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**GGI** LES PRIX

Barrangou Charpentier Doudna Horvath Plummer Zhang



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# WELCOME

to the 2016 Canada Gairdner Awards Symposia in Toronto. We are proud to continue our tradition of presenting some of the world's leading scientists to talk to you about their latest work. Our international award winners will explore the expanding potential of the CRISPR technique for gene editing, and our Wightman and Global Health awardees will discuss their experience with HIV/AIDS research and to the role of research and health policy at home and across the world. On Friday the speakers will step beyond the discovery of the CRISPR-Cas system to explore the frontiers of its potential as a potent tool in human health, disease control and environmental engineering.

Many people and institutions contribute to the events outlined in this program. We particularly appreciate the enthusiastic support of the University of Toronto, whose volunteers from many different departments help with the annual Gairdner events.

We hope you enjoy our 2016 offerings.

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D. Lorne Tyrrell OC MD PhD FRCP FRS Chair, Board of Directors The Gairdner Foundation

Janet Rossant President & Scientific Director Gairdner Foundation

### 2016 Canada Gairdner Awardees Lecture

Thursday, October 27, 2016 9:00 a.m. – 2:45 p.m. University of Toronto, Macleod Auditorium

#### 9:00 am - 9:05 am

#### Welcome Remarks

Dr. Janet Rossant, President and Scientific Director, Gairdner Foundation, Toronto, Ontario, Canada

#### 9:05 a.m. - 9:10 a.m.

#### **Chair Remarks**

**Dr. Trevor Young**, Dean, Faculty of Medicine and Vice Provost, Relations with Health Care Institutions, University of Toronto, Toronto, Ontario, Canada

#### 9:10 a.m. - 10:10 a.m.

#### **CRISPR-Cas Systems in Bacteria: Discovery and Applications**

**Dr. Rodolphe Barrangou**, Associate Professor, Department of Food, Bioprocessing and Nutrition Sciences; Todd R. Klaenhammer Distinguished Scholar in Probiotics Research, North Carolina State University, Raleigh, North Carolina, USA

Dr. Philippe Horvath, Senior Scientist, DuPont, Dangé-Saint-Romain, France

#### 10:10 a.m. - 10:30 a.m.

Health Break

#### 10:30 a.m. - 11:00 a.m.

#### CRISPR-Cas Genome Engineering: Advent & Application of A Transformative Technology

**Dr. Jennifer Doudna**, Li Ka Shing Chancellor's Chair in Biomedical and Health Sciences; Professor of Molecular and Cell Biology and Professor of Chemistry at UC Berkeley; Investigator of the Howard Hughes Medical Institute, Berkeley, California, USA



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#### 11:00 a.m. - 11:30 a.m.

#### The Transformative Genome Engineering Technology CRISPR-Cas9: Biology, Mechanisms, Evolution & Applications

Dr. Emmanuelle Charpentier, Scientific member of the Max Planck Society, Director at the Max Planck Institute for Infection Biology, Berlin, Germany; Professor, Umeå University, Umeå, Sweden

#### 11:30 a.m. – 1:00 p.m.

**Lunch Break** 

#### 1:00 p.m. – 1:05 p.m.

#### **Chair Remarks**

**Dr. Phil Marsden**, Professor of Medicine, St Michael's Hospital, Elisabeth Hofmann Chair in Translational Research at the University of Toronto, Oreopoulos-Baxter Division Director of Nephrology, Department of Medicine, University of Toronto, Toronto, Ontario, Canada

#### 1:05 p.m. – 1:35 p.m.

#### Genome Editing Using CRISPR-Cas Systems: Development and Prospects

**Dr. Feng Zhang**, Core Member, Broad Institute of MIT and Harvard; Investigator, McGovern Institute for Brain Research, Massachusetts Institute of Technology; W. M. Keck Career Development Professor in Biomedical Engineering, Departments of Brain and Cognitive Sciences and of Biological Engineering, Massachusetts Institute of Technology; Cambridge, Massachusetts, USA; Robertson Investigator, New York Stem Cell Foundation

#### 1:35 p.m. – 2:05 p.m.

#### **Untold Story of The National Microbiology Laboratory**

**Dr. Frank Plummer**, Special Advisor to the Chief Public Health Officer, Public Health Agency of Canada; Distinguished Professor, Medical Microbiology, College of Medicine, Faculty of Health Sciences, University of Manitoba and former Tier 1 Canada Research Chair in Resistance and Susceptibility to Infections (2001-2014), Winnipeg, Manitoba, Canada

#### 2:05 p.m. - 2:35 p.m.

#### Three Decades of Global Health Science and Policy: A Personal Journey

**Dr. Anthony S. Fauci**, Director, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland, USA

#### 2:35 p.m. – 2:45 p.m.

#### **Closing Remarks**

Dr. Janet Rossant, President and Scientific Director, Gairdner Foundation, Toronto, Ontario, Canada

#### **BIOGRAPHIES:**

#### Dr. Rodolphe Barrangou

Rodolphe Barrangou is an Associate Professor in the Department of Food, Bioprocessing and Nutrition Sciences at North Carolina State University, a NC State University Scholar, and the Todd R. Klaenhammer Distinguished Scholar in Probiotics Research. Dr. Barrangou is also an associate

member of the Microbiology graduate program, the Biotechnology graduate program, the Functional Genomics graduate program, and the Center for Integrative Medicine. Dr. Barrangou is also an adjunct member of the Food Science Department at the Pennsylvania State University.

His CRISPR laboratory focuses on the evolution and functions of CRISPR-Cas systems, and their use for bacterial genotyping, building prokaryotic immunity, and Cas9-mediated genome editing in lactic acid bacteria used in food manufacturing.

Dr. Barrangou earned a BS in Biological Sciences from the Rene Descartes University in Paris, France; a MS in Biological Engineering from the University of Technology in Compiegne, France; a MS in Food Science from NC State University; a PhD in Genomics from NC State University; and a MBA from the University of Wisconsin-Madison. Dr. Barrangou and colleagues at DuPont established the biological role of CRISPR-Cas systems in adaptive immunity in bacteria, and used CRISPR-based technologies for bacterial genotyping of industrial cultures, and for the vaccination of dairy cultures against bacteriophages. After nine years in R&D and M&A at Danisco and DuPont, he joined the faculty at NC State University in 2013.

Dr. Barrangou is the recipient of the 2014 NC State Alumni Association Outstanding Research Award, and of the 2015 NC State Faculty Scholars Award. He has been on the Thomson Reuters Highly Cited Researchers list in 2014 and 2015. Dr. Barrangou is on the board of directors of Caribou Biosciences, a co-founder and member of the Scientific Advisory Board of Intellia Therapeutics, and a founding investor of Locus Biosciences.

#### **Dr. Philippe Horvath**

Philippe Horvath is a senior scientist at DuPont. He graduated from Université Louis-Pasteur, Strasbourg, France in 1996 and obtained his PhD in Cellular and Molecular Biology in 2000. That same year, he was recruited by Rhodia Food and worked at the R&D center in Dangé-Saint-Romain, France, where he contributed to the development of molecular biology tools for bacterial strain screening, microbial identification, and typing of lactic acid bacteria and their bacteriophages.

Philippe became senior scientist in 2006, two years after Rhodia Food was acquired by the Danish company Danisco, a world leader in specialty food ingredients. In 2014, three years after DuPont acquired Danisco, Philippe was appointed Associate to the DuPont Fellows Forum, and further appointed DuPont Nutrition & Health Technical Fellow in 2015.

Since late 2002, a large part of Philippe's research activities has been dedicated to CRISPR (clustered regularly interspaced short palindromic repeats), first as a polymorphic chromosomal region useful for strain differentiation and tracking, and then as a bacterial immune system with considerable industrial, biotechnological, and medical applications. Philippe is co-inventor of 95 patents and/or patent applications, of which 62 are related to various uses of CRISPR, and co-author of 31 peer-reviewed articles (22 about CRISPR) and 4 book chapters. Together with other scientists in the company, Philippe was recognized with the 2008 Danisco Innovation Award, and with the 2013 Bolton/Carothers Innovative Science Award. In addition to being selected as a 2015 Thomson Reuters Highly Cited Researcher, Philippe was awarded with the 2015 Massry Prize.

#### Dr. Jennifer Doudna

Jennifer Doudna is the Li Ka Shing Chancellor's Chair in Biomedical and Health Sciences and she is Professor of Molecular and Cell Biology and Professor of Chemistry at UC Berkeley and an Investigator of the Howard Hughes Medical Institute. Prof. Doudna's research seeks to understand how RNA molecules control the expression of genetic information in cells. Her research led to insights about CRISPR-Cas9-mediated bacterial immunity that enabled her lab along with collaborator Emmanuelle Charpentier to harness this system for efficient genome engineering in animals and plants, creating a transformative technology that is revolutionizing the fields of genetics, molecular biology and medicine. She is a member of the National Academy of Sciences, the American Academy of Arts and Sciences, the National Academy of Medicine and the National Academy of Inventors. She is also a Fellow of the American Association for the Advancement of Science and the American Society for Microbiology. Dr. Doudna is a recipient of awards including the NSF Waterman Award, the FNIH Lurie Prize, the Paul Janssen Award for Biomedical Research, the Breakthrough Prize in Life Sciences, the Princess of Asturias Award (Spain), the Gruber Prize in Genetics, the Masry Prize and the L'Oreal-UNESCO International Prize for Women in Science. Dr. Doudna has been named as one of Time Magazine's 100 most influential people in the world (2015) and as one of

Foreign Policy's leading global thinkers (2014). Dr. Doudna is a founder and the executive director of the Innovative Genomics Institute at UC Berkeley and UC San Francisco.

#### **Dr. Emmanuelle Charpentier**

Emmanuelle Charpentier is Scientific Member of the Max Planck Society and Director at the Max Planck Institute for Infection Biology in Berlin, Germany. She is Alexander von Humboldt Professor in Germany and Visiting Professor at Umeå University in Sweden. E. Charpentier is recognized as a world-leading expert in regulatory mechanisms underlying processes of infection and immunity in bacterial pathogens. With her recent groundbreaking findings in the field of RNA-mediated regulation based on the CRISPR-Cas9 system, E. Charpentier has laid the foundation for the development of a novel, highly versatile and specific genome editing technology that is revolutionizing life sciences research and could open up whole new opportunities in biomedical gene therapies. The resulting field of research is now developing at dazzling speed, with exciting new aspects emerging almost weekly. E. Charpentier is Elected Foreign Member of The Royal Swedish Academy of Sciences, Elected Member of the German National Academy of Sciences, Elected Member of the European Academy of Microbiology, Elected Fellow of the American Academy of Microbiology and Elected EMBO Member. E. Charpentier has been awarded prestigious honors including an Honorary Doctorate of the New York University, the Paul Ehrlich and Ludwig Darmstaedter Prize 2016, French Chevalier Order de la Légion d'Honneur in 2016, Leibniz Prize 2016, the Otto Warburg Medal 2016, the L'Oréal-UNESCO For Women in Science Award 2016, the Carus-Medal of the German National Academy of Sciences Leopoldina 2015, the Gruber Prize in Genetics 2015, the Princess of Asturias Award for Technical and Scientific Research 2015, the 2015 Louis Jeantet Prize for Medicine, the 2015 Ernst Jung Prize for Medicine. the 2015 Breakthrough Prize in Life Sciences, the 2014 Grand Prix Jean-Pierre LeCocg and the 2014 Göran Gustafsson Prize. The impact of her scientific accomplishments has also been recognized in the broader community of world affairs. E. Charpentier was selected as one of TIME's 100 Most Influential People in the World in 2015. one of Foreign Policy's 100 Leading Global Thinkers in 2014, one of Vanity Fair's 50 most influential French people worldwide in 2014 and 2015. E. Charpentier is inventor and co-owner of seminal intellectual property comprising the CRISPR-Cas9 technology, and co-founder of CRISPR Therapeutics and ERS Genomics, created to facilitate the development of the CRISPR-Cas9 genome engineering technology for biotechnological and biomedical purposes.

#### Dr. Feng Zhang

Feng Zhang is a Core Member at the Broad Institute of MIT and Harvard, an Investigator at the McGovern Institute for Brain Research at MIT, and an Assistant Professor in the Department of Brain and Cognitive Sciences. He was born in Shijiazhuang (Hebei Province, China) in 1981 and moved to Des Moines, Iowa in 1993. His introduction to engineering biological tools for mammalian systems began as a sophomore in high school with an opportunity to intern in the gene therapy lab of John Levy in Des Moines, Iowa. He obtained an A.B. in Chemistry and Physics from Harvard University in 2004 working with Xiaowei Zhuang. As a PhD student in the Chemistry Department at Stanford University, Zhang worked with Karl Deisseroth to develop optogenetics technologies for dissecting brain circuits, using light-sensitive proteins from microbes to enable control of neuronal activity in living organisms with light. After finishing his PhD in 2009, Feng joined the Harvard Society of Fellows as a Junior Fellow (2009-2010), focusing on developing gene editing tools based on transcription activator-like effectors (TALEs). In 2011, Zhang began his own laboratory at the Broad and McGovern Institutes, where he harnessed CRISPR-Cas systems for gene editing in eukaryotic cells. His lab continues to play a critical role in the development of gene editing technologies and applications that are accelerating research around the world.

#### **Dr. Francis Allan Plummer**

Dr. Frank Plummer is a Senior Advisor to the Deputy Minister and Chief Public Health Officer, Public Health of Canada and a Distinguished Professor, University of Manitoba.

Dr. Plummer is a native Manitoban and received his medical degree from the University of Manitoba in 1976. He trained in internal medicine and infectious diseases at the University of Southern California, the University of Manitoba, the University of Nairobi, and the Centers for Disease Control in Atlanta. He joined the University of Manitoba faculty in 1984 and spent 17 years in Nairobi as the leader of the world-renowned Manitoba Nairobi collaboration. From 2000-2014 he was Scientific Director of the National Microbiology Laboratory in Winnipeg, building it into a globally preeminent public health laboratory.

Dr. Plummer is recognized internationally for his work in public health and science, having published over 375 high impact original articles. He has received numerous honors, including; Officer of the Order of Canada, Order of Manitoba, Killam Prize; Prix Galien; two honorary degrees.; Rh Institute Award; Achievement Award from the American Venereal Disease Association; I.S. Ravdin Award, American College of Surgeons; St. Boniface Hospital Research Foundation International Award; Canadian Institutes of Health Research Researcher of the Year 2007; Scopus Award, Hebrew University of Jerusalem. He has been elected to the American Society of Clinical Investigation and the Association of American Physicians and advised has the National Academy of Sciences in the US, the World Bank, the World Health Organization, and the Governments of Kenya, India and Lesotho.

#### Dr. Anthony S. Fauci

Anthony S. Fauci, M.D., is director of the National Institute of Allergy and Infectious Diseases (NIAID) at the National Institutes of Health. Since his appointment as NIAID director in 1984, Dr. Fauci has overseen an extensive research portfolio devoted to preventing, diagnosing, and treating infectious and immune-mediated diseases. Dr. Fauci also is chief of the NIAID Laboratory of Immunoregulation, where he has made numerous important discoveries related to HIV/AIDS and is one of the most-cited scientists in the field. Dr. Fauci serves as one of the key advisors to the White House and Department of Health and Human Services on global AIDS issues, and on initiatives to bolster medical and public health preparedness against emerging infectious disease threats such as Ebola and pandemic influenza. He was one of the principal architects of the President's Emergency Plan for AIDS Relief (PEPFAR), which has already been responsible for saving millions of lives throughout the developing world.

Dr. Fauci is a member of the US National Academy of Sciences and is the recipient of numerous prestigious awards for his scientific and global health accomplishments, including the National Medal of Science, the Mary Woodard Lasker Award for Public Service, and the Presidential Medal of Freedom. He has been awarded 42 honorary doctoral degrees and is the author, coauthor, or editor of more than 1,280 scientific publications, including several major textbooks.

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## **Gene Editing: Bacterial Immunity to Global Impact**

Friday, October 28, 2016 9:00 a.m. – 2:30 p.m. University of Toronto, Macleod Auditorium

#### 9:00 a.m. - 9:05 a.m.

#### Welcome Remarks

Dr. Janet Rossant, President and Scientific Director, Gairdner Foundation, Toronto, Ontario, Canada

#### 9:05 a.m. - 9:10 a.m.

#### **Chair Remarks**

Dr. Karen Maxwell, Terrence Donnelly Centre for Cellular & Biomolecular Research, University of Toronto, Toronto, Ontario, Canada

#### 9:10 a.m. - 9:40 a.m.

#### **CRISPR-Cas Systems: From Humble Beginnings to Today's Headlines**

**Prof. Sylvain Moineau**, PhD, Canada Research Chair in Bacteriophages; Department of Biochemistry, Microbiology, and Bioinformatics, Faculty of Sciences & Engineering, Pavillon Vachon, Université Laval, Québec city, Quebec, Canada

#### 9:40 a.m. – 10:10 a.m.

#### Controlling the Volume of Gene Expression with CRISPRi and CRISPRa

Jonathan Weissman, PhD, Howard Hughes Medical Institute Investigator and Professor of Cellular; Molecular Pharmacology at the University of California, San Francisco

#### 10:10 a.m. - 10:30 a.m.

**Health Break** 

#### 10:30 a.m. – 11:00 a.m.

#### **Manipulating DNA Repair to Improve Gene Editing**

Daniel Durocher, PhD FRSC, Senior Investigator, The Lunenfeld-Tanenbaum Research Institute, Professor, Department of Molecular Genetics, University of Toronto, Toronto, Ontario, Canada

#### 11:00 a.m. – 11:30 a.m.

#### **Synthetic Biology and Malaria**

Anthony James, PhD, Distinguished Professor, Microbiology & Molecular Genetics, & Molecular Biology & Biochemistry, University of California, Irvine, California, USA

#### 11:30 a.m. – 12:45 p.m.

**Lunch Break** 

#### 12:45 p.m. – 12:50 p.m.

#### **Chair Remarks**

Jim Woodgett, PhD, Director of Research & Senior Investigator, Lunenfeld-Tanenbaum Research Institute, Toronto, Ontario, Canada

#### 12:50 p.m. – 1:20 p.m.

#### Gene Editing for HIV/Aids

Paula Cannon, PhD, Professor, Molecular Microbiology & Immunology, USC, Keck School of Medicine, Los Angeles, USA

#### 1:20 p.m. – 1:50 p.m.

#### Human Gene Editing: Insights from Slow Science

Françoise Baylis, PhD, Professor and Canada Research Chair in Bioethics and Philosophy Dalhousie University, Halifax, Nova Scotia, Canada

#### 1:50 p.m. - 2:25 p.m.

# Roundtable Discussion: Includes all speakers and Drs. Barrangou, Charpentier, Horvath, Plummer and Zhang

Chair: Dr. Janet Rossant, President and Scientific Director, Gairdner Foundation, Toronto, Ontario, Canada

#### 2:25 p.m. - 2:30 p.m.

#### **Closing Remarks**

Dr. Janet Rossant, President and Scientific Director, Gairdner Foundation, Toronto, Ontario, Canada

#### **BIOGRAPHIES:**

#### Dr. Sylvain Moineau

Professor Sylvain Moineau graduated with a BSc degree in Microbiology from the Université Laval in 1987. He continued at the same university but in Food Sciences, where he obtained his PhD in 1993 for his studies investigating phages biology. During his PhD, he also spent 18 months at North Carolina State University. He then undertook an industrial postdoc in Florida with the food ingredients company Quest International, which was at the time a division of the multinational Unilever. During this time, his research focused on mechanisms used by lactic acid bacteria to defend against phages. In 1996, he moved back to Canada and the University Laval as an Assistant Professor in Microbiology where his lab continues to work on phage biology and resistance mechanisms in lactic acid bacteria. His was appointed full Professor of Microbiology in 2005 and since 2011, he holds the Canada Research Chair in Bacteriophages, Since 2002, he is also the Curator of the Félix d'Hérelle Reference Center for Bacterial Viruses, the world largest collection of reference phages (www.phage.ulaval.ca). Over the years, Professor Moineau has won numerous teaching and research awards and he has also developed one of the leading international phage research programs. Prof. Moineau's team has made a number of landmark discoveries that have changed our views of phage-host interactions, including his work on CRISPR-Cas systems. In 2013, he won the NSERC Synergy Award fro Innovation in recognition for his long-standing collaboration with Agropur dairy cooperative. Recently, he was awarded the Médaille Gloire de l'Escolle, the highest career award from the ULaval Alumni Association, Professor Moineau was also on Thomson Reuters's list of highly cited researchers in the Microbiology Category in 2014 and 2015.

#### Dr. Jonathan S. Weissman

Jonathan Weissman is a Howard Hughes Medical Institute Investigator and Professor of Cellular and Molecular Pharmacology at the University of California, San Francisco. His development of the technique of Ribosome Profiling, as well as CRISPRi and CRISPRa, giving us the ability to turn on and off any desired gene, are revolutionizing both basic science and medical research.

Dr. Weissman received his undergraduate physics degree from Harvard College. After obtaining a PhD in Physics from the Massachusetts Institute of Technology, where he worked with Peter Kim, Dr. Weissman pursued postdoctoral fellowship training in Arthur Horwich's laboratory at Yale University School of Medicine.

Dr. Weissman's numerous honors include the 2008 Raymond and Beverly Sackler International Prize in Biophysics, election to the National Academy of Sciences in 2009, election as a Fellow of the American Academy of Microbiology in 2010, the 2015 Keith R Porter Lecture Award from the American Society of Cell Biology, and the 2015 National Academy of Sciences Award for Scientific Discovery.

#### **Dr. Daniel Durocher**

Daniel Durocher is a Senior Investigator at the Lunenfeld-Tanenbaum Research Institute where he also acts as Assistant Director. He is a Professor in the Department of Molecular Genetics at the University of Toronto, the Thomas Kierans Chair in Molecular Mechanisms of Cancer Development and Canada Research Chair (Tier 1) in Molecular Genetics of the DNA Damage Response.

Dr. Durocher obtained a B.Sc. degree in Biochemistry at Université de Montréal before graduating with a PhD degree in Experimental Medicine from McGill University. Dr. Durocher did his postdoctoral training in the laboratory of Steve Jackson at the University of Cambridge and was recruited back to Canada in 2001 to establish his group at the Lunenfeld, where he has been ever since. Dr. Durocher's overarching interest lies in understanding how cells maintain genome integrity, with an emphasis on the detection, signaling and repair of DNA double-strand breaks. Dr. Durocher is widely recognizing for having established ubiquitin as a central organizing molecule in DNA damage repair and Dr. Durocher's work has recently expanded to address how the cell cycle regulates DNA double-strand break repair, and as part of these studies his group is now keenly interested in developing means to manipulate DNA repair to improve genome editing outcomes.

Among the prizes, awards and honors received by Dr. Durocher in recent years, particularly notable is the 2016 Paul Marks Prize for cancer research awarded by Memorial Sloan Kettering. He was also named one of Canada's Top 40 under 40 by Caldwell Partners, a distinction that highlights exceptional contributions to Canadian society by individuals under 40 years of age in the arts, science and business spheres. He also delivered the 2015 SCILLS lecture at the University of Dundee in honour of his work on the role of ubiquitin in the DNA damage response.

#### Dr. Anthony A. James

Anthony A. James, PhD is Distinguished Professor of Microbiology & Molecular Genetics (School of Medicine) and Molecular Biology & Biochemistry (Ayala School of Biological Sciences) at the University of California, Irvine. He is a member of the National Academy of Sciences USA. His research group uses genetics as the basis for synthetic approaches to prevent transmission of mosquito-borne diseases. Contributions include the development of mosquito transgenesis procedures and engineered genes that interfere with malaria parasite development in mosquitoes. He collaborated also to develop approaches to prevent dengue virus transmission and a population-suppression strain based on flightless female mosquitoes. Most recently he collaborated to develop a gene-drive system to spread beneficial genes quickly through mosquito populations.

#### **Dr. Paula Cannon**

Dr. Paula Cannon is a Professor of Molecular Microbiology and Immunology at the Keck School of Medicine of the University of Southern California. She obtained her PhD from the University of Liverpool in the United Kingdom, and received post-doctoral training in virology at Harvard and Oxford Universities. Dr. Cannon's research is highly translational, with a focus on the development of gene and stem cell therapies to treat chronic viral infections and genetic diseases. Her work in this area uses genome editing technologies such as zinc finger nucleases (ZFNs) and CRISPR/Cas9, and her group has made a number of important technical advances that are enabling their broader use. In 2010, she reported on the use of ZFNs to disrupt the CCR5 gene in human hematopoietic stem cells (HSC), and demonstrated that these modified cells provided a potent anti-HIV effect when transplanted into a humanized mouse model of HIV infection. These findings provided the preliminary data to obtain a Disease Team grant from the California Institute for Regenerative Medicine, which has allowed this therapy to move into a clinical trial in HIV-infected individuals. More recently, Dr. Cannon has described a platform that supports high levels of site-specific gene editing and correction in HSC, and which is expected to have broad applications for the correction of genetic diseases of the blood and immune systems. Dr. Cannon's research is funded by several private foundations, the National Institutes of Health, and the California Institute for Regenerative Medicine.

#### **Dr. Françoise Baylis**

Françoise Baylis is a philosopher whose innovative work in bioethics, at the intersection of policy and practice, has stretched the very boundaries of the field. Her current research focuses on women's health with particular attention to assisted human reproduction and research participation, human embryo research, and research involving heritable modifications. This work aims to move the limits of mainstream bioethics and develop more effective ways to understand and tackle public policy challenges in Canada and abroad. Baylis holds the Canada Research Chair in Bioethics and Philosophy. She is an elected fellow of the Royal Society of Canada and the Canadian Academy of Health Sciences. In 2016, she was awarded the Canadian Association of University Teachers Distinguished Academic Award.

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