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2021 CANADA GAIRDNER AWARDS RECOGNIZE WORLD-RENOWNED SCIENTISTS FOR TRANSFORMATIVE CONTRIBUTIONS TO RESEARCH IMPACTING HUMAN HEALTH

TORONTO, ON (April 7 2021) – The Gairdner Foundation is pleased to announce the 2021 Canada Gairdner Award laureates, recognizing some of the world's most significant biomedical research and discoveries. During these challenging times, we believe it is important to celebrate scientists and innovators from around the world and commend them for their tireless efforts to conduct research that impacts human health.

2021 Canada Gairdner International Award

The four 2021 Canada Gairdner International Award laureates are recognized for seminal discoveries or contributions to biomedical science:

Dr. Daniel J. Drucker, MD
Professor, Department of Medicine, University of Toronto; Senior Scientist, Lunenfeld-Tanenbaum Research Institute, Sinai Health, Toronto, Ontario

Dr. Joel Francis Habener, MD
Professor of Medicine, Harvard Medical School; Director, Laboratory of Molecular Endocrinology, Massachusetts General Hospital, Boston, MA

Dr. Jens Juul Holst, MD, DMSc
Professor, Department of Biomedical Sciences and group leader, Novo Nordisk Foundation Center for Basic Metabolic Research, The Faculty of Health and Medical Sciences, University of Copenhagen, Copenhagen, Denmark

Awarded "For research on glucagon-like peptides that has led to major advances in the treatment of Type 2 diabetes, obesity and intestinal disorders."

The Work:
The independent and collaborative work of Daniel Drucker, Joel Habener and Jens Holst enhanced our understanding of how our gastrointestinal organs function and created new classes of drugs for the treatment of metabolic disorders, specifically type 2 diabetes, obesity and short bowel syndrome.

Drucker, Habener and Holst discovered hormones called glucagon-like peptides (GLP-1 and -2) which control the levels of Insulin and glucagon which work together to maintain healthy sugar levels. They elucidated their biology and physiological function and played critical roles in the design and testing of therapies informed by their initial and subsequent discoveries

These three scientists are awarded for a combined body of work with significant impact on the field of diabetes and short bowel syndrome but are also recognized for their individual discoveries that underpin the translational results.

In the 1970s, Holst recorded intestinal surgery patients experiencing insulin spikes and drops in blood sugar after meals, leading him to conclude that an incretin, subsequently identified as GLP-1, along with insulin and glucagon was responsible for the glucose-induced gastrointestinal stimulation of insulin secretion that caused the changes in blood sugar levels.

Around the same time, Habener used pancreatic cells from anglerfish to demonstrate that glucagon and somatostatin were encoded in the pancreatic cells as larger, precursor hormones.

During additional mammal studies he discovered two new hormones related to glucagon which are known as GLP-1 and GLP-2.

Drucker, a fellow in Habener's lab in the 1980s, outlined the processing of proglucagon and the biology of GLP-1 action on insulin-producing cells, which led to the development of multiple types of treatments for type 2 diabetes. Together with Holst, working mostly in people, they showed that when food is ingested, GLP-1 is released into the bloodstream from cells in the gut increasing insulin release and suppressing glucagon.

Work from their labs and others led to the development of novel therapeutics to control insulin secretion in Type 2 diabetes based on understanding the action of GLP1 and its metabolism by the enzyme, DPP4, leading directly to the development of the DPP-4 inhibitors for diabetes therapy.

Drucker discovered the first actions of GLP-2 as a gut growth factor and both Drucker and Holst extensively characterized its mechanisms of action in animals and humans. The first GLP-2 analogue (teduglutide) was approved for clinical use in the treatment of short bowel syndrome in 2012.

The Impact:
Together, Drucker, Habener and Holst made major contributions to endocrinology and changed the treatment of metabolic and gastrointestinal diseases. Their work is both basic and translational, a true example of bench to bedside research.

GLP-1 therapies have been effective in the treatment of type 2 diabetes and more recently, as a treatment of obesity to reduce appetite. Drucker and Holst's research on the function of GLP-2 and its role as an intestinal growth factor helped develop treatments for short bowel disease, decreasing the need for feeding tubes to provide nutrition in children and adults with the condition.

To date, over 100 million people with type 2 diabetes have been treated with a GLP-1 analogue or a DPP-4 inhibitor.

Dr. Mary-Claire King, PhD

American Cancer Society Professor; Department of Medicine and Department of Genome Sciences, University of Washington School of Medicine, Seattle, WA, USA; Affiliate Member, Fred Hutchinson Cancer Research Center, Seattle, WA, USA

Awarded "For transforming cancer genetics and oncology with the discovery of inherited susceptibility to breast cancer due to mutation of the BRCA1 gene."

The Work:
Dr. King's first breakthrough was in molecular evolution and population genetics. Her research as a PhD student suggested that the differences between humans and chimpanzees are due to a small number of mutations affecting gene regulation and the timing of gene expression, rather than accumulation of differences in protein-coding sequences.

King's work evolved to focus on proving the existence of inherited susceptibility to breast cancer and identifying BRCA1 as the first gene responsible for it. Her group studied families in which many women developed breast or ovarian cancer. First, based on mathematical modeling, King hypothesized that severe inherited mutations in a single gene could be responsible for breast cancer in some women. At the time, this hypothesis was considered far-fetched and very unlikely.

Then based on this hypothesis, King proved the gene's existence by mapping the still-hypothetical gene to a specific chromosomal location. She named the gene BRCA1. The idea was no longer far-fetched and an international "race" of four years ensued to clone the gene.

After the gene was cloned, King and her colleagues developed and deployed next-generation sequencing strategies to identify mutations in BRCA1 and its sister genes responsible for multiple

forms of inherited cancer. She and many others have applied the same approach to identification of genes with major impact on other complex diseases.

The Impact:
Dr. King's discovery has transformed the diagnosis, drug development, and treatment of inherited breast and ovarian cancer. The identification of BRCA1 — and subsequently BRCA2 — has made it possible to diagnose whether a woman in an affected family is at extremely high risk of developing breast and ovarian cancer, enabling her to pursue preventative treatment.

King's passion for gene discovery integrated tools from genetics, statistics, mathematics, epidemiology, molecular biology, genomics and clinical medicine. Her revolutionary approach to gene discovery has had an impact on many other diseases, ranging from prostate cancer to inherited hearing loss to schizophrenia. King is also a pioneer in the development of DNA sequencing for the identification of victims of human rights' violations.

2021 John Dirks Canada Gairdner Global Health Award
The 2021 John Dirks Canada Gairdner Global Health Award laureates are recognized for outstanding achievements in global health research:

Dr. Yi Guan, MD, MMedSci, PhD
Chair Professor in Emerging Viral Diseases, Daniel C K Yu Endowed Professor in Virology, School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong; Director, State Key Laboratory for Emerging Infectious Diseases, The University of Hong Kong; Director, Joint Institute of Virology (Shantou University-The University of Hong Kong), Shantou University, Shantou, China; Director, Guangdong-Hong Kong Joint Laboratory of Emerging Infectious Diseases, Shantou University, Shantou, China.

Dr. Joseph Sriyal Malik Peiris, MBBS, FRCPath, DPhil (Oxon), FHKAM (Path), FRCP, FRS
Professor and Chair in Virology, The University of Hong Kong; Honorary Consultant Microbiologist, Queen Mary Hospital, Hong Kong; Co-Director, WHO H5 reference laboratory and SARS reference laboratory, HKU; Co-Director, WHO reference laboratories providing confirmatory testing for COVID-19, The University of Hong Kong.

Awarded "For significantly contributing to understanding the origins and options for control of newly emerging infectious disease outbreaks in Asia, notably zoonotic influenza and severe acute respiratory syndrome (SARS)."

The Work:
Drs. Guan and Peiris began collaborating at The University of Hong Kong in the aftermath of the H5N1 avian flu outbreak in Hong Kong. They initiated seminal studies of the underlying causes of H5 virus pathogenicity, the evolution of the H5N1 virus, and developed a highly effective monitoring and surveillance program of avian and swine influenza strains. Through their research Guan and Peiris established that live poultry markets in southern China and Hong Kong were the source of the virus spreading to humans, where it exhibited up to 60% lethality in infected persons. This work led to the temporary closure of the live poultry markets and cessation of animal to human transmission. Their subsequent work established new protocols for periodic live poultry market closures, emptying markets of poultry overnight to reduce virus amplification within these markets and the appropriate use of poultry vaccines to protect both poultry and people in Hong Kong from H5N1 infections. They have made major contributions towards understanding the emergence, transmission, epidemiology and pathogenesis of highly pathogenic avian influenzas including H5N1, H9N2, H6N1, H7N9, H5Nx and others and have provided evidence-based options for control of avian influenza viruses in Asia.

In 2003, following the emergence of novel coronavirus, SARS (severe acute respiratory syndrome) in China, Peiris led the team that first identified the virus responsible for the syndrome, the SARS-CoV-1 coronavirus, elucidating its pathogenesis, transmission, and quickly developed a diagnostic test which was then shared internationally. Meanwhile, Guan's team identified the human infectious source and zoonotic interface of SARS in the wild animal markets in Guangdong, China in 2003

and identified the human infectious source of MERS (Middle East Respiratory Syndrome) in Saudi Arabia in 2015. Guan's research accelerated advocacy of the closure of wild game animal markets, averting a potential recurrence of SARS in 2004.

The Impact:
Guan and Peiris' investigations into the emergence and evolution of animal influenza H5 strains (and other H and N subtypes) and their role in identifying the SARS coronavirus, mode of transmission, risk factors, virus infectivity and period of infectivity, and identifying the original animal source were critical in the successful response to the outbreak.

In the case of SARS, which was causing up to 10% lethality in infected persons, their open sharing of information with the World Health Organization (WHO) and broader international community directly resulted in the rapid control of the disease. The establishment of the role of wild game animal markets in the transmission of the virus was pivotal in the decision by local Guangdong authorities to discontinue such markets to prevent future outbreaks of this or another emerging zoonosis. The isolation and characterization of the causative agent of SARS as a novel coronavirus and quick development of a diagnostic test of the virus in humans directly influenced public health policy to effectively monitor and control the spread of the disease.

Guan and Peiris' comprehensive strategies for surveillance, monitoring, identifying the human infectious source, investigation, diagnosis and control of emerging infectious disease outbreaks continue to provide critical guidance and insight for countries throughout Asia and the world, including the 2009 swine flu pandemic, Middle East Respiratory Syndrome (MERS), and the COVID-19 pandemic.

2021 Canada Gairdner Wightman Award
The 2021 Canada Gairdner Wightman Award laureate is a Canadian scientist recognized for outstanding leadership in medicine and medical science throughout their career:

Dr. Elizabeth Eisenhauer, OC, MD, FRCPC, FRSC

Professor Emerita, Departments of Oncology and Medicine, Adjunct Professor of Oncology, Queen's University; Innovation Lead, Kingston Health Sciences Centre

Awarded "For investigation of new cancer drugs and delivery approaches, leading change in cancer clinical trials and establishing new standards of cancer treatment that have impacted patients around the world."

The Work:
Dr. Eisenhauer's research has transformed the fields of cancer clinical trials and cancer drug delivery. Her fundamental contributions to the clinical evaluation of new anti-cancer agents, as well as cancer research strategy and clinical trials development, have been critical in the development of new treatments for ovarian cancer, malignant melanoma and brain tumours. She is credited with developing new methodologies for the delivery of Taxol, one of the most important cancer drugs in the world, which maintained the drug's efficacy and reduced toxic side effects to cancer patients. This shorter, safer method to deliver the drug has become the international standard, transforming the experience and outcomes of millions of patients worldwide.

Dr. Eisenhauer's extraordinary contributions extend to impactful national and international leadership roles including the founding in 1982 and subsequent direction of the Investigational New Drug Program (IND) of the National Cancer Institute of Canada Clinical Trials Group (NCIC-CTG), now the Canadian Cancer Trials Group. Dr. Eisenhauer also co-led the Methodology for the Development of Innovative Cancer Therapies International Task Force where she developed recommendations for the design and endpoints for trials of novel targeted cancer agents. As well she led the creation of the first collaborative cancer research strategy for Canada in her role as co-Chair of the Canadian Cancer Research Alliance, convened the first Summit to create a Tobacco Endgame for Canada and was inaugural Expert Lead for Research in the Canadian Partnership against Cancer.

The Impact:
Dr. Eisenhauer's commitment to the advancement of cancer therapy, supportive care and prevention is unparalleled. Her extensive research contributions and leadership within the field of cancer care in Canada have influenced and advanced the conduct of clinical trials internationally. Her work has expanded the understanding of therapeutic interventions and has led to new standards of cancer treatment for patients in Canada and around the world.

About the Gairdner Foundation:

The Gairdner Foundation was established in 1957 by Toronto stockbroker, James Gairdner to award annual prizes to scientists whose discoveries have had major impact on scientific progress and on human health. Since 1959 when the first awards were granted, 394 scientists have received a Canada Gairdner Award and 92 to date have gone on to receive the Nobel Prize. The Canada Gairdner Awards promote a stronger culture of research and innovation across the country through our Outreach Programs including lectures and research symposia. The programs bring current and past laureates to a minimum of 15 universities across Canada to speak with faculty, trainees and high school students to inspire the next generation of researchers. Annual research symposia and public lectures are organized across Canada to provide Canadians access to leading science through Gairdner's convening power.

www.gairdner.org

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