

# REALIZING THE CANADIAN ADVANTAGE IN THE HEALTH AND LIFE SCIENCES

A Submission to Canada's Science Review

Submitted by HealthCare*CAN*  
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## Executive Summary

HealthCareCAN is the national voice of patient care organizations in Canada including the majority of the country's research hospitals. We thank the Government of Canada and the Science Review Panel for conducting this much needed review and for acknowledging the unique role of research hospitals.

There are approximately 40 research hospitals in Canada. They are intimate partners and staunch supporters of every medical and doctoral university in the country. They have a tripartite mandate of care, training, and research; house a \$2.6B dollar research enterprise; and 60,000 research-related staff, scientists and students, including some of the largest contingents of discovery scientists in the sector.

In this submission, we answer the questions posed by the Panel referencing three common themes. The first is strategic coordination. There is a large diversity of science programs and funders in the health and life sciences, and a clear vision along with coordinating mechanisms are needed to better leverage existing resources. The second is strategic investment. Are we internationally competitive for both research and innovation? The third is strategic policy. The health and life sciences needs a 'whole of government approach' and research hospitals need to be able to take their place alongside universities, colleges and businesses if we are to truly maintain our tradition of success and achieve the Canadian Advantage in the health and life sciences. Our specific recommendations are the following:

**Recommendation 1:** Reduce pressure on the current CIHR budget by implementing an Innovation Fund that would cover the more applied aspects of the CIHR Act, without creating new machinery.

**Recommendation 2:** Create a more explicitly inclusive research ecosystem that rewards excellence wherever it is found, allowing research hospitals to apply directly to all federal research and innovation funds and programs, and explore a credentialed research hospital system.

**Recommendation 3:** Provide an immediate increase of \$120M per year to the A base budget of CIHR (in addition to the \$30M committed in Budget 2016), with the view to restoring the lost ground since 2010.

**Recommendation 4:** Reconsider Government's current practice of formulaic adjustments to the base budgets of the tri-council granting agencies in favour of a more integrated needs-based approach.

**Recommendation 5:** Review CIHR governance to ensure that there are adequate checks and balances in the decision making and a closer relationship to the broader community including research hospitals

**Recommendation 6:** Implement the Chief Science Officer role with sufficient authority to oversee the development of a Science Strategy and coordinating and integrating mechanisms across funding bodies.

**Recommendation 7:** Implement (1) a strategic coordination mechanism and (2) a whole of government approach to the health and life sciences in part through a health and life sciences roundtable.

**Recommendation 8:** That the federal government undertake a funding flow study to understand how its granting council dollars are being leveraged.

**Recommendation 9:** Revisit the current Federal Support for Research Programs to assess an internationally competitive coverage rate of indirect costs and allow research hospitals to apply directly.

**Recommendation 10:** Restore a healthy sustainable CIHR budget and explore implementation of the recommendations stated by the Association of Early Career Health Researchers to assist this group.

**Recommendation 11:** Ensure that there is "right sizing" of the university-granting council relationship when it comes to the intake, training and incentive structure for graduate students and post docs.

**Recommendation 12:** That universities and granting councils engage in right sizing the system discussions to ensure that peer review success rates are reasonable and that pilots be developed to allow peer review for novel and more risk-laden research endeavours.

**Recommendation 13:** Encourage greater strategic and operational coordination between CFI and the granting councils; consider innovation conducted using traditional technologies as a fundable area of infrastructure; and explore the possibility of extending maintenance coverage beyond five years.

## Realizing the Canadian Advantage In the Health and Life Sciences

### Introduction

HealthCareCAN is the national voice of patient care organizations in Canada including the majority of the country's research hospitals. We thank the Government of Canada and the Science Review Panel for conducting this much needed review and for acknowledging the unique role of research hospitals in its mandate, particularly given the background of the panel. We begin this submission with some introductory remarks and will then answer each of the questions directly.

First, we applaud the key questions driving this timely review. These questions express many of the items we have asked the Government to consider in preceding submissions, including our submission to the Review of Federal Support to R&D (2011)<sup>1</sup>, the Update to Canada's Science and Technology Strategy (2014)<sup>2</sup>; the Federal Healthcare Innovation Advisory Panel (2015)<sup>3</sup>, and the most recent consultation on CFI Funding Architecture (2015)<sup>4</sup>. Thank you for squarely addressing them.

Next, we would like to share with you a little bit about fundamental research in a research hospital setting. There are approximately 40 research hospitals in Canada. They are intimate partners and staunch supporters of every medical and doctoral university in the country. Many of them have multiple overseas collaborations.<sup>5</sup> Research hospitals have a tripartite mandate of care, training, and research and collectively house a \$2.6B dollar research enterprise.<sup>6</sup> When it comes to the health and life sciences, many research hospitals have some of the largest contingents of discovery scientists in the country. They are noted as the most collaborative research sector in the economy and the only group of innovation leaders showing net growth in 2015-2016.<sup>7</sup>

Research hospitals are where the promise of health research meets possibilities for patient care. As one Vice President of Health Research put it, *"they are models of science as 'team sport' bringing together multidisciplinary teams of researchers to solve the most fundamental challenges to the human race. These teams use and even more importantly conceive and develop all the weapons in the modern health sciences from molecular genetics and genomics to model organizations, first in human trials and health system research"*. They are also the practice homes of clinician scientists cross trained in basic science and in clinical care. As another Vice President of Health Research put it, *"Research hospitals are the best possible marriage between understanding the pressing needs of health care and creating the innovation that is required to meet these challenges. Research Hospitals have the unique benefit of having a direct hand in patient care intertwined with a culture of research and innovation"*. Research hospitals bridge the biomedical and biopsychosocial translation of research into practice. International peer reviewed research on Science Policy is also acknowledging this unique role.<sup>8,9</sup> Finally, between 2012 and 2016, research and innovation successes from Canada's Research Hospitals were featured close to 6,000 times in reputable print media.<sup>10</sup>

Given our role in the health and life sciences research ecosystem, we will provide a perspective that focusses primarily on health research; what happens at its boundaries; and the programs most relevant to this area. With this, it is our pleasure to offer comment on the questions the panel is posing.

## I. Funding of Fundamental Research

*1.1 Are granting councils optimally structured and aligned to meet the needs of the current research community in Canada? Are the current programs the most effective means of delivering the objectives of these organizations? And are they keeping pace internationally?*

To the central question regarding the effectiveness and impact of the granting councils in supporting excellence in fundamental research and whether their approach, governance and operations have kept pace with an ever-changing domestic and global research landscape, our response is a qualified “no”.

When it comes to health research, the integration of basic, clinical, health services and population health research through the evolution of the Medical Research Council to the Canadian Institutes of Health Research was hailed as a success. The four pillars of health research form a continuum and are best addressed together. Therefore, CIHR as a model for a granting agency for health research is viewed very positively. However, problems of funding, peer review, governance and integration exist within CIHR and at its interfaces with other granting councils, programs and agencies.

**Breadth of the *CIHR Act* relative to budget:** According to the *CIHR Act*, the mandate of our country’s premier health research granting council is to “*excel in the creation of new knowledge and its translation*”. However, its current \$1 billion annual budget is not sufficient to engage in both of these mandates. Accordingly, we support the Federal Advisory Panel on Healthcare Innovation’s proposition that the scaling up and spreading of new ideas is a separate issue from the generation of research and thus we support its call for a Canadian Healthcare Innovation Fund. In our view, this fund could: (1) repatriate all of the current CIHR budget to the institutes, researchers, and open grants programs by creating a separate pot of funding for implementation related activities; (2) incentivize and match funding for provincial knowledge to practice pathways and programs; (3) explore a credentialed research hospital system for those organizations taking a leading role in research, education and innovation endeavors, and (4) create a Canadian Health Innovation Network (CHIN).

**Recommendation 1:** Reduce pressure on the current CIHR budget by implementing an Innovation Fund that would cover the more applied aspects of the *CIHR Act*, without creating new machinery.

**Leveraging translational capacity:** A briefing document from CIHR noted the following, “*The Canadian research community is globally acknowledged for its depth and breadth of expertise and regularly outperforms other countries in terms of scientific impact in key areas (e.g., clinical research, genomics), ranking 6th by country in the number of most highly cited researchers. It continues to lag in the translation of new knowledge into changes in health care practice and often forgoes important international opportunities due to a lack of funding flexibility. Moreover, health research investments by private industry in Canada are on the decline*”.

As the Science Review Panel considers the effectiveness of investments in fundamental science, now may also be the time to consider our translational infrastructure. In this context, we define translational research both as “*the process of bidirectional transfer of knowledge between basic work in the laboratory and elsewhere with that of the person, in health or disease*”<sup>11</sup> and more broadly. The question is whether we are investing enough in the receptor capacity for the translation of research.

Our country currently has no national policy and funding framework for research hospitals despite their significant role in the generation and translation of health research. Instead, research hospitals are



acknowledged and/or included on a “hit and miss” basis depending on the knowledge of the incumbent policy leader. Consider for example that while research hospitals can apply directly to CIHR, they must go through universities when applying to most other federal research and innovation agencies and programs such as to the Canada Foundation for Innovation, the Federal Research Support Fund, the Canada Research Chairs funds, MITACs and others. In some federal research and innovation funds, like the Canada First Research Excellence Fund and the Knowledge Infrastructure Program, research hospitals were explicitly precluded from applying due to criteria such as “post-secondary degree granting institutions only”.





More recently, while we were delighted that Budget 2016 recognized the role of research hospitals and explicitly welcomed them to apply to the Strategic Investment Fund, due to the time pressures associated with a stimulus fund, the administrative requirements asked for a university president signature on an otherwise independent research hospital application. This is difficult to ask or expect in a competitive process. To be clear, we are not at this point asking for a special privilege, but for a concept similar to what the UK Science Review concluded: “Invest in excellence; wherever it is found”.

As such, we would like to see a policy and funding framework that systematically embeds research hospitals alongside the universities in the federal research and innovation ecosystem. Universities, colleges and businesses cannot succeed in the health and life sciences without Research Hospitals; just as we are equally dependent on their success. HealthCareCAN is currently exploring indicators that will help to better explain and demonstrate the unique role of research hospitals in Canada. The designated cancer centre model in the US is also worth considering whereby a designated set of organizations are funded to provide infrastructure for research and innovation. Funding is contingent on performance.<sup>12</sup>

**Recommendation 2:** Create a more explicitly inclusive research ecosystem that rewards excellence wherever it is found, allowing research hospitals to apply directly to all research and innovation funds and programs, and explore a credentialed research hospital system.

**Are we keeping up internationally:** A challenge shared by research hospitals and universities alike is the considerable strain being experienced by the research enterprise. Canada’s gross expenditures on R&D (GERD) intensity declined from 1.96% in 2006 to 1.62% in 2013. Our global ranking fell from 16th to 24th out of 41 countries. Table 2 shows Canada’s spending on health research (from all sources) compared to other comparator countries.

**Table 2. How does our Health Research spend compare to those of our peer countries?<sup>13</sup>**

Region	Health Research Expenditure	Total Health Expenditure	Health Research Expenditure / Total Health Expenditure
 United States	\$ 130,383,000,000	\$ 2,900,000,000,000	4.5%
 Australia	\$ 5,500,000,000	\$ 130,000,000,000	4.2%
 United Kingdom	\$ 8,500,000,000	\$ 235,000,000,000	3.6%
 Canada	\$ 6,400,000,000	\$ 214,900,000,000	2.9%

In addition, when it comes to granting council budgets, the Government’s current practice is to apply a funding formula for additional monies in the ratio of 1\$ for CIHR; \$1 NSERC; \$0.50 for SSHRC. This

practice is an anachronism. Our proposal is that CIHR is in fact a different type of agency. CIHR is the only granting agency which through an Act of Parliament is required to work with the healthcare system. This is complex and costly. It is also the only agency dealing with an area of research where deliberate efforts must be made in translation and where often invasive research is conducted with animals and human subjects, with all the ethical issues and safeguards that must be involved.

**Recommendation 3:** Provide an immediate increase of \$120M per year to the A base budget of CIHR (in addition to the \$30M already committed in Budget 2016), with the view to restoring the lost ground due to zero increases since 2010.

**Recommendation 4:** Reconsider the Government’s current practice of formulaic adjustments to the base budget of each of the tri-council granting agencies in favour of a needs-based integrated approach.

**CIHR Governance:** Finally, in addition to mandate and resources, a particular issue for further reflection is one of governance at CIHR. Good governance is about alignment of authorities and accountabilities. Recent events associated with the historic changes in the grant review process and the launching of new programs point to a lack of checks and balances. Since the inception of the funding and peer review reforms, there have been expressions of concern about the speed at which the reforms were being implemented and the absence of contingency plans or change management strategies. It is perplexing that nearly three years later, 1300 scientists had to take a fairly aggressive but understandable and predictable stance, using mass media to get their point across to CIHR and the Government. How did it get this far? Where were the checks and balances in the governance structure? Fortunately, CIHR itself is exploring many of these issues proactively.<sup>14</sup> More generally however, the mandate and membership of CIHR’s governing council needs to be reviewed with a view to greater connection to the scientific community, more equitable representation between hospitals and universities, and a more deliberate and fail safe approach in the decision-making responsibilities of Board and leadership.

**Recommendation 5:** Review CIHR governance to ensure that there are adequate checks and balances in the decision making and a closer relationship to the broader community including research hospitals

**Chief Science Officer:** The problems that occurred at CIHR, concerns about the amount of research funding, as well as the concerns of federal scientists, all support Minister Duncan’s call for a Chief Science Advisor type role. We would suggest that to be effective, the role must have sufficient clout and authority and should be conceptualized as a Chief Science Officer of Canada, rather than an advisor. He or she should chair the tri-council and report to the Minister of Science, the Minister of Health and the Minister of Innovation, Science and Economic Development. He or she should have responsibility for developing and implementing a Science Strategy for Canada. He or she should also have authority (working through and with granting councils) to free up strategic investment funds to help bridge the two valleys of death in the research to innovation ecosystem.

**Recommendation 6:** Implement the Chief Science Officer role with sufficient authority to oversee the development of a Science Strategy and coordinating and integrating mechanisms across funding bodies.

*1.2. Are granting council programs and structures sufficiently flexible to reflect and accommodate internationalization of research? Are granting councils accommodating the full range of research areas; multidisciplinary research and new approaches from traditional knowledge to ore open collaborative forms of research? If not, what steps need to be taken?*

At the interface between CIHR and other tri-council agencies, and the panoply of funding agencies and programs influencing the health and life sciences, there are also issues that must be addressed. With

the increased number of programs, agencies, departments, partners, and recipients, decisions taken in one part of the research ecosystem will have reverberations in other parts of the ecosystem that may never have been adequately considered.

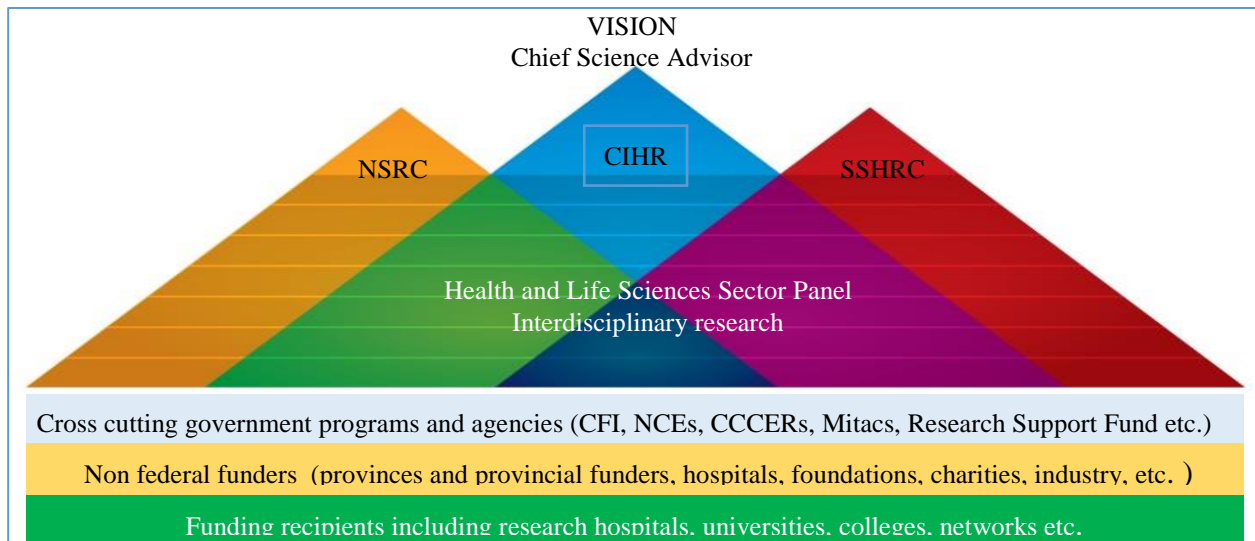
In this regard, much as the Jenkins’ Panel felt Canada needed a “whole of government” approach to innovation, so too do we believe that Canada needs a “whole of government vision coupled with a sector-specific strategy to leverage up the Canadian advantage in the health and life sciences.<sup>15</sup> There are several reasons for this, including: (1) successive federal Science, Technology and Innovation policy statements have recognized our potential for global leadership in the health and life sciences; (2) the success of Federal Support to fundamental science in this area impacts health, and involves human subjects; (3) the success of the health research enterprise is dependent on a diversity of organizations including hospitals, universities, colleges, and industry; there are many funders who partner with the federal government; and (4) there are distributed Ministerial accountabilities. Finally and perhaps most importantly, with the evolution of interdisciplinary research, research projects and early career investigators can fall through the cracks of the eligibility for funding from each council.

If we were to strike such a high-level coordinating mechanism or a Health and Life Sciences and Innovation Council, we’d have to begin with a clear and compelling vision on how best to leverage the Canadian science advantage to compete globally. This would have to be coupled with a clear and more consistent alignment of authorities, responsibilities, and accountabilities across and between federal research councils, institutes, and agencies. This includes governance, oversight and leadership. It includes, as noted above, a robust job profile for the Chief Science Officer of Canada

CIHR, NSERC and SSHRC also need to go beyond the traditional tri-council meetings of senior staff and identify mechanisms through which interdisciplinary research can be addressed and appropriately reviewed. Similarly, while acknowledging efforts to date, capital and operating grant opportunities need to be more effectively coordinated to create new technologies, equipment and models of care.

We have met many early career investigators who have won million dollar equipment grants but can’t find the funds to operate them. Granting councils must ensure they are not competing with their applicants for limited matching industry, provincial or philanthropic dollars. Our indirect costs and technology transfer programs must be examined along international standards. Finally we need to correct operational idiosyncrasies frustrating health research efforts (e.g. false dichotomies between care and research, some tax policies, etc.).

**Figure 3: Proposed coordination mechanism for better integration across the health and life sciences**



How do we achieve this? There are at least two possibilities. The first possibility is an informal ‘boundary spanning solution’, whereby staff and review committees from each of the granting councils and funding programs are cross trained and move seamlessly at the boundaries of the granting councils as needed. There is no new administrative body, but the coordination could be overseen by the Chief Science Advisor. Figure 3 provides an illustration. The second possibility is a more formalized coordinating mechanism such as the UK’s Research Councils of the United Kingdom (RCUK) which coordinates the UK’s multiple granting councils. For example, RCUK has a Cross-Council Funding Agreement that applies to all responsive-mode (investigator led) research proposals submitted to any of the seven Research Councils to help ensure that multidisciplinary research does not fall through the cracks.<sup>16</sup>

If we can achieve strategic coordination, we believe that we will facilitate the opportunity to be more competitive and collaborative internationally. Currently, when there is an international opportunity for Canadian scientists, we need to “cobble” together an offering that makes us competitive. This can often mean waiting for application cycles. We believe that a by-product of strategic coordination will be the ability to undertake a better selection of mission driven activities for which funding can be leveraged quickly and when international opportunities knock.

**Recommendation 7:** Implement (1) a strategic coordination mechanism and (2) a whole of government approach to the health and life sciences in part through a health and life sciences roundtable.

*1.3. Is there an appropriate balance between funding elements across the research system, i.e. between elements involving people and other direct costs, operating costs and indirect costs? What are best practices for adjusting these?*

**Balance of funding elements:** An appropriate balance of funding elements would suggest a deliberate balance of funding elements. The latter has certainly been lacking. The government does not currently fund the full costs of research. As such, another benefit of strategic coordination across programs and agencies will be better information, which we believe will lead to better balance. Currently we have a patchwork quilt. The full costs of research are poorly understood. Researchers and organizations cobble together revenue streams. Funding may flow to one partner while expenses are paid by another. Our propensity towards matching fund requirements often puts agencies and applicants in competitive stances for the same dollars. In some respects, the panoply of funding agencies and programs may be creating accounting issues that are intractable. The Science Review Panel may wish to recommend that an accounting firm undertake a study of health research to truly understand funding flows across all funders, recipients and partners. Salaries, operating dollars, equipment, equipment maintenance, and indirect costs are all covered from different sources. This is necessary to help the Government understand how federal investments are being leveraged. Anecdotally, we know that hospital research institutes and their foundations are covering an increasingly greater proportion of investigator salaries.

**Recommendation 8:** That the federal government undertake a funding flow study to understand how its granting council dollars are being leveraged.

**Indirect Costs:** Canada’s Indirect Costs program, renamed Research Support Fund, has been steadily increasing, but it is still severely underfunded compared to international indirect costs programs. A comparison conducted by Canadian Association of University Business Offices shows that the Canadian Indirect Costs program typically provides reimbursement at 20% of direct costs. Indirect costs are on average between 40 and 60% of direct costs. In the UK, US, and AU this percentage is much higher.<sup>17</sup>



While Budget 2014 recommended that the Government undertake a study to identify the correct level of indirect cost reimbursement, we are unclear of the results or the resulting actions.<sup>18</sup> In addition, the administration of Canada's federal support to research program may be somewhat flawed. Instead of acting as an indirect costs program it is actually a quasi-capacity building program which aims to level the playing field across universities with different size infrastructures by offering indirect cost coverage on a sliding scale. This leaves organizations with a large amount of Tri-council funding with a lesser percentage of indirect cost coverage than organizations with a smaller amount of grant funding. While this may reflect an equalization aspiration, the fund itself is not big enough to truly build capacity nor is it being fully leveraged to cover indirect costs.

Finally, research hospitals are not able to receive direct reimbursement from this program and must go through the universities. Again, this reflects an outdated conceptualization of the research and innovation ecosystem. Our view, one that is hopefully shared by our university partners, is that research hospitals are equal and essential partners. It is time to level the playing field.

**Recommendation 9:** Revisit the conceptualization of the current Federal Research Support Fund to assess the appropriate and internationally competitive coverage of indirect costs and allow research hospitals to apply directly.

*1.4. Are students, trainees, and emerging researchers including those from diverse backgrounds, facing unique barriers within the current system and what can be done to address those barriers?*

**Students, Trainees and Emerging Researchers:** HealthCareCAN was pleased to help the Association of Canadian Early Career Researchers (ACECHR) establish their association in 2016. However, the need for this association speaks to the serious challenges this group has been having and the threat to the future of our health research endeavour. According to a survey by ACECHR, early career investigators (ECIs), defined as those within the first 5 years of their independent careers, have been particularly hard hit. ACECHR reports that between 2008-2009 and 2014-2015, CIHR funding awarded to ECIs declined by 38%. In an informal survey they ran between March 17 and March 24, 2016 they received 143 responses from verified early career health researchers in Canada who hold competitive positions and have a history of research success. They found that 84% of the respondents who collectively employed 204 staff and supervised 909 trainees, were delaying starting potentially impactful research, scaling back their research, and are losing competitiveness internationally. Some of them were laying off staff and nearly half were considering leaving research, academia, or Canada.<sup>19</sup>

To address the needs of early career health researchers, the first step must be to restore the health of the CIHR budget (another estimated \$120M per annum). As ACECHR has eloquently expressed 'successful early career health researchers become mid-career health researchers'. We must also explore strategies that help to ensure that early career researchers are not disadvantaged. This includes looking at the definition of early career health researchers and ensuring that assessment criteria include life stage issues for both men and women. In some cases, it may be less a matter of the number of years since becoming a faculty member, than what activities have taken place during that time period. ACECHR has also recommended that CIHR take measures to ensure that success rates for the early career investigator group match other groups and that success rates be looked at as a percentage of funding rather than applications.

In terms of the diversity of backgrounds, we believe that it would be important for the granting councils and the universities to work together on right sizing the system so that there is a better match between supply and demand of graduates and grant funding programs. Our universities and granting agencies select impeccably well for traditional candidates headed for a career in academia. However, there is only room for 10% of those graduates. We need to modernize doctoral and post-doctoral award programs so that we do not end up in situations where students are “incentivized” towards certain experiences in order to be an outstanding candidate for a granting council award that can go no further than their graduation day because it is mismatched to industry needs. The Institute of Health Services Policy Research at CIHR held an excellent session on this issue earlier in the spring.

**Recommendation 10:** Restore a healthy sustainable CIHR budget and explore implementation of the recommendations stated by the Association of Early Career Health Researchers to assist this group.

**Recommendation 11:** Ensure that there is “right sizing” of the university-granting council relationship when it comes to the intake, training and incentive structure for graduate students and post docs.

*1.5. Are existing peer review processes rigorous fair and effective in supporting excellence across all disciplines? Are they rigorous, fair and effective in supporting riskier research and proposals in novel and emerging research areas or multidisciplinary, multinational areas?*

The panel is likely aware of recent issues with the reforms of the peer review process at CIHR and the need to maintain face to face peer review. We will not discuss this further here other than to say that we appreciate the researchers, the Minister of Health, CIHR and the subsequent committee chaired by Dr. Kubes who either called for, enabled, or followed up on actions to improve the situation. As we have suggested previously, we believe that improved governance at CIHR with checks and balances for major decisions; closer interactions with the full range of stakeholders in the community; and a healthier resource base, will prevent this type of situation from recurring in the future.

In regard to peer review issues more generally, there are a few issues for consideration. First, the administration and operations of the peer review process for reviewers are cumbersome. Even printing applications is problematic. We would encourage administrative and technological considerations for simplifying the process even before any content changes. This is important as the process takes a long time, we need people to keep volunteering, and additional administrative problems are not helpful.

Second, our peer review system, possibly because of its rigour is predictable and selects for traditional candidates. While we strongly support a clear definition of excellence, traditional candidates make up only about 10% of the people we are training to be independent researchers. This requires two types of responses. First as noted earlier, granting councils need to coordinate with the universities about the number of graduate students that the universities are taking in and/or the universities making clear to graduate students about their chances of funding from the granting councils. This is about right sizing the system. Second, to get at the more novel and/or risk laden proposals, we would support the development of pilots that would allow for consideration of risk and novel proposals.

**Recommendation 12:** That universities and granting councils engage in right sizing the system discussions to ensure that peer review success rates are reasonable and that pilots be developed to allow peer review for novel and more risk-laden research endeavours.

## 2. Funding of facilities/equipment

*2.1 Is the Canada Foundation for Innovation optimally structured to meet the needs of the current research community in Canada? What are the strengths and weaknesses of this organization? What is the appropriate federal role in supporting infrastructure operating cost and how effective are current mechanisms in fulfilling that area?*

We believe that overall CFI's program architecture is meeting its four goals: responding to the needs of the research community; serving a spectrum of organizations; having a simple architecture; and coordinating with tri council funding and programs. Overall, in our discussions with the Vice Presidents of Health Research from across the country's research hospitals and academic regional health authorities, we have heard that CFI's programs are important and well-run. We do not advise major changes but rather additional considerations. We again commend the Canada Foundation for Innovation (CFI) for conducting this consultation with the community. CFI is a well-regarded and respected institution. Having said that, there are areas where we have suggestions for further improvement.

First, the issue of coordination with the Tri Council funding programs must be strengthened, particularly for new investigators. We have described in Figure 3 a proposed coordinating mechanism. In many cases, the availability of equipment is foundational to a program of research. This is particularly important for new investigators. Second, CFI is one of the only sources for the funding of equipment. We encourage CFI to consider that innovation exists not just in new technologies, but in the innovative use of existing and/or more traditional technologies. We also support increasing the minimum amount of this fund, to maintain and increase its purchasing power given the rising cost of equipment.

In terms of the Infrastructure Operating Fund at CFI, we have appreciated CFI's understanding and responsiveness to the need for funds that allow for maintenance of equipment. We would encourage further consideration of how we can extend maintenance on equipment that is highly used, beyond the grant period, but not necessarily in need of full replacement. For example, while maintenance is often covered for five years, for many pieces of equipment, an additional five years of maintenance would serve instead of the full purchase of a replacement. CFI could institute a competitive review process for equipment that is highly used. We would also like CFI to consider mechanisms through which it might engage in the maintenance of highly used research equipment that may not be originally funded by CFI (for example, an MRI that is being highly used for extremely innovative research purposes, but for which funding was generated by a foundation). Again, CFI would have to develop a competitive process for this. If this is an area of exploration, members of the HealthCareCAN VPRs Roundtable would likely be available to assist CFI in considering how this might work.

Third, while research hospitals/academic regional health authorities and CFI have a very positive and productive relationship, the application rules for research hospitals/academic regional health authorities in some parts of the country appear to, or are understood to, preclude some of these organizations from applying directly to CFI. We recommend that research hospitals/academic regional health authorities be able to apply directly for CFI funding.

**Recommendation 13:** Encourage greater strategic and operational coordination between CFI and the granting councils; consider innovation conducted using traditional technologies as a fundable area of infrastructure; and explore the possibility of extending maintenance coverage beyond five years.

*2.2 What are best practices (internationally/domestically) for supporting big science (including, inter alia, international facilities and international collaboration)?*

The Canadian Science Policy Conference and CFI recently brought together experts from Big Science bodies in Canada, the US, and the UK to discuss possible directions for this area. Their conclusions were that Canada needs a vision and roadmap for big science if it is to maximize these high cost and lengthy endeavours; that funding for big science is the responsibility of both countries as international collaborators and the public sector; that a big science model should be fair and flexible and bring together the granting councils; that governance and accountability are key since scientific, human resource, financial and business planning will be required; and that a user facility should be both host and participant to ensure excellence. Again, one of the benefits of strategic coordination across programs and councils will be the ability to better identify mission driven science.

*2.3 Many requests for government support for research are not tied to the cycles of the four major research agencies, but they have economic or competitive relevance. How can we ensure that the Government has access to the best advice about funding these projects in the future?*

We believe that it is important for Canada to encourage researchers to participate in international research endeavours and to have representatives who can use their experience to provide Canada with advice. We also believe that the establishment of a health and life sciences roundtable will assist the government in obtaining the best advice about funding these types of initiatives in our domain.

### **3. Funding of Platform Technologies**

*3.1 What types of criteria and considerations should inform decisions regarding whether the Government should create a separate funding mechanism for emerging platform technologies and research areas of broad strategic interest and societal application?*

As has been discussed throughout this submission, strategic coordination across the range of funders is crucial to achieving a robust science system in Canada. We do not necessarily believe that separate funding mechanisms should be developed for emerging platform technologies, but that these should be co-located within existing agencies, programs and funds that are strategically coordinated. The problem with developing new funding mechanisms is that it takes time and resources to develop the adjudication and application process. Ironically, a successful funding mechanism for emerging technologies will likely render the technology mainstream and have well designed processes that would be wasteful to shut down but as such creating additional overhead in the system. For example, as one Vice President of Health Research suggested, Genome Canada's extraordinary success in building DNA sequencing capacity has rendered this mainstream. Could an organization like Genome Canada, with already developed adjudication and application processes for big science projects be repurposed for special technologies?

Similarly, as acknowledged by CFI in its consultation document on CFI fund architecture, it is still too early to understand the full function and benefit of the cyberinfrastructure fund at CFI. There are certainly important cyberinfrastructure initiatives that need funding. However, the consideration is not only equipment but also personnel to manage, administer, and operate this equipment. As such, we query why the cyberinfrastructure fund must be segregated from other funds and whether cyberinfrastructure projects may fit in other funds as well.

*3.2 Today's emerging platform technology may rapidly become a standard tool used tomorrow by a wide variety of researchers. If such technologies are initially given stand-alone support via a dedicated program or agency what factors should inform decisions on when it would be appropriate to mainstream such funding back into the granting councils?*

As previously discussed, it would be our preference that funding for emerging platform technologies be administered within existing agencies rather than to create a new one for this purpose. In combination with a health and life sciences coordinating table, advice could be provided that would guide this decision. However, it would underscore the importance of strategic and operational coordination.

## Concluding Remarks

We appreciate the thoughtfulness of the questions that the Science Review Panel has conceived for this consultation. They are as important as the responses. While we have answered a diversity of questions, three common themes underpin our responses. The first is strategic coordination. There is a large diversity of science programs and funders, particularly in the health and life sciences, and we believe that coordinating mechanisms, beginning at the level of strategy but continuing into operations are needed to better leverage existing resources. This will reduce idiosyncrasies that frustrate the research endeavour. It will open up possibilities for greater collaboration nationally and internationally and for emerging technologies and opportunities. In terms of strategic investment, we believe it is necessary to restore the health of the federal granting council for health research; right-size the system, remain internationally competitive, and invest in people, particularly those that are entering the system at a difficult time and/or who bring a non-traditional skill set that would prove valuable to novel types of research and translation. Finally, in terms of strategic policy, we propose that the health and life sciences brings a unique set of consideration and circumstances, sufficient enough to merit a strong vision and whole of government approach to the sector. We also suggest that research hospitals need to take their place alongside universities, colleges and businesses, if we are to truly maintain our tradition of success and achieve the Canadian Advantage in the health and life sciences.

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<sup>1</sup> Association of Canadian Academic Healthcare Organizations (2011). "Supporting Innovation as Strategy... From Bench to Bedside to Business". [http://rd-review.ca/eic/site/033.nsf/vwapi/sub119.pdf/\\$file/sub119.pdf](http://rd-review.ca/eic/site/033.nsf/vwapi/sub119.pdf/$file/sub119.pdf)

<sup>2</sup> HealthCareCAN (2014). "Moving Forward in Science, Technology, and Innovation: Optimizing Opportunity and Execution in the Health & Life Sciences Sector: A response to the Science and Technology Consultation "Seizing Canada's Moment Moving Forward in Science, Technology and Innovation". [http://www.healthcarecan.ca/wp-content/uploads/2015/10/MovingForwardinScience\\_EN.pdf](http://www.healthcarecan.ca/wp-content/uploads/2015/10/MovingForwardinScience_EN.pdf)

<sup>3</sup> HealthCareCAN (2015). "From Invention by Accident to Innovation by Design: Collaborating to Improve Health and Compete Globally: A submission to the Federal Advisory Panel on Healthcare Innovation from Canada's Leading Healthcare Organizations". [http://www.healthcarecan.ca/wp-content/uploads/2015/10/InventionAccidentInnovationDesign\\_EN.pdf](http://www.healthcarecan.ca/wp-content/uploads/2015/10/InventionAccidentInnovationDesign_EN.pdf)

<sup>4</sup> HealthCareCAN (2015). "Response to Canada Foundation for Innovation Consultation on Program Architecture". <http://www.healthcarecan.ca/wp-content/uploads/2015/03/VPR-HealthCareCANResponsetoCFIConsultationNovember302015.pdf>

<sup>5</sup> For example, University Health Network has operations in Kuwait and Shanghai among others. McGill University Health Centre has collaborations in more than 46 countries.

<sup>6</sup> Based on the aggregated total of HealthCareCAN member research budgets as posted in the public domain.

<sup>7</sup> Innovation, Science and Economic Development Canada (2014). "Seizing Canada's Moment: Moving Forward in Science, Technology and Innovation 2014". [https://www.ic.gc.ca/eic/site/icgc.nsf/vwapi/Seizing\\_Moment\\_ST\\_I-Report-2014-eng.pdf/\\$file/Seizing\\_Moment\\_ST\\_I-Report-2014-eng.pdf](https://www.ic.gc.ca/eic/site/icgc.nsf/vwapi/Seizing_Moment_ST_I-Report-2014-eng.pdf/$file/Seizing_Moment_ST_I-Report-2014-eng.pdf)

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