using data and insights from these studies, alongside immunological, mechanistic, epidemiological and implementation research, Prof. Kang has generated extensive information on the complex interactions between the environment and infections in children, and the influence of prior infections on subsequent responses to vaccination. Through extensive, cross disciplinary work drawing on field epidemiology, molecular understanding of infectious agents and infections, clinical trials and policy implementation, she explored the complex relationships between enteric diseases, gut function, and physical and cognitive development in affected children. Prof. Kang conducted the largest single birth cohort study on rotaviral infections in the world, demonstrating that protection after a natural infection is lower in India than in developed countries, which has important implications for the control of diseases by vaccination.

As a physician-scientist, Prof. Kang has led key studies that contributed to the development and introduction of two Indian rotavirus vaccines into the national immunization program. These vaccines are now WHO prequalified and their introduction has begun in countries beyond India. She has expanded her research and collaborations to work on other enteric pathogens, particularly cholera and typhoid, with a view to further vaccine introductions; on nutritional and pharmacological interventions aimed at improving oral vaccine efficacy; and on the transmission and impact of, and vaccine effectiveness for COVID-19 in the Indian context.

**The Impact:**

Gagandeep Kang has built an internationally recognized and competitive research program centred in India that prioritizes Indian needs while providing valuable and translatable insights to other regions affected by enteric infections. In addition to understanding the mechanism of infection and its effects on individuals, Kang’s group has used geographic information systems to connect virus prevalence at the community level to cost of illness studies, resulting in India becoming the only low-income country with comprehensive disease burden estimates for which cost-effectiveness of vaccination for multiple clinical outcomes could be predicted, as well as new vaccine roll-out programs. By 2019, all 26 million children born annually in India were eligible to receive the rotavirus vaccine, which has the potential to reduce infections, associated complications and death of vulnerable children.

In addition to excellent scientific research, Prof. Kang is an exemplary leader. Her approach to clinical and public health research uses a community base to identify problems that need to be addressed through laboratory science in India, and as needed, through international collaborations. In addition to her work in Vellore, India, she took on the challenge of leading the Department of Biotechnology’s Translational Health Science and Technology Institute (THSTI) from 2016 to 2020 to establish the translational science systems needed in the Indian medical research ecosystem. The programs initiated at the Institute have been critical to supporting the multiple vaccine development efforts of Indian vaccine manufacturers and have received global recognition.

**2024 Canada Gairdner Momentum Award**

The 2024 Canada Gairdner Momentum Award laureates are mid-career investigators recognized for exceptional scientific research contributions with continued potential for impact on human health.

Meghan Azad, PhD

Professor, Pediatrics and Child Health, University of Manitoba; Research Scientist, Children’s Hospital Research Institute of Manitoba; Director of Science & Knowledge Mobilization, THRiVE Discovery Lab; Co-Director, Manitoba Interdisciplinary Lactation Centre (MILC); Canada Research Chair, Early Nutrition and the Developmental Origins of Health and Disease

*Awarded “For research on understanding how human breast milk contributes to shaping the infant microbiome and lifelong health.”*

**The Work:**

Dr. Azad is leading innovative research about breastfeeding, human breast milk and the

microbiome. While previous studies have often been underpowered, narrowly focused on single milk components, inconsistent in their definition of “breastfeeding”, and limited by confounding (e.g. the socioeconomic status) issues, Dr. Azad’s research is addressing these nuances and shortcomings to provide new insights on how infant feeding practices and hundreds of different breast milk components influence health and disease throughout the life cycle. Studying over 3,000 children, Dr. Azad’s team has shown that longer and more exclusive breastfeeding is associated with healthier body composition and reduced risk of asthma. Further, their studies have provided novel evidence that the method of feeding (i.e. pumping vs. nursing at the breast) matters – possibly because bioactive milk compounds degrade in storage. Indeed, her team found that pump extraction affects the human milk microbiome and bacteria sharing between mothers and infants.

**The Impact:**

Dr. Azad is a renowned research leader whose groundbreaking work is pushing the

boundaries of knowledge generation and translation in the important areas of infant nutrition, lactation, maternal-child health, and the developmental origins of disease. Moreover, she is highly dedicated to enriching the scientific community in Canada through her commitment to recruiting and training new researchers, supporting science literacy among Canadian children and the general public, and engaging Canadian policymakers to foster support for science and evidence-based policy-making.

Meghan Azad is Professor of Pediatrics and Child Health at the University of Manitoba. She holds a Canada Research Chair in Early Nutrition and the Developmental Origins of Health and Disease, and she co-directs the THRiVE Discovery Lab, where her team studies how early life nutrition shapes the infant microbiome and child health. She co-founded the Manitoba Interdisciplinary Lactation Centre (MILC) and leads several interdisciplinary research teams, including the International Milk Composition (IMiC) Consortium (7 countries, 18 investigators, 1200 mother-infant pairs). In addition, she is Deputy Director of the CHILD Cohort Study, an ongoing longitudinal Canadian birth cohort of 3500 families. In 2022, she received the Steacie Prize for early career researchers.

Christian Landry, Prof.

Professor of biology and biochemistry, Laval University; Canada Research Chair in Cellular Systems and Synthetic Biology

*Awarded “For the development of novel approaches that combine synthetic biology, experimental evolution, and systems biology to address fundamental questions about gene function relevant to health and human disease."*

**The Work:**

Prof. Landry’s research group is integrating cutting-edge approaches in genetics, genomics, systems biology and bioinformatics to answer one of the most long-lasting questions in biology and biomedical research: how mutations change the way cells work and alter their performance. Understanding the principles by which mutations translate into phenotypes is at the core of human genetics and other fields such as evolutionary biology and biotechnology. The overarching goal of Prof. Landry’s team is to probe the robustness and function of cellular networks, with the long-term objective of better understanding how individual variation such as mutations cause changes in complex traits and, ultimately, diseases. Over the past six years, it has developed numerous high-throughput tools that allow the investigation of entire protein interaction networks, how these networks can be rewired by mutations, and how their past evolution may influence the outcomes of disease mutations.

**The Impact:**

Christian Landry has brought an entirely new perspective to systems biology, in which networks, such as protein-protein interactions, and cellular signaling, are investigated in the context of historical evolutionary forces in order to better understand their fundamental properties. His work is of critical importance to health and human disease since all organisms evolve through the same principles, including pathogens impacting humans. His recent research has ranged from investigations of the evolution of resistance to antifungal drugs, host-pathogen arms races, and evolutionary trade-offs in cellular processes and networks, to systems biology studies of microbial interactions.

In the long term, systematic analyses of mutations causing variations in complex phenotypes such as drug resistance will enable the development of drugs that are less likely to lead to resistance, which is key in the context of limited treatment options. Prof. Landry was elected in the inaugural cohort of the College of the Royal Society of Canada; he received the NSERC EWR Steacie Memorial Award for early career researchers in 2017 and the SMBE Mid-career Award for outstanding contributions in 2020. In 2021, he received Laval University's Excellence Prize for teaching and mentoring to graduate students and postdocs. He is also contributing to changing the way science is published and communicated through his work as Senior Editor for eLife and editorial advisor for EMBO Review Commons, two organizations actively involved in remodelling the scientific publication landscape to make it more transparent and equitable.

**About the Gairdner Foundation**

Established in 1957, the Gairdner Foundation is dedicated to fulfilling James A. Gairdner’s vision to recognize major research contributions to the treatment of disease and alleviation of human suffering. Through the prestigious annual Canada Gairdner Awards, the Foundation celebrates the world’s most creative and accomplished researchers whose work is improving the health and wellbeing of people around the world. Since its inception, 418 awards have been bestowed on laureates from over 40 countries, and of those awardees, 98 have gone on to receive Nobel Prizes. The Gairdner Foundation believes in coming together to openly discuss science in order to better engage the public, understand the problems we face, and work together to find solutions. Since its founding, a number of outreach events and programs have been developed with the goal of inspiring the next generation of scientific innovators and fostering an informed society.

<https://www.gairdner.org/>

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