



The Henry G. Friesen
INTERNATIONAL PRIZE
in Health Research

LE PRIX INTERNATIONAL
de la Recherche en Santé Henry G. Friesen



(Est. 2005)

Friesen International Prize Program

*“Strategies for Advancing Health
Research Funding ”*

Proceedings of a Policy Roundtable
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Amis des instituts de recherche
en santé du Canada

FCIHR / AIRSC

Friends of Canadian Institutes
of Health Research

Celebrating Science and Administrative Leadership



The Henry G. Friesen International Prize in Health Research is awarded in recognition of the distinguished leadership, vision and innovative contributions of Dr. Henry G. Friesen. The prize supports an annual Public Forum and luncheon address to the Canadian Academy of Health Sciences (CAHS). Through the partnership of CBC Radio One Ideas, the lecture is broadcast to reach the broadest possible audience. Formal Policy Roundtables became an added feature of the Friesen Prize Program in 2015. Published Proceedings of these gatherings are an historic record of then current views of leading authorities.

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Message From The Friends of The Canadian Institutes of Health Research

The health of individuals and our communities rests on the interplay of complex environmental, behavioural and genetic factors. Generally, a healthy population reflects supportive societal processes, enriched environments, adaptive behaviours and genetic normalcy. Understanding these interactions requires research and the systematic assessment of evidence about causes, mechanisms and outcomes of different peoples across the life course. The foundation for advancement of our understanding of health risks, diseases and consequences resides in rigorous observational and interventional studies of various population samples and of model systems.

In this roundtable, we shall explore the current approaches to funding health research, and probe how we might optimize the funding of health research in order to improve the health, health outcomes and health economy of Canada. In this regard, we shall consider the major trends in scientific knowledge creation and translation. We shall explore the nature of research, how research is integral to societal progress, and what the dimensions of research funding are. We shall examine Canada's performance in funding health research as compared to international benchmarks, reflecting on our priority setting approach. We shall also consider how to achieve growth of the research envelope, exploring alignment strategies for the funding of people, processes and property that underlie excellence in health research. Finally, we must probe the diversity of our Canadian publics, imagining how they can be better informed and integrated into the conversations and actions needed for Canada to be a world-leading health research enterprise.

Dr. Aubie Angel

Dr. Bruce McManus



Roundtable

"Strategies for Advancing Health Research Funding"

Co-Chairs



Dr. Bernard Jasmin
Dean of Medicine, U Ottawa

Dr. Bernard Jasmin is presently the Dean of Medicine at U Ottawa. He obtained his PhD in 1988 from the Université de Montréal. Following postdoctoral training in Paris, France (1988-90), he worked at the University of Miami School of Medicine with a focus on cellular and molecular neurobiology. He was recruited to the University of Ottawa as an Assistant Professor in 1992 by the Department of Physiology. He quickly moved through the ranks and was promoted to Full Professor in 2000. In 1999, he co-founded the University of Ottawa Centre for Neuromuscular Disease and acted as one of its co-Directors until 2002. From 2002-2009, Dr. Jasmin was Chair of the Department of Cellular and Molecular Medicine (CMM). Early in 2017, Dr. Jasmin was also named Vice-President, Research, at the Association of Faculties of Medicine of Canada (AFMC). Dr. Jasmin has been instrumental in the marked increase in research intensity seen in the Faculty of Medicine, while playing key roles in the establishment of several strategic initiatives including the Brain and Mind Research Institute, the Centre for Infection, Immunity and Inflammation, and the design and implementation of a joint recruitment plan for Professors/Scientists with Clinical Departments and affiliated Research Institutes. Dr. Jasmin's research program focuses on defining signaling pathways and regulatory events that control expression of synaptic genes and proteins in neurons and skeletal muscle cells. Dr. Jasmin has published more than 130 scientific articles and book chapters, mostly as senior investigator.



Dr. Lorne Tyrrell
Director, Li Ka Shing Institute of Virology, U Alberta

D. Lorne Tyrrell is a Distinguished University Professor at the University of Alberta. He is the Founding Director of the Li Ka Shing Institute of Virology and has focused his research since 1986 on viral hepatitis. His work on the development of antiviral therapy was supported by CIHR and Glaxo Canada. It resulted in the licensing of the first oral antiviral agent to treat chronic hepatitis B infection – lamivudine – in 1998. Today, lamivudine is licensed in over 200 countries worldwide for the treatment of HBV. He has also been involved in the establishment of a biotech company—KMT Hepatech Inc. based on the first non-primate animal model for HCV. Dr. Tyrrell was the Dean of the Faculty of Medicine and Dentistry from 1994-2004. Since leaving the Deanship in 2004, Dr. Tyrrell has taken on a number of important board positions in healthcare in Alberta and Canada. These include the Chair of the Board of the Institute of Health Economics, Chair of the Gairdner Foundation Board, and member of the Research Advisory Council for the Canadian Institute for Advanced Research. He also has been appointed to the Science Advisory Board to Health Canada. For his studies on viral hepatitis, Dr. Tyrrell has received numerous prestigious awards including the Gold Medal of the Canadian Liver Foundation (2000), Officer of the Order of Canada (2002), Alberta Order of Excellence (2000) and Fellow of the Royal Society (2004). He was inducted into the Canadian Medical Hall of Fame in April 2011 and was awarded the Killam Prize Health Sciences in May 2015.



Roundtable

"Strategies for Advancing Health Research Funding"

Keynote



Dr. Bruce McManus

VP, FCIHR; CEO, Proof Centre; Prof. Medicine, UBC

Bruce McManus, CM, PhD, MD, FRSC, FCAHS, is Professor, Department of Pathology and Laboratory Medicine, University of British Columbia (UBC). He serves as CEO, Centre of Excellence for Prevention of Organ Failure (PROOF Centre), and as Co-Director, Institute for Heart + Lung Health. He is a Senior Scientist in the UBC James Hogg Research Centre. Dr. McManus received BA and MD degrees (University of Saskatchewan), an MSc (Pennsylvania State University), and the PhD (University of Toledo). He pursued post-doctoral fellowships at the University of California Santa Barbara (Environmental Physiology) and at the National Heart, Lung, and Blood Institute, Bethesda, MD (Cardiovascular & Pulmonary Pathology), and residency training at the Peter Bent Brigham Hospital - Harvard University (Internal Medicine and Pathology). Dr. McManus joined the Faculty of Medicine, University of British Columbia, as Department Head of Pathology and Laboratory Medicine in 1993. He served as inaugural Scientific Director of the Institute of Circulatory and Respiratory Health, Canadian Institutes of Health Research from 2000-2006. Dr. McManus' investigative passion relates to mechanisms, consequences, detection and prevention of injury and aberrant repair in inflammatory diseases of heart and blood vessels. He has mentored many faculty and trainees and has convened many public-private partnerships.

"Nurtured Science - One Pillar of a Healthy Society"

Dr. Bernard Jasmin and Dr. Lorne Tyrell, distinguished guests and esteemed colleagues. Aubie Angel has a way of pressing people into things that they probably shouldn't do, but I accepted the challenge of providing a few opening remarks to frame this discussion today. I have framed my Abstract as a series of questions. The title of my Keynote presentation is: "Nurtured Science - One Pillar of a Healthy Society".

To begin, here are a few central questions that I would like everyone to think about:

- What is research? And why do we do it? For whom do we do it?
- What is the impact of research?
- How do we support research? How do we really want it to grow? What are all the facets that need to grow (i.e., dollars, cents, people)?
- How do we know when we are there?
Do we actually have a destination?

Aristotle, a younger contemporary of Plato, gave much thought to "Deductive Reasoning" in Science. In the golden age of Islam, long before the Renaissance scientists, Ibn al-Haytham as the prototypical



leader of that era; he outlined the scientific method that underpinned the philosophy of Aristotle. “The Hypothesis” – its definition, its teaching and evaluation of results – originated in Islam some 1,000 years ago. And then Roger Bacon took this inductive idea to Europe. René Descartes was a Platonian scientist, who thought that the deductive process was central. Fortunately, Isaac Newton was one of the luminaries who really emphasized the fact that we need both deductive and inductive science. So as we can see, Science has been an activity conceptualized, for at least 1,000 years.

As we jump forward 1,000 years, I would like to offer my remarks in honour of Dr. David Naylor who has brought much to this country in parsing out how we can harness the power of ingenuity and creativity to advance the outcomes objectives cherished by our citizenry. This is more so about being much closer to humanity and the society in which we live, than it is about the science. I have always said to my trainees and my colleagues: “We have to think always about science in the context of society, not science for itself. I think Dr. David Naylor captured this beautifully both in the Panel Review he chaired on the support of Science in Canada, and in his remarks at the FCIHR Leaders Breakfast this morning. There was a follow-up in the Globe and Mail just a few days ago by Daina Lawrence and here is an excerpt of a quote from Dr. David Naylor: "There is very little substitute that any society has found for having large numbers of citizens with open and inquiring minds and the ability to ask tough questions". Especially freely motivated to ask tough questions and to think about strategies for obtaining the answers.

And for our other especially distinguished guest today, Dr. Henry Friesen, I embrace him. I have actually taken license here to integrate several thoughts of Dr. Henry Friesen from different points of time that really wrap together his message to us. “I think we can aspire to be the best. Our highly valued healthcare system ought to be linked to the very best research underpinning it. Such an enterprise should be networked. Posturing with collaboration, coordination and innovation – these are some things we heard a bit about this morning. From these, anything is possible.” From the report tabled by Dr. David Naylor and his Panel have tabled, they ask the question of why do we do it? Well, I have sort of framed this within the stars of our future: the quality and length of our lives, our environment, our cultures and especially, the diversity of our heritage and Canada’s Indigenous Peoples. This includes products and services; the economy; social programs; the broad value to society; and inclusivity by reaching out to everyone in society with our science. And then of course, there is the policy discussion that makes science not only all about debate and discourse, but brings it to action, on behalf of the people of Canada.

Some of you may know Mariette DiChristina, Editor-in-Chief of the Scientific American for a number of years and I really like what she has said in many forums. I will illustrate two things that are very relevant to the mid-term elections in the USA today (November 6th, 2018). In 2014, Mariette DiChristina and a few others presented to the US Senate Committee on Commerce, Science and Transportation in the context of the US direction for bringing science and innovation. She reminded them of a number of stories, namely the 40 to 50% economic growth linked to basic science, dating back to WWII. But there is also the difficulty in actually pinning down the return on investment and spill-over effects in timing with expectations of when observers think they should occur. Energy security, health, and the overall sustainability of society had definitely been benefited in the last several decades from fundamental and translational research. It is interesting, though, that Mariette DiChristina’s presentation to the US Senate occurred in 2014, during the the Obama period. Now we have moved into the Trump period. And there seems to be the impression that all Americans are better off when

science has seceded the table. The point is that science is having a hard time having a seat at the table in many societies today.

As you know, the rate of return on research investment is very hard to estimate. There have been many efforts on the part of the UK and USA to revisit this subject. Likewise in Canada. US historical data from the agricultural domain depict huge returns on investment in various aspect of technology and farming practice. In the United States, the progress is attributable to investments in R&D. Now in the broader scale, the estimates for direct consequences of R&D in the UK generate social rates of return of about 20%. There was a study a few years ago looking at mental health and cardiovascular disease. The direct consequences are more like 7, 8 to 9%, however spill-over yields longer-lasting more pervasive secondary benefits. But one thing that is important, in terms of our discussion, is the R&D channel. Certain research councils in the UK appear to have the biggest benefit on private sector productivity; R&D investment contributes to economic growth and productivity. There are also the various estimates made by others, for example Edwin Mansfield. Essentially, it is difficult to obtain specific numbers for a specific field at a specific time, but we know that society ultimately benefits primarily, secondarily and tertiarily from investments in research.

We know a bit better how to support research and how to perform the research, so let's turn to that topic.

Analysis of a graph indicating Gross domestic expenditures on research and development (GERD) as a percentage of Gross Domestic Product (GDP) on the X-axis versus Number of Researchers on the Y-axis, you will see that Canada is lingering somewhere in the middle. By comparison with other countries, Israel and Korea are at the top; the US is investing a fair bit; northern European countries (ie., Finland, Denmark, Sweden) are really investing. They have a lot of scientists per capita and they have quite a good GERD investment. So, this is where we sit as a country compared to the rest of the world. And this was alluded to at the Leaders' Breakfast this morning, as well as in the Naylor Report. An important difference between Canada and a number of other countries is that the federal government contributes only a small percentage to the total higher education or HERD. Perhaps Dr. David Naylor and others will comment on this. The private not-for-profit is actually rising slowly and steadily in the total investment in HERD in Canada. But the question of what we lose by not having more investment by the federal government in HERD is something that needs more examination.

Starting with an hypothesis, we go on to acquire knowledge. Then we evaluate that knowledge. There are producers and there are users. Ideally, we should aim for a seamless process; otherwise, we are very inefficient, which we largely are in reality. There are valleys and peaks in research. The valley: basic and pre-clinical research. The peak: applied research and advanced technology that gets commercialized. As pointed out in the Naylor Report, simply put, we need researchers. Despite the number of research trainees who do not enter the Academy, we need a more fortified funding approach along this path if we are going to be successful and keep people interested in science and our training programs.

Research takes time. It could take 15 to 20 years before we achieve a meaningful translation from a discovery. And we are always thinking about this in terms of how we can compress that time. So, where are we headed? Just as there are challenges, there are also opportunities. I have summarized some of the points outlined in the Naylor Report. All research funding enterprises need to make choices: people versus projects, many small or few large, direct and indirect. Who is paying that indirect? There is also

the choice between established, early career and innovation researchers and I put "Flavour of the Month" out there because there is a tendency for people to go in the direction of the latest wave of innovation in science. We need to find our place and know where we are going, in order to become a Science Innovation leader, as opposed to adopting the "Flavour of the Month" of science, which is often the more pervasive pathway.

One must also not forget the issues of safe versus risky; investigator versus priority-driven; and hope versus hype. There is also the issue of science being communicated properly. The US faces this problem as well. There is a nice article in Science in 2014 on how to distribute funding more effectively and also how the NIH, which everybody thinks is the bulwark of scientific funding, can be a much more stable environment, instead of these peaks and valleys in funding that make people chase money in different directions, as opposed to chasing a question right to the very end.

Can we do better beyond expanding the funding envelope? We do know that Canada has a health research system of sorts and it includes all of these stakeholders, patients and the public at the top, but it includes everyone with different needs and different perspectives looking at the system. The question is: Do we have the right formula in order to have better alignment? Some good examples come from environmental research that reveals global alignment from 2017, highlighting the need for concerted governance, strategic alignment, a common mission and mandates, bringing together member states, for example, like our provinces. Subsequently, various industries, NGOs and others could contribute to this overall paradigm of alignment. Generally speaking, we have not achieved very good alignment in Canada. And I am making a statement that may not have rich data to defend.

I draw your attention to something I found interesting from this framework. Any high income country like Canada needs stewardship and governance that are coherent. Financing and capacity building with all of these elements must also be coherent. As I mentioned previously, we need knowledge generation, translation and utilization that are seamless, existing in a virtuous cycle, if not a continuous cycle of evolution.

Additionally, I would pose a few other questions. I am involved, like many, in the digital technology supercluster. We have several across the country. Do superclusters really embrace research? Are they framed in a way to embrace research and to reach the destination of improving innovation, as Dr. Lorne Tyrrell alluded to earlier.

Similarly, but somewhat differently, the recent economic strategy tables that were released are focused on arcane structural-functional problems and deficiencies in our health and bio-system. In order to accelerate innovation, we must make a concerted effort to attract talent and offer opportunities for success. This may take the form of adopting facile regulations and harnessing digital technologies like Artificial Intelligence (AI). And this includes working in a more concerted fashion to not only support our own local talent, but also to attract people to opportunities for success. This would involve creating anchors. The problematic area in this report is that it does not allude to universities or to the healthcare system at all. It is incomplete; I do not even think the words appear in the report.

We need to connect the dots. Who is missing from the conversation? Everyone at this Roundtable is painfully aware that we have a new environment that I had never heard of before – "The Post-Truth World". Everybody is entitled to their own opinion, but should these opinions be post-truth. Sometimes, the public will say they support science, only to view it as more of a matter of opinion. And

I think we have reached the ultimate, where anyone's opinion in society about anything has now framed our realities.

Some of you may be familiar with Bruno Latour, who had a really lovely piece about a week or two ago in the New York Times. Bruno Latour is sort of a modern science philosopher of France. He is often thought to be against science, but in fact, he has been trying to look for ways in which scientists can relate to society to demonstrate that they are not out there just discovering things that we know already exist, but rather are creating knowledge through genius and innovation. This is a subtle, but important distinction, one that empowers scientists to actually have the authority to improve society through creativity. This is but a very superficial glimpse at Bruno Latour's points. I highly recommend pursuing his thinking further.

There is an interesting discussion that transpired between Daniel Colón-Ramos, fundamental scientist from Yale, Elliot Fisher outcomes researcher from Dartmouth, and Dan Rather, distinguished science and news journalist. They have a really great blog about how scientists and journalists should align together, despite gaps in unity and gaps in communication. Ultimately, scientists and journalists could benefit each other, because both sides seek a current version of the truth. The manner of approach is different. Taking the example of André Picard and other great people in this country, we can be more aligned to tell the stories the way they really are, supported by facts that can be interpreted appropriately by the public. In Canada, we have the virtues of an educated and open public. I think the public would be more receptive to a closer alignment between science and journalism.

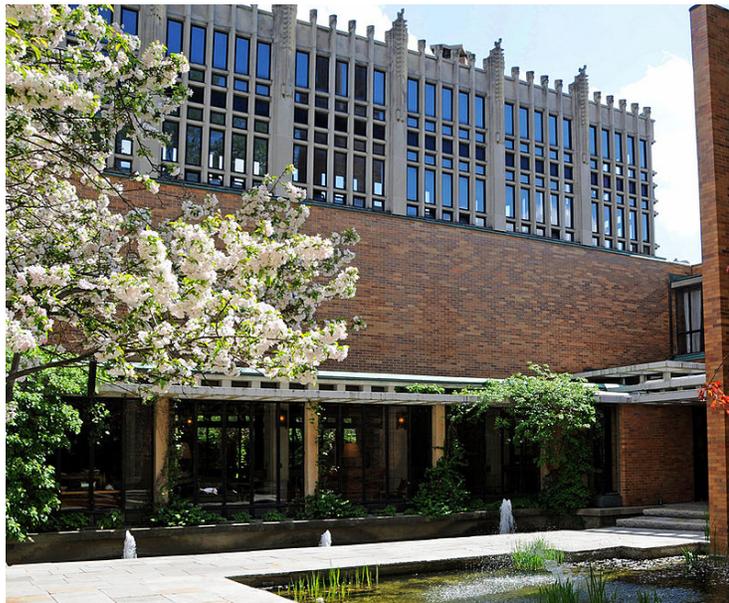
In closing, I present two to three thoughts. In the last few years, I have had close association with the BC Science Teacher's Association. I have been involved in science fair adjudications. We must be aware of the great value of science fairs across this country. I know that the science teachers of BC are only one component of this, yet there are 800 of them from Kindergarten to Grade 12 and they are all extraordinary (I even golf with two of them). I delivered a Keynote presentation for the BC Science Teachers' annual cluster event. These teachers are right there with the children at all levels, reaching into the homes. We talk about how we can connect with society, but it is not only about journalism. It is also through these avenues that are naturally already in place in our education system where opportunities lie. We can make apples and orange into pears and share all the fruits. There is a great deal written about this. While there may be ambient negative talk about becoming a scientist, we could offset this trend by making science more mainstream with better communication and outreach to schools. However, we are preaching to the converted when we, scientists, just talk amongst ourselves and not to the public. There are so many perspectives to consider. It is not like there is a vacant parking lot of information on this subject. It is not just about communicating with the government, but also communicating with the public and with the younger generation.

When we discuss Biology, we are prone to discuss systems, as in molecule-to-population, but we need to talk about science within a societal context and the complexity of society. Science enriches our society in a way that makes us adapt and move forward from biology to the outer periphery of the environment. And again, I do not think we have taken on that role sufficiently. We should be doing that in the health sciences. For example, the UK science and technology facility council has a plan for bringing STEM more into focus for the public and for public engagement. It is a little bit on the edge of where most health research is at the moment. But at least it is a model to partly emulate.

We need to remember that researchers go from background information to supporting details, then gather results and form a conclusion. The public really wants to know the bottom-line, as in, what does it mean to them at an individual level? The supporting details then come later. Our current whole approach to communication is not quite aligned with the public's needs.

Sowing the seeds early on in schools by building a strong foundation, enabling engagement and promoting lifelong learning – altogether culminate in the growth of a culture of inquiry. And not surprisingly, when Mariette DiChristina asked her daughter what she should tell the US Senate, her daughter, who is in a combined computer and biological sciences program, simply answered: “Well, science is the foundation of everything”, which is not quite true, but a great thought!

Rather, I believe we need to pursue Science in a more concerted way. Canada lacks a culture of research and I think it is because we have not connected to the public. This is my opinion. We need to have a systemic approach to this and we need to track it like we do all scientific endeavours: 1) allocate resources predictively, which we do not; 2) align with best practices in other countries. I often think of Sweden. We need to evaluate upstream and refine our approach. Thank you for the opportunity to share these reflections.



Massey College, University of Toronto

Home of F.C.I.N.R.



Roundtable

"Strategies for Advancing Health Research Funding"

Distinguished Guest



Dr. David Naylor
2018 Friesen Prizewinner

Dr. C. David Naylor is one of Canada's most preeminent health scientists, who has made major scholarly and policy contributions that influenced health service delivery, public health and health research funding. He is currently Professor of Medicine and Emeritus President, University of Toronto (2005-2013). Before that, he was Dean of Medicine at U of T. He obtained his MD at U of T and as a Rhodes Scholar, earned a DPhil in social and administrative studies at University of Oxford. He initiated and led the Institute of Clinical Evaluative Sciences (ICES), Canada's largest independent network of health care investigators, research trainees and students. He is the author or co-author of over 300 publications with a major interest in cardiovascular care. Naylor Chaired Canada's National Review of Public Health after the 2003 SARS outbreak, which led to the creation of the Public Health Agency of Canada. In 2016-2017, he Chaired the Federal Review of Support for Fundamental Science and produced the "Naylor Report". He is the recipient of many major awards and was elected FRSC (2004), CAHS (2005), Officer of the Order of Canada (2006); inducted to the Canadian Medical Hall of Fame (2016) and the Henry G. Friesen International Prize in Health Research (2018).

"Toward a Healthier Canada"

Dante described Hell as "a place where nothing connects with nothing". In his Keynote, Dr. Bruce McManus reminded us that the scientific and research community indeed has something to say, but could communicate its messages better. So our situation, fortunately, is not hellish. Nonetheless, it does sometimes feel as if there is nothing or no one with whom our community can connect.

I will therefore briefly comment on "Receptor Capacity" in government and industry – in particular, the relative absence of science interlocutors in high elected office or in the upper reaches of the civil service. This is not a simple issue. It has bedevilled people for years in various scholarly and scientific fields. Right now, for example, I do not see a lot of PhDs in Parliament, nor are there a lot of scientists and scholars in our provincial legislatures. We were therefore lucky to get Kirsty Duncan, a PhD with academic credentials, as our federal Science Minister. And we have also been fortunate that there have been Prime Ministers and federal ministers who were sympathetic to research and scholarship. Still, it is much harder for us to make headway when there are so few internal champions who immediately understand what our community is saying and why we are saying it.

The same problem exists in industry. Canadian industry's spending on R&D as a percentage of GDP has been falling for many years. Indeed, our ratio of gross domestic expenditures on research and



development (GERD) relative to GDP is now one of the lowest among industrialized nations. There are many reasons for that situation, some of which have been explored in elegant writings such as Nicholson's analysis of the Canadian paradox of high business profitability amidst low levels of R&D investment and weak indices of business innovation. I suspect this regrettable trend will have to change in future as Canadian business responds to intensifying global competition.

For now, however, the implication is obvious. Our community has to think carefully about our messages, and work harder to connect with decision-makers not only in government but also in industry. We may want to highlight, too, the the absence of receptor capacity, and see if anything can be done to improve it. There is no easy answer – short of a stampede of scientists and scholars seeking public office! But I sense that other countries have more receptive decision-makers in government and industry, and if that is indeed the case, perhaps something can be learned from international experience.





Roundtable

"Strategies for Advancing Health Research Funding"

Speaker



Dr. Rod McInnes

Director of the Lady Davis Institute at McGill

Roderick R. McInnes, CM OOnt MD PhD, is the Director of the Lady Davis Institute of the Jewish General Hospital, Alva Chair in Human Genetics, Professor of Human Genetics and of Biochemistry at McGill, where he was Tier 1 Canada Research Chair in Neurogenetics. Previously, at the University of Toronto, he was a University Professor, Head of the Program in Developmental Biology at the Hospital for Sick Children, an International Research Scholar of the HHMI and the Inaugural Scientific Director (2000-2010) of the Institute of Genetics of CIHR. Prof. McInnes

has made important contributions to the genetics of vision and brain development. He is one of three coauthors of the 5th, 6th, 7th and 8th editions of the classic textbook Thompson and Thompson's Genetics in Medicine, for which the authors received the 2015 American Society of Human Genetics Award for Excellence in Human Genetics Education. In 2010, he was the President of the American Society of Human Genetics. He is a Fellow of the Royal Society of Canada and the Canadian Academy of Health Sciences, and a member of the Order of Ontario (2008) and the Order of Canada (2009). In 2017-2018, he was the Acting President CIHR.

"There's no Magic Wand, But There Are Opportunities"

I think the most important thing remarked upon in Dr. Bruce McManus' Keynote is that Canada lacks a "Culture of Research". Equally important is Dr. David Naylor's observation that we need "Receptor Capacity" amongst various groups and in society, to take up the cause of research in our society.

The problem is exemplified by my own family: I come from a family of lawyers; I know the legal community very well. They are very capable people of course, but they generally have no real understanding of how science works. They just don't get it, really, unless they read up on Science in the Globe and Mail! We are lacking a "Culture of Research" and this is the key issue that we need to address.

Our presenters today touched on the role of teachers, the young and how we present the story of science to society. To elaborate further on this topic, I will draw from my own experience. I have done a lot of work in the U.S. with various organizations, where there is a much broader community of influential people, more specifically very wealthy people, who have a deeper understanding of science in general, an example being Michael Bloomberg. Such individuals launch organizations and lobby to senators and House of Representatives for support, not just for a disease that their cousin may have, but rather for greater support from the NIH. In Canada, we do not have any influence like this at all. Ironically, one of the impediments here is our overall wonderful Parliamentary system, which does not operate in the same fashion. I do not know how we can morph this situation re science into a different model.



Just to reiterate, I started off by agreeing with Dr. Bruce McManus' critical statement that Canada lacks a "Culture of Research", which is essentially the bottom line. Furthermore, Dr. David Naylor emphasized that we lack "Receptor Capacity". I do not know whether we can change the dialogue in some way to reach out more to people of influence. It all boils down to the fact that most educated individuals outside academe do not really understand science. The resultant changes that we see from lobbying and the effectiveness and impact of the US National Institutes of Health, and from of the Americans amazing NGOs come from the political and business elites (for lack of a better word), or rather, from "the influencers", which is a safer politically correct term. Similarly in Canada, I think we must try to create a community of influential leaders who truly understand the role of science in modern society and will advocate for it.

Friends of CIHR alone is not the solution because we are just speaking to ourselves. Nevertheless, it is a great start.

Why are our intelligentsia not more engaged in the value of health research? Clearly, we need to engage wealthy community leaders and other influencers. There are some who truly "get it". I am thinking of John Risley, the owner of Clearwater Seafoods in Nova Scotia. John Risley has given millions of dollars to marine biology research at Dalhousie. One issue is the number of wealthy people. In the States, it is so much more vast. There are lots of wealthy people in Canada who are not contributing to research- I am not thinking so much of their funding research, as advocating strongly and constantly for it. I am thinking of people who have horse-racing farms and so on. In the States, it is almost a competition amongst the wealthy and influential members of society to be seen to support research.

I am very familiar, as Director of Research at the Jewish General Hospital in Montreal, of the senior members of the Jewish Community there, who are phenomenal in their advocacy and support of research. Indeed, they love competing with each other to give. Financial leaders across the country have similarly been wonderfully generous to this cause, but we need more - their influence with governments and policy makers. With regard to this issue re. presidents of banks, members of law firms and business leaders, we have to help them overcome the barrier of science illiteracy if we are to foster a "Culture of Research". This means creating a community of influential thought leaders in Canada who understand science. Joe Rotman in Toronto, and Arnold Steinberg in Montreal were wonderful in this roles. They were some of research's greatest allies.

We need to engage the private sector advocating for research and in various ways. And my favourite example of how this has been done really brilliantly is Aled Edwards, a biochemist at U of T, who conceived and created the Structural Genomics Consortium (SGC), a international collaboration originally between Sweden, the Wellcome Trust, Oxford, Genome Canada and CIHR. The SGC generates protein structures that drug companies can then use to design drugs. Now much of its funding comes from 9 pharmas, in addition to support from research agencies internationally. The unique feature of the SGC is that although a lot of the funding comes from the private sector, the discoveries made are immediately available to anyone, for any purpose - a compelling "open science" model. This is a remarkable achievement. In this open science model, the funding pharmas have very minimal control over what is studied. They might have a favourite protein for which they want to develop a drug, but the SGC's structural discovery of that proteins become public. The pharmas are invested in the SGC pro bono because they see the broader good as well as advancing their own goals. This is a model that might be adopted in many research contexts. It is a brilliant achievement by Aled, and an astounding example of novel leadership that I think can be mimicked to the benefit of Canadian research in any area.



Roundtable

"Strategies for Advancing Health Research Funding"

Speaker



Dr. Vivek Goel
VP Research & Innovation, U of T

Professor Vivek Goel is Vice President, Research and Innovation at the University of Toronto and a Professor in the Institute of Health Policy, Management and Evaluation at the Dalla Lana School of Public Health. Professor Goel is a distinguished scholar with an extensive background in teaching, research and university administration. He obtained his medical degree from McGill University and completed post-graduate medical training in Community Medicine at the University of Toronto. Dr. Goel obtained an MSc in Community Health from U of T and an MS in Biostatistics from Harvard University School of Public Health. His research has focused on health services evaluation and the promotion of the use of research evidence in health decision-making. Professor Goel joined the University of Toronto in 1991 as Assistant Professor in the Department of Preventive Medicine and Biostatistics. He was chair of the Department of Health Administration in the Faculty of Medicine from 1999 until 2001, then served as Vice-Provost, Faculty and subsequently was the University's Vice President and Provost from 2004 until 2008. He was a founding scientist at the Institute for Clinical Evaluative Sciences (ICES), where he continues as an Adjunct Senior Scientist. He served as founding President and CEO of Public Health Ontario from 2008 until 2014, where he was highly successful in building an academic public health services agency that provided scientific and technical advice to front-line practitioners. Prior to rejoining U of T he served as Chief Academic Strategist with Coursera, a global platform that connects universities and learners with online courses. He has extensive experience in governance and in his University role serves on the boards of MaRS Innovation, the Vector Institute, the Centre for Commercialization of Regenerative Medicine, the Centre for Commercialization of Antibodies and Biologics, Compute Ontario, TRIUMF, IC-IMPACTS and is co-chair of the Southern Ontario Smart Computing Innovation Platform (SOSCIP). He is also the Chair of the Toronto Central Local Health Integration Network board and Vice-Chair of the Canadian Institute for Health Information.

"Improving Health, Health Outcomes and Health Economy"

To start, I would like to refer to the Keynote title of Dr. Bruce McManus: "Nurtured Science – One Pillar of a Healthy Society". CIHR has 4 pillars which we should always keep in mind. Furthermore, Dr. Rod McInnes referred to "Basic Science" as "the motherlode". All 4 pillars should be treated as equal and valuable by our research leaders. The Panel for the Canadian Fundamental Science Review went through great lengths to ensure that the broad definition of "scholarship" was included. The language that we use particularly constrains the health research community and quite honestly turns off a large part of the health research community. This blocks us from achieving the goal of a Healthy Society that is in the title of the session.



In addition to conducting science and disseminating science, we must improve health system performance and public and population health if we are going to see improvements in the health of Canadians. And that is only going to happen with all of the pillars working together. I had the privilege of doing a review of the Institute of Health Services and Policy Research, where I was on the founding Institute Advisory Board (IAB), back when Dr. Alan Bernstein was the President of CIHR. The overall funding proportions have not actually moved that much for health services research over that time period, even though we recognize its importance. Similarly, if you were to look at the data for health and clinical research, you would probably still find the same. Across all the funding programs for Health Services Research (HSR) and not just the Institute, I believe the growth rate for funding has been below 5%, although I am not sure about the exact number. Bearing this in mind, if we are going to actually have an impact on the health system, we cannot just look at the CIHR side. We also need to think about investments in the health system and other agencies in order to adopt and implement the results of research.

We often forget about Dr. David Naylor's previous report on Health Innovation, which had a number of recommendations, that have yet to be acknowledged or acted upon, and I think these would have driven some of that receptor capacity. I would not say that this issue is all just about CIHR.

Furthermore, there are infrastructure requirements for other categories of research that are not invested in the same way. For example, if you consider genomics capacity across the country in the last 20 years, we have had tremendous investments through the Canadian Foundation for Innovation (CFI), Genome Canada and other resources. Taking into consideration the databases, the cohort studies, the other types of infrastructure that are the bedrock of other categories of research, as well as some interesting new initiatives from CIHR, we have progressed in this area, but we still need a lot more work to be done.

Regarding the issue of registries in the Scandinavian countries, we need to continue the support. And it is not just financial. This is linked to public engagement. For example, Statistics Canada is bringing in data from financial services to perform better assessments on the economy. Similarly, it is absolutely necessary for us to follow suit with health data. There is an increasing amount of health data that resides outside of the formal healthcare system and if we do not figure out how to capture it, we will miss out on many cases of disease. This is another element of public engagement to ensure they support the need for this type of data collection and use.

Additionally, I would like to comment on clinician researchers. And again, I say "clinician researchers", rather than "clinician scientists", because I think that gets people into a particular mindset. We need researchers on the frontlines of clinical practice who are trained to do research on everyday problems. But we need more mechanisms for supporting them and again our healthcare system often is generally not set up to support embedded researchers, who are actually improving practice.

The final point I will discuss is engaging with the health system. And this has to be more than just checking off boxes in the Knowledge Translation (KT) section of Grant applications or declaring that you have a knowledge user on your grant. When I was working in a public health agency, I actually managed to be both the researcher and the knowledge user in the same grant. The language of "co-creation" was used. We need to devise a way to engage people embedded in the health system with clinical researchers who develop the research proposals. I think this will lead to the adoption of issues surrounding innovation.



Roundtable

"Strategies for Advancing Health Research Funding"

Speaker



Dr. Martha Crago
VP Research & International, McGill

Professor Martha Crago, B.A., M.Sc., Ph.D., C.M., is McGill University's Vice-Principal (Research and Innovation). Prior to returning to McGill, she was the Vice-President (Research) at Dalhousie University. Her previous university administrative positions include Vice-President of International and Inter-Governmental Relations at the Université de Montreal as well as the Dean of Graduate and Postdoctoral Studies and Associate Provost (Academic Programs), at McGill. Professor Crago is the Chair of the Research Committee of the U15 group of Canada's research-intensive universities as well as a member of the Social Sciences and Humanities Research Council (SSHRC) Governing Council, the Research Partnership Committee of the Natural Sciences and Engineering Research Council (NSERC), and the Senior Research Officers of the Association of American Universities (AAU). In 2016, the Minister of Science of Canada selected her to be a member of Canada's Fundamental Science Review. Professor Crago was appointed a Member of the Order of Canada in 2017.

"Post-'Naylor Report' Thoughts on the Funding of Health Science in Canada"

We just heard a very good talk about the Friends of CIHR and the broader concept of 'Friends of Research'. Let me expand on some of why we need friends for research and why such friends would align well with the directions research is taking and also be friends who could help take research to all kinds of people.

The Fall in Canada is grant proposal season. This brings to my mind the different funding programs across Canada's different research funding agencies. It is interesting to consider what may be the unintended consequences of our country's various funding programs and the differences between the various agencies' programs.

The Natural Sciences and Engineering Council (NSERC) has a funding program called "Discovery Grants". A Discovery Grant is for an individual researcher. There are no team Discovery Grants. This past year, approximately 70 percent of people who applied for them were funded. This is a very high success rate, higher than any other Canadian agency's success rate. However, it is my opinion that such grants tend to form what could be called "lone wolf researchers" since scientists with a Discovery Grant do not get experience in team science with other researchers within their very own university or even their own department.



Another NSERC program is called “Collaborative Research and Development” (CRD) grants. These grants are about research and development or R+D as the name and initials indicate so clearly. NSERC contributes half of the money to these grants with the other half coming from industry. The success rate for the Collaborative Research and Development program is approximately 80%. This is really a remarkably high success rate. It rewards scientists who work with industry and it is greatly appreciated by industry.

Finally, NSERC has yet another program that is called “Strategic Network Grants”. These grants connect researchers in one university to scientists in other universities across the country as well as to industry.

Continuing on with our inspection of NSERC funding programs, there is yet another one called “Industry Research Chairs” or IRCs. These chairs allow universities to hire a new people and have them funded by NSERC and an industrial partner. At the end of 5 years, IRCs can be renewed for another 5 years. There are at both junior and senior levels. This program has given universities that are struggling with hiring freezes, a very interesting way to bring on new professors in industry-related research fields.

Now, let us turn to the Canada Institutes for Health Research (CIHR) and take a very superficial look at some of its funding programs. CIHR has a program known as the “Foundation Grants” that funds large sums of money for a 7 year period to excellent researchers. It is interesting to speculate on the unintended consequences of this form of funding. Foundation Grants tip considerable amounts of CIHR funding toward a small number of senior researchers, many of whom are white and male. On the other hand, several Foundation Grants, fund not only a Principal Investigator but also that person’s team of co-investigators including younger emerging researchers, more of whom are women.

CIHR also has a program called the Strategic Patient Oriented Research (SPOR) grants. The activities these grants support are arguably what provinces in Canada should be supporting. Finally CIHR funds Project Grants. These are held by individuals or small teams who are typically funded at a much lower level than Foundation Grants. It is notable that the success rates in CIHR grants have had a nation wide average of lower than 15 percent. The contrast with NSERC grants is astonishing. Furthermore, there are relatively few industry facing grants at CIHR.

This brief look into some forms of program funding and structures shows both the intended consequences and unintended consequences of how research funding programs can affect not only what researchers do but also what funding they have available and at what career stages. It also shows how different and seemingly disconnected the forms of funding are across our agencies.

I think Friends of Research should encourage the Canadian funding agencies to look across their programs in a comparative fashion and to assess their consequences as well as their possible points of contact. University researchers have proposal deadlines for one agency and often, right away, prepare another proposal for a different proposal deadline as well as for a variety of different programs. This means that ambitious researchers spend considerable time and energy just in proposal writing. It is also very hard to get multidisciplinary funding because our agencies have all been running different kinds of programs that are not easily aligned with one another. The agencies have had what was referred to as poor porosity in a recent report on the funding of fundamental science in Canada. This is particularly significant at a time when a number of global challenges require approaches from across a spectrum of disciplines.



Climate change is staring us in the face and it comes with effects on health. New technologies can be disruptive and yet, at the same time, they facilitate many advances in the health world. Life sciences as well as engineering and natural sciences need social sciences and humanities to provide an understanding of human behavior and to address legal, ethical and policy concerns related to climate change and new technologies. Our world is one where multi-disciplinary research matters. Does this mean you need to reconsider your role and become quite simply “Friends of Research”? If we continue to do siloed research and have siloed councils and siloed “friends”, we may well not address many of today’s challenges in the ways we need to. Perhaps this newly imagined Friends of Research could sponsor a prize for multi-disciplinary research.

Finally, I would like to share with you what I call “The Janitor Story”. There is a urban legend in Canada’s research intensive universities, that I have reason to believe is true. A little less than a year ago, the Executive Heads of the 15 most research intensive universities in Canada visited our Prime Minister, Justin Trudeau. He is reputed to have asked them: “How many working class people have been in the laboratories of your universities aside from the janitors?” At this time in history, we have whole segments of the populations in a number of countries embracing populism and manifesting disdain for academic and other elites. Indeed, it is likely that the only working class people aside from certain students who have indeed set foot in our laboratories are the janitors. Is there a role for the Friends of Research here? Could a group like our imaginary non-agency specific Friends of Research help to move research and its discoveries and laboratories into people’s every day lives?

I will now conclude with my own favourite story, one I call the Beavertail Story. I live in Westmount, Quebec which is known to be a part of Montreal where ‘elites’ live. One night, I got off of the bus and there, right in the middle of Westmount, was a food truck selling Beavertails, those sugary Canadian fried bread favorites that appear at parks and entertainment areas. I stood there and thought to myself “What on earth is a Beavertail Truck doing here?” Then it struck me – what if we had ‘Science Trucks’? What if we deployed Science Trucks out onto the streets and brought little mini science discoveries and laboratories straight to people of all walks of life and ages. How about a Friends of Research sponsored truck? It could of course be accompanied by a Beaver Tail truck that provided refreshments. There really is a lot that friends of research can do. Let’s do it together across sciences, across agencies, across programs and across a wider spectrum of people.



Roundtable

"Strategies for Advancing Health Research Funding"

Speaker



Ms. Pari Johnston

VP, Policy and Public Affairs, Universities Canada

Pari Johnston is vice-president, policy and public affairs at Universities Canada, leading all federal policy and advocacy initiatives of the association. She is responsible for strategic oversight of Universities Canada's government relations, communications, policy and research, and international relations to promote the role of higher education, research and innovation in Canada's future, at home and abroad. Ms. Johnston joined Universities Canada in 1997, and has played increasingly senior roles, including director of international relations, before building a new member relations program and leading the public affairs team. She is a member of the Board of Directors of The Conversation Canada, a global platform for academic journalism recently launched in Canada. She holds a bachelor of arts degree (French literature) from the University of Regina and a master's in international affairs from Carleton University. Ms. Johnston is married to David Heath and has two young sons.

"Talent and Skills Development Through Research: A Narrative for Research Funding"

Thank you for the invitation, on behalf of Universities Canada. My perspective stems from successful research advocacy campaigns. I want to focus on what happened last year because I think it is instructive for us. The community came together and spoke with a united voice. We engaged the public in a meaningful way and we put support for early career researchers at the centre of our political and public narrative. We had a very compelling vision and roadmap.

The "Canada's Fundamental Science Review" was a rallying cry for our sector. Stakeholders converged to work together in a much more coordinated way. Universities Canada took on a lead role, but we were not the only ones. This was all part of an 18-month effort involving over 50 national organizations, from students to research trainees to faculty associations, U15, and the health sector lobby. This working together was something that had not happened before on that kind of scale. This is still happening, it has allowed us to stay in a campaign mode and keep up the momentum of the vision and roadmap of "Canada's Fundamental Science Review".

We engaged third party champions. We mobilized the community sector and the private sector. We still have more work to do. But we did manage to connect to the community foundations of Canada and explain why more investments in research build stronger communities. Our work with our health and research sectors was very helpful. In particular, the "Health Charities Coalition of Canada" was very helpful in sharing the importance of research in their own work.



Many others also talked about the next generation of health researchers. A strong part of our narrative has been helping top health researchers produce their best work and realize important benefits for Canadian communities.

Regarding public engagement, there is strong support for Science among the Canadian public. Universities Canada has been conducting polls on how Canadians view research. Canadians do understand the value of research and what it means to Canada. 86% of Canadians polled in 2017 felt the government needs to spend more on university research. We use this finding to great effect with Ministers, the Department of Finance, etc. Health outcomes were one of the top priorities that Canadians identified when they made the link to university research. We cannot be complacent about this. We continue to work with “Abacus Data” to update this polling this Fall.

There is concern that the public has superficial knowledge of what research is all about. We cannot be complacent, nor can we take it for granted. With regard to graduate students, senior established health researchers should continue to open their doors and their labs to engage with the public and work with politicians to demonstrate value, such that it relates to what Canadians care about. This has worked to good effect for various initiatives here in Ottawa.

Out East, the Conservative party held its convention in Halifax. Universities Canada worked with Dalhousie to enable a number of Parliament MPs to meet with young health researchers. The MPs toured the lab. They had a panel. They were very engaged. I could not agree more with what Dr. Vivek Goel said about the importance of a Policy Roundtable. This is incredibly effective because it demonstrates how university research addresses problems we care about.

I want to close with a discussion about early career researchers. As the Universities Canada campaign evolved, the lead narrative was that “Canada’s Fundamental Science Review” advocated for investments in sustainability, diversity, and the potential of the next generation. The “Students for the Report”, a national movement, and the “Global Young Academy”, were both instrumental in getting us to the finish line. We connected to them and now it is a very strong partnership.

I suggest that we continue to engage early career researchers at the table by listening, learning and harnessing their own advocacy strategies. This is a government where a youth narrative resonates. Millennials will outnumber Boomers in the next election. It is in the interest of the community to support and recognize trainee-led groups and find ways to create a network of them across the country. Perhaps next year, we could have trainees at our Roundtable. They are committed and they are great storytellers for investing in research. Unfinished pieces of business from last year’s Budget are graduate scholarships and fellowships. An argument circulating around Ottawa suggested that if you just invest in the principal investigators, then it will just trickle down. This is not good enough. It is incumbent upon all of us to lend our voices to these issues. Young researchers helped get us across the finish line last year; we need to better garner support for scholarships and fellowships.

Lastly, Universities Canada and our coalition are committed to keeping the government’s feet to the fire for this roadmap. This should not be viewed as a one-off Science Budget; we are going to have to work together to keep the government on track. I agree with Dr. David Naylor that there should be a report card evaluating how they are doing and where things need to go. We are all continuing to work hard in the “Research Support Fund”, but we need growth in the base budget for fundamental research. In this post-election period, the Universities Canada coalition is finding ways to achieve this.

We look forward to working with you all.



Roundtable

"Strategies for Advancing Health Research Funding"

Speaker



Dr. Linda Rabeneck
President, CAHS

Dr. Linda Rabeneck MD MPH FRCPC FCAHS, a physician, clinician scientist and health care executive, is Vice President, Prevention and Cancer Control at Cancer Care Ontario. She is Professor of Medicine at the University of Toronto (U of T), and Senior Scientist at the Institute for Clinical Evaluative Sciences (ICES) in Toronto. Dr. Rabeneck received her MD from the University of British Columbia (UBC), followed by post-graduate training in Internal Medicine and Gastroenterology at UBC and the U of T. She received her Master's degree in Public Health (MPH) from Yale University, where she trained as a Robert Wood

Johnson Clinical Scholar. Dr. Rabeneck, whose scholarly work focuses on the evaluation of health care and health system performance, is best known for her research on colorectal cancer screening. Dr. Rabeneck played a leadership role in the launch of ColonCancerCheck in Ontario, Canada's first organized, province-wide colorectal cancer screening program. Dr. Rabeneck was elected Master, American College of Gastroenterology (ACG), received the ACG's Berk/Fise Clinical Achievement Award, and UBC's Medical Alumni Association Wallace Wilson Leadership Award. In 2012, Dr. Rabeneck was elected Fellow of the Canadian Academy of Health Sciences and in 2017, she became President.

"Mobilizing the best scientific minds"

I would like to start off by drawing your attention to the Canadian Academy of Health Sciences (CAHS), which was founded in 2005. Currently we comprise approximately 650 Fellows, with expertise across the health disciplines.

Our mission is to inform policy and practice by mobilizing the best scientific minds to provide independent and timely evidence-based assessments of critical health challenges affecting Canadians. Our vision is informed actionable solutions that improve the health of Canadians. The CAHS pledges to serve Canadians by volunteering the time and expertise of our Fellows by conducting independent, unbiased, expert assessments on health-related topics of major importance to Canada.

At this time, CAHS has issued nine major assessments. I would like to acknowledge Dr. Paul Armstrong, Founding President of CAHS, who joins us at this Roundtable today. The most recent CAHS assessment released in 2017 is entitled, "Academic Recognition of Team Science: How to Optimize the Canadian Academic System". The Chair of the Panel was Dr. Peter MacKinnon, former President of the University of Saskatchewan. Dr. Rod McInnes was also on the Panel. "Team Science" makes an important set of 12 recommendations for universities and funders in 3 categories: 1) recommendations



to adapt culture and behaviour to Team Science; 2) recommendations to help review committee members measure Team Sciences contributions; and 3) recommendations to improve the assesement/evaluation of Team Science contributions. Dr. Bruce McManus mentioned “Team Science” in his keynote slides and Dr. Martha Crago talked “lone wolves” in research. The Team Science panel noted that it will take strong leadership to implement these recommendations. “Team Science” is a really important report, an excellent example of the contribution of the CAHS to science policy in Canada.

The second observation I want to make is that there were many comments this morning in reference to our health system. I want to clarify that from my perspective we actually do not have a “health system” in Canada. We do not have any “provincial health systems” either. What we have in each province and territory is publicly funded, single-payer insurance coverage of claims for physician and hospital services, and incomplete drug coverage. While very important, these aspects, taken together, do not comprise integrated health systems. Much work needs to be done to achieve integrated health systems. And in moving forward we need to ensure that we are able to take into account emerging science and innovations in all that we do.





Roundtable

"Strategies for Advancing Health Research Funding"

Speaker



Dr. Alan Bernstein
President, CIFAR

Dr.

Alan Bernstein, President & CEO of CIFAR, received his Ph.D. from the University of Toronto in Medical Biophysics. Following postdoctoral research at the Imperial Cancer Research Fund Laboratories in London (UK), he joined the Ontario Cancer Institute, University of Toronto. In 1985, he joined the Samuel Lunenfeld Research Institute and served as Director of Research from 1994-2000. In 2000, Dr. Bernstein became the founding president of CIHR, the Canadian Institutes of Health Research, where he led the transformation of health research in Canada (2000 – 2007). He then served as executive director

of the Global HIV Vaccine Enterprise (2008 – 2011), an international alliance of funders charged with accelerating the development of an HIV vaccine. Author of over 200 peer reviewed publications and more than 60 articles in the lay press, Dr. Bernstein's contributions to science have been recognized with many awards and honorary degrees. He serves on advisory and review boards for governments, foundations and research institutions. He is a Senior Fellow of Massey College and Distinguished Fellow of the Munk School of Global Affairs; an Officer of the Order of Canada; recipient of the Order of Ontario; Canadian Medical Hall of Fame Laureate; and recipient of the 2017 Henry Friesen International Prize in Health Research.

"Lessons From Canadian Farmers"

The title of our Roundtable today is: "Strategies for Advancing Health Research Funding". This is an important and timely topic. I would like to go back to a question I raised after Dr. Bruce McManus' excellent Keynote talk. Question: Given how compelling the case is for science in general, and health research in particular, why has it been so difficult to convince policy makers to fund research? Unless we can answer that question, we will continue the same approaches with undoubtedly the same result.

I suggest that at least one major reason is that most of our arguments do not resonate with the public. We have by and large failed to put ourselves in the shoes of the Canadian public. Rather, we have taken it as a given that research is important and have largely advanced arguments that assume that research will one day give rise to cures for disease or a better health system or a stronger economy. By and large the arguments that have been advanced have centred around success rates and the size of grants. These arguments fail to resonate with non-scientists or align with the priorities of the government of the day.



All of us here understand the importance of fundamental research and the close relationship between outstanding health care and health policy on the one hand and research on the other hand. We understand that research and evidence is key. What we do not do is tell the story of the connection between fundamental research and its ultimate impact on the health system, on innovation and the economy and on society.

During this Roundtable, Dr. Martha Crago talked about the differences between CIHR and NSERC. Think about this for a moment and consider how this is perceived by our politicians and officials in the Department of Finance. At CIHR, the average grant size is over \$150,000—a policy we launched at the outset of CIHR. As a consequence and with the growth of the health research community, success rates in the open grants competition are indeed too low. In contrast, at NSERC, the success rates are of the order of 60-75% and the average grant size is \$35,000. As pointed out in the Fundamental Science Review, this huge difference in philosophy and policy makes it difficult for collaboration across agencies and for our elected officials to understand which approach is correct. At CIHR, the community has argued for internationally competitive levels of funding. At NSERC, the community has argued that everyone is entitled to a small piece of the pie.

Our focus needs to centre around how to achieve the best science and the best impact for Canada. I am not arguing for simply “relevant research”. That is not the issue. I think we all know the strong linkage between fundamental research and its impact on society (and see my piece in a recent CIFAR Newsletter).

Inadvertently, we have been sending signals to policymakers and to the Canadian public that what we really care about is ourselves. Arguments about success rates are essentially self-serving arguments while giving almost every applicant a little bit of support comes from a philosophy that we are all entitled to a bit of the pie.

I suggest we learn from Canada’s farmers! When I was president of CIHR and working in Ottawa, every summer the farmers from the nearby Ottawa Valley would roll into Ottawa on their tractors pulling bales of hay in the wagon behind them. They would travel slowly through the city, disrupting Ottawa traffic. On the bales of hay, they all carried big signs, arguing for more support for farmers and for farming. The signs didn’t say, “Give farmers more money”. They said “If you ate today, thank a farmer.” Brilliant.

What would be the equivalent sign for the health research community? How about: “If you are over 45 years of age, thank a scientist.” At the time of Canada’s Confederation, the average lifespan of a Canadian was 42. Now, it is 82+ years. This astounding doubling is all because of science – all 4 pillars of CIHR.

The second point I want to discuss is how to nurture the careers of early career investigators and the role of our universities in actively promoting and rewarding a problem-based approach to science and scholarship. We are in the midst of a profound period of convergence where multiple disciplines are being brought to bear on exciting and important problems in science. Health research in particular has become a crystallizing force, bringing together diverse areas of science and technology from AI to computational biology, to chemistry, to physics, to biology, to high performance computing to address fundamental problems in biology, analyze large patient and cohort populations, and assist in drug discovery. I can’t imagine a more exciting time to be in health research.



This is the time to actively encourage our researchers, especially early career investigators, to participate in leading edge health research, in part through problem-based collaborations that cut across disciplines, institutions and countries. Our funding agencies, universities, and hospital;-based research institutes should get together and discuss how best to make this happen.

To sum up, the Canadian health research community has a great story to tell. From insulin to stem cells to the socioeconomic determinants of health, Canadian researchers have played a major role in transforming health and health care in the 20th and 21st century. Its time we told those stories.



Toronto ,Ontario, Canada



Roundtable

"Strategies for Advancing Health Research Funding"

Speaker



Dr. Marc Carrier

Assoc. Professor, Dept. of Medicine, University of Ottawa

Dr. Marc Carrier, M.D., MSc, FRCPC, is a Professor in the Faculty of Medicine, Department of Medicine and Senior Scientist in the Clinical Epidemiology Program of The Ottawa Hospital Research Institute. He holds a Tier 2 Research Chair in Venous Thromboembolism and Cancer from the Department of Medicine at the University of Ottawa. His clinical research is focused in venous thromboembolic disease and cancer, including cancer screening, prevention and Management.

“Advancing Health Research Funding through Collaborative Networks”

I am a mid-career investigator. I am a clinician researcher. I do not have the insight that many of you at this Roundtable have on leadership and the goals for moving research forward. But when I was reflecting on advancing healthcare research, I was reminded of what was very successful to me. Working Groups and networks. And this relates back to what Dr. Martha Crago and Dr. Alan Bernstein were discussing earlier at this Roundtable; this approach has been very successful for me.

The Canadian research community has several strong and successful research working groups and networks of different size (NCE or smaller). The impact of these go way beyond conducting major practice-changing research. It helps train future investigators and perform knowledge transfer activities. Funding of these networks have led informal collaboration between co-investigators to structured networks with organized infrastructures including different platforms (trial collaborations, training and mentoring, knowledge translation, patients, etc.). Networks have unified Canadian researchers on a national scale with a shared goal and vision. It has helped early- and mid-career investigators with funding pilot trials and provided researchers with a forum to network and establish collaborations through frequent teleconference and face to face meetings. It is hosting and providing administrative support to different Clinical Investigators Groups and building Canadian capacity (researchers) in their focus of research (Fellowship. Studentship, travel awards, start-up funds, etc.). Finally, these networks help train and engage with patients' partners.

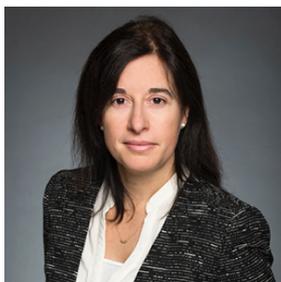
Most of these networks are at crossroads and would probably need minimal investment from CIHR for a network to remain attractive (i.e. CIHR-funded) to other profit and not-for-profit partners. This will allow networks to continue to thrive and help other clinician investigators like me to become independent researchers.



Roundtable

"Strategies for Advancing Health Research Funding"

Speaker



Dr. Carolina Ilkow

Assistant Prof., Dept. of Biochem, Microbio. & Immunology, University of Ottawa

Research interests: Therapeutic viruses have been gaining momentum both pre-clinically and clinically as promising multi-modality anti-cancer platforms. Several viruses have been successfully engineered to selectively replicate and kill cancer cells, thereby rendering them oncolytic (onco = tumor; lytic = killing).

However, a tumour is more than a collection of malignant cells. The tumour microenvironment also contains cancer-associated fibroblast (CAFs), fat cells (cancer-associated adipocytes), vascular endothelial cells, immune cells and the extracellular matrix that binds them all together.

The overarching hypothesis of my research is that the tumour microenvironment as a separate but integral cancer-associated entity that (1) may be targeted by oncolytic viruses (OVs) and that (2) may modulate the therapeutic outcome of viroimmunotherapy. Dissecting the interplay between different cellular components of the tumour microenvironment and their role in innate and acquired resistance to virus-based therapies will enable us to design highly targeted and effective OVs. As an example of this type of approach, we have recently identified that CAFs play a central role in modulating the sensitivity of the tumor cell compartment to OV infection and cell killing. In order to capitalize upon this, we have engineered the key molecule mediating this effect, fibroblast growth factor 2 (FGF2), into the genome of the oncolytic virus MG1. We have demonstrated both in vitro and in vivo that this virus has an increased capacity to replicate in cancer cells and leads to improved therapeutic outcomes in murine models.

"Starting up a New Academic Laboratory When Funds Are Tight"

As an Investigator, I am actually experiencing the things that have been discussed by our fellow Speakers at this Roundtable today.

Two years ago, when I got my position, I was really good at doing Science. I had all the skills to do Science, but I did not have the Management skills to deal with people, how to write grants and how to navigate the system. No one had taught me how to do all that. Unfortunately, even though we have mentors, my mentors also had to focus on their own proposals. I felt there was a gap in my training. While I felt confident about the skills I had acquired over the years, I could not use any of it because now I was investing all this time in learning how to apply for funding through all these different systems and navigating websites.

The point I raise is that there is a gap in training from being a post-doc to becoming an investigator. This



is toxic to our system for I cannot offer the best to my own trainees, because I am investing a substantial portion of my time navigating the system, as opposed to performing working that I know.

Another key point I would like to bring up is the issue of Innovation and thematics. I trained as a team player. The most important thing my mentor taught me was how to work in a team. Now I am obligated to work by myself; I was not trained to work in this way. I truly believe that the best Science is produced by working together to effect change. Now that I have to work by myself, I need to prove that I can think by myself and write grants. I need to also show that I can train people. Knowing full well that I am capable of working in a team, I do not think that I should indeed be working in isolation.

First of all, I appreciate that new investigators have a chance at better training. Furthermore, I do not believe that we are working for Canadians and making a real impact if we scientists are left to work independently. At the moment, I do not think we have a solid answer. New investigators, very senior investigators and clinicians all have something different to offer. We need a solid mentorship plan and platform to offer our new investigators. This is crucial.

We have yet a lot to learn about navigating and operating in this system of Health Research.



Tabaret Hall, University of Ottawa



Roundtable

"Strategies for Advancing Health Research Funding"

Discussant



Dr. Lynne-Marie Postovit

Co-Director, Cancer Research Institute of Northern Alberta

2019 - Appointed Head, Dept. of Biomedical and Molecular Sciences,
Queen's University

Lynne-Marie Postovit is the Alberta Innovates Health Solutions Translational Chair in Cancer, the Sawin-Baldwin Chair in Ovarian Cancer and the Dr. Anthony Noujaim Legacy Oncology Chair as well as an associate professor in the Department of Oncology at the University of Alberta and an adjunct professor in the Department of Anatomy and Cell Biology at Western University. She is also a co-director of the Cancer Research Institute of Northern Alberta. Lynne has published over 60 peer-reviewed manuscripts in the area of the cellular microenvironment, and her work has produced 3 patents; one of which progressed into clinical trials for the treatment of prostate cancer and has led to the development of a start-up company. In 2009, Dr. Postovit received the Peter Lougheed/CIHR New Investigator Award, the Canadian Institutes of Health Research's (CIHR's) most important career development award, given annually to Canada's brightest young researcher at the beginning of their career. In 2012 she was named "a scientist to watch" by the Scientist magazine, in 2015 she was named the Researcher of the Month by Canadians for Health Research and in 2016 she was elected to the College of the Royal Society of Canada. Lynne studies the microenvironmental regulation of cell phenotype in cancer and stem cells. She is particularly interested measuring and targeting stem cell promoting proteins in the cancer

How do we better engage the public to support fundamental research?

We discussed the need to better engage the public and to provide accurate information that highlights our research. We pondered whether we could harness public health records, and more specifically personal health portals, to enable this. It was recognized that classical methods for disseminating information to the public, such as television and newspapers, have been replaced by self-directed searches; which while empowering could lead to the propagation of misinformation and could skew the public perception of research. This new era of "individual knowledge consumption" could, however, be capitalized on by tailoring information packages to patients, and providing them with links highlighting research achievements. This may also address the concepts covered in the New York Times article by Latour (covered in our plenary lecture); by showing patients, and thus the public, Canadian knowledge generators, through the artful and purposeful dissemination of individualized information to re-establish "the authority of science". We need to collectively emphasize the importance of content experts to a population with access to a never-ending supply of media and unfiltered information. This, I believe will take ingenuity, personalized approaches and trust.



What are the major hurdles affecting investigators through the career continuum?

The panel also deliberated obstacles impeding the advancement of early and mid-career scholars. We discussed the need to rebuild the constructs upon which academic research is based; in order to better recognize team research. Currently, adjudication processes rely heavily on individual assessments, counting senior author papers and grants, where the scholar is the nominated PI, above all else. This has led to difficulties in providing consistent, objective evaluations and has driven researchers, particularly at early stages, to focus on independent projects---which may inadvertently reduce the potential impact of the work. In addition, it forces disengagement from established networks. This approach makes increasingly less sense, given the interdisciplinary nature of modern biomedical research. Why train a person for over ten years to become an expert in an area, and then have them do something different, and why favor uprooting social and professional networks in favor of the perceived independence derived from moving institutions? Of note, these notions may be particularly damaging to the advancement of women, who may often wish to move less frequently for a variety of societal reasons.

We recognized that impactful research is rarely done by one laboratory, and that it is truly collaborative. Accordingly, institutions must find ways to count and celebrate the involvement of scholars who participate in group efforts. This, we agreed, involves revising institutional cultures and developing modern criteria for promotion and tenure; wherein the impact considers collaborative efforts as well as the time needed to discover and validate exceptional findings. Recommendations regarding how to best implement this have been made by groups such as the Canadian Academy of Health Sciences. Finally, we discussed the need for continued mentorship throughout the career trajectory. This mentorship would support new investigators as they equip the lab and begin managing personnel. It would also support mid-career scholars who must often evolve their research program dramatically; from a question that stemmed from impactful postdoctoral work; to new questions that have emerged and that often require a network of collaborators. It would be critical to also support those who may wish to move into leadership positions, by providing training as well as graded opportunities to organize and facilitate research and/or education on local, national and international stages. Current leaders must share the spotlight with, and support those at the mid-career, who follow them.



Roundtable

"Strategies for Advancing Health Research Funding"

Rapporteur



Dr. Reinhart Reithmeier

President-Elect, Royal Canadian Institute for the Advancement of Science

Dr. Reinhart Reithmeier is a Professor at the University of Toronto in the Department of Biochemistry in the Faculty of Medicine. He obtained his B.Sc. at Carleton University in 1972 and his Ph.D. in Biochemistry at the University of British Columbia in 1977. Following post-doctoral training at Harvard and the University of Toronto he obtained his first faculty position at the University of Alberta in 1980, moving to the University of Toronto in 1986. Dr. Reithmeier is known internationally for his lab's research on anion transport membrane proteins in human health and disease. An award-winning lecturer and mentor, Dr. Reithmeier enjoys teaching introductory biochemistry to 1,000 undergraduate students every year, as well as upper level and graduate courses. As former Chair of Biochemistry and a Special Advisor to the Dean of Graduate Studies for graduate professional development, Dr. Reithmeier is dedicated to ensuring that graduate students have the skill set and network to be fully prepared to take advantage of the diverse job opportunities available to them in today's global marketplace. His leadership was recognized in 2012 by election to the Canadian Academy of Health Sciences.

Science is back on the federal agenda! The Naylor Report on Fundamental Science has galvanized the research community into action and has captured the attention of the Trudeau government. We now have a Minister of Science and a Chief Science Advisor. We just had a successful "Science Meets Government" event on Parliament Hill, where young scientists met directly with politicians. The 2018 budget provided an increase in funding but has fallen short in terms of the support needed going forward. The 2019 pre-election budget however provides an opportunity for a campaign for research. A theme that emerged from the roundtable discussion was the need for scientists to engage with the public and politicians alike. Translation of discovery research into everyday applications (e.g., insulin in the 1930s, stem cells today) can provide meaningful impact and improve the lives of Canadians and help drive an innovation economy.

After introductions around the table, **Dean Bernard Jasmin** provided a warm welcome and thanked **Dr. Aubie Angel** for organizing this event.

Dr. Angel thanked the University of Ottawa for their on-going support of Friends of CIHR, and for **Drs. Jasmin and Tyrell** for co-chairing this roundtable on "Strategies for Advancing Health Research Funding". He pointed out that this event is a continuation of the last three roundtables sponsored by Friends of CIHR addressing issues on the funding of research focused on the development of young



people and research in the future. **Dr. Angel** thanked the participants from across Canada for attending this event and sharing their thoughts, wisdom and insights. The Proceeding will be published to be shared widely.

Lorne Tyrrell set an optimistic tone. He expressed the research community's gratitude to **David Naylor** for the work his panel has done in producing the Report on Fundamental Science, which emphasized the importance of supporting basic discovery research and the next generation of researchers. The Government of Canada responded very positively to the report, with new investments in research. Our health care system is poised to enter the new era of personalized medicine and human genomics transforming how we treat patients in the future. We need to demonstrate the benefits of research to patients to enhance public support. Discovery research is here but innovation is not. We have a well-trained workforce but need to translate publically-funded research here in Canada rather than elsewhere. Government, universities, industry, and financiers need to work together make this happen.

Dr. Bruce McManus provided a keynote address entitled "Nurturing Science: One Pillar of a Healthy Society". Dr. McManus opened the discussion by posing a series of questions: What is research? Why do we do it and for whom? What is its impact? How do we support research? How do we know when we are there?

Dr. McManus highlighted that the scientific method has a long 1,000-year history beginning with golden age of Islam and continuing with Aristotle/Plato and deductive reasoning into modern time with philosophers like Bruno Latour. Science harnesses the power of human ingenuity and creativity to advance objectives cherished by our citizens, highlighting a higher role of science in society, affecting the quality of our lives, reflecting our heritage and our culture.

Science seeks the answers to tough questions. We need to aspire to be the best, yet investment in research is lagging our OECD competitors particularly from the federal level. Investment from the private sector has flat-lined and even decreasing. Economic prosperity has its deep roots in science. There is lots of innovation in areas like agriculture, providing a solid return on investments. Science needs to have seat at the table with the decision-makers. Story-telling is key in engaging the public.

There is the "Valley of Death" between basic research and its translation into pre-clinical studies and finally into the clinic. There needs to be continuity of funding to move discovery to practice. There are many stakeholders in health research, with patients at the top. Yet, there remain gaps in funding and choices need to be made. People versus project, investigator-initiated/ priority, direct/indirect, "flavour of the month", etc. The need for funding of discovery research continues, and trainees are our future leaders so they need proper support.

What is missing? Especially in the post-truth work. Scientists create knowledge but need to engage with the public. Science and Journalism need to come together, as both are seeking truth. Science communication is key. The public is interested in the bottom-line but its needs to come first. We need to connect with society on the importance of science. We also need to get to schools and science teachers and develop this natural information pipeline. It is important to link basic science to economic growth. We need to talk about science in a societal context using a systematic approach. We need to talk to the public, not just ourselves. The public want to know the bottom line.

Dr. McManus left us with three considerations:



- 1) connect to the public to develop a culture of science,
- 2) the need to develop a systemic approach to research and allocate resources in a predictable manner, and
- 3) align with best practices.

The presentation generated a great deal of discussion. **Arnold Naimark** asked “What is a fact?” It’s what you found but the finding is open to interpretation. He recommends the writing of the French sociologist Bruno Latour (Science in Action). In the age of “alternative” facts Latour has now come to the defense of science

(<http://www.sciencemag.org/news/2017/10/bruno-latour-veteran-science-wars-has-new-mission>).

Alex MacKenzie highlighted the need for more women to engage in STEM and to address inequities. **Naylor** raised the issue of connectivity. We need to communicate better. We need to develop receptor capacity in government and industry. Low investment by industry is an issue. We need to develop better connections. **Aubie Angel** pointed out that some institutions

(<http://news.mit.edu/2014/beyond-stem-to-steam>) have include arts as an essential element in science and technology, hence the term STEAM.

Pari Johnston from Universities Canada provided a recent example of science communication, with scientists reaching out to politicians in the “Science Meets Parliament” event held this week. The event provided the opportunity for 20 Canada Research Chairs to meet with politicians in an informal setting and learn about a day in the life of a scientist. We need to frame our communication with government in the context of the benefits to Canadians.

Alan Bernstein asked: “Why is it so hard to make the case for science?” when there are clear benefits to people and society. As scientists we need to tell better stories and make them accessible to the general public. **Carolina Ilkow** highlighted the importance of developing the right language to communicate the public. **Naylor** cautioned that we need to be careful about over-promising research and innovation as driver of economic prosperity given the long lifecycle involved. Stakeholders also have different interests and priorities and we need to be mindful of different audiences. The “Next-Gen Researcher” is equipped with the ability to distill their work into short pitches, such as 3-Minute Thesis.

Vivek Goel emphasized that public engagement needs to focus on key issues that have traction the political and public arenas. For example, how research and innovation can bring an end of hallway medicine, something everyone wants to happen. We need to focus in what issues that are importance to our stakeholders and speak their language.

Rod McInnes bemoaned the lack of a culture of research and a limited receptor capacity in society. There is a poor understanding of research among the public. He made three points:

- 1) Science in Canada needs champions, people of influence, leaders in business and society, who value and support research,
- 2) we need to value basic research, which is the “motherlode” for advances in medicine, and
- 3) we need to engage the private sector.

He gave the example of SGC (<https://www.thesgc.org/>) led by Aled Edwards, who developed a powerful partnership with industry to study drug targets, with all work open access.



What is a culture of research? Is it broadly evident in society, beyond the elite? Are the public engaged in research? Canadians value our health care “system”. We need to increase the knowledge of science. **Lorne Tyrell** emphasized the need to change the culture both within science to become more entrepreneurial and in the public to understand how science works.

Vivek Goel talked about the “language of science”. It’s broader than basic research and scientists working in labs, the common public perception. All CIHR pillars need to work together. Infrastructure is also more than major equipment -it’s data bases, cohort studies and clinical records. Integrating health data from various sources like STATS CAN is key to public engagement. We need to support researchers improving practice and allow them to develop research proposals. Clinician researchers tackle problems their patients face in everyday life, which reminds one of what the great Sir William Osler said “The good physician treats the disease, the great physician treats the patient who has the disease.”

Martha Crago talked about the unintended consequences of funding programs on science and science careers. She highlighted the funding difference in NSERC (small individual grants, high % success rate) versus CIHR (large individual grant, low % success rates). CIHR Foundation Grants tend to go towards senior scientists. There is poor coordination between the tri-councils. Yet, issues like climate change required coordination and collaboration with different expertise. Research is increasing done in teams and funding is in place to support such efforts. For example, The Canada Research Coordinating Committee (<http://www.cihr-irsc.gc.ca/e/51107.html>) is creating a new fund to support international, multi-disciplinary, high-risk, rapid-response research, strengthen equity and diversity in research, and support early career research. Yet, the lone wolf scientist still exists and operating grants support this culture. How many members of the public are invited into labs? Janitors: (<https://www.youtube.com/watch?v=tqdOwOxY3s>). We need to open our labs to the public. Beavertails trucks bring tasty treats to the public in particular venues. Perhaps we need science trucks to bring science to the public.

Pari Johnston listed three features of successful research advocacy based on the success:

- 1) a united vision,
- 2) engaging the public, and
- 3) a focus on early careers.

Given the momentum of the Naylor Report we need to stay in “campaign” mode. The health charities are valued partners in this effort. Investment in research builds strong communities. The narrative in this budget cycle is about helping young researchers do their best work. Polls tell us that Canadians value university research, especially linked to health outcomes. We could open labs to demonstrate value to what Canadians care about. Next-Gen researchers are a powerful voice and need to be engaged in advocacy. Trainees are committed and represent our future. Graduate student scholarships to support them is key. We all need to work together to keep science on the political agenda.

Linda Rabeneck highlighted the role of CAHS members in providing assessments and issuing reports such as the one on Team Science (<https://www.cahs-acss.ca/academic-recognition-of-team-science-how-to-optimize-the-canadian-academic-system/>). There needs to be a change in university culture to allow young investigators to



participate in team science and get credit for their contribution especially during tenure reviews, even if they are not team leaders.

Not sure we have a health care “system”. We have a single payer publicly-funded coverage for medical costs. Proper governance and accountability is lacking so uptake of new products of science and innovation into medical care can happen seamlessly.

Alan Bernstein re-focused the discussion on health research funding. Making the case for science is often difficult and can be seen as self-serving. We need to tell the story between the connections between basic research and better health and longevity. In a system there is always basic research and innovation going on and moving through the pipeline, even though time lines are long. Health research is a crystallizing force for science across disciplines but university culture promotes individual research rather than interdisciplinary teams. Engaging the public in the understanding of science is key. “What is science?” Science is about doubt and understanding, not facts. Science is really a process of discovery through investigation. Politicians and the public however want certainty, clarity and no doubt. Yet, science provides a profound understanding of the world around it.

Lynne-Marie Postovit stated that the public can easily access information today. Scientists need to be one of these voices.

Marc Carrier highlighted the value of working in groups to advance health research and building networks that engage young researchers.

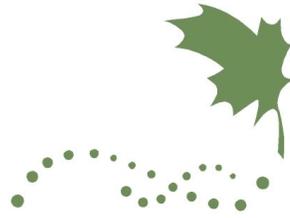
Carolina Ilkow called for better training and mentorship for young investigators, especially those engaging in team science while trying to set up and run their own lab. Skills built during training and working in large teams does not translate how to navigate the funding system and be successful as an independent investigator. The best examples of translation of basic research happens when researchers work together.

While the session ended, the conversations continued in anticipation of **Dr. Naylor’s** Friesen Prize Lecture.

There are eager receptors for the knowledge generated by science out there, we just need to connect and engage with industry, with politicians, and with the public. Canada has one of the highest science literacy rates in the world (<https://www.scienceadvice.ca/reports/science-culture-where-canada-stands/>). We just need to tell our stories because they are good ones and the public are an eager audience.

Reinhart Reithmeier, Rapporteur

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