

MOVING FORWARD IN SCIENCE, TECHNOLOGY, AND INNOVATION OPTIMIZING OPPORTUNITY & 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”*

Submitted on behalf of the Association of Canadian Academic
Healthcare Organizations and the Canadian Healthcare Association
(newly merged as of January 1, 2014)

February 7, 2014

MEMBERS OF ACAHO-CHA



EXECUTIVE SUMMARY

On January 1, 2014, the Association of Canadian Academic Healthcare Organizations (ACAHO) merged with the Canadian Healthcare Association (CHA). The resulting organization, currently referred to as the newly-merged ACAHO-CHA, is now the only national voice of different types of healthcare organizations in Canada. It also remains the national voice of the country's academic healthcare organizations.

The newly merged ACAHO-CHA commends the Federal Government's commitment to updating its Science, Technology and Innovation (ST&I) Strategy, *Mobilizing Science & Technology to Canada's Advantage*. To update it, we recommend a focus on sector specific approaches, execution and coordination at sector specific levels, especially in health and life sciences. In response to the consultation questions, we recommend:

Recommendation 1: Pursue the Federal Research and Development (R&D) Review's recommendation to establish a clear voice for innovation federally as well as a Coordinating Committee/Sector Panel for the Health and Life Sciences Sector. The latter would engage leadership from research institutes, funding agencies, industry, provinces and others to monitor and optimize coordination of funding models, investments and policy.

Recommendation 2: Establish a federal policy space that would allow the Federal Government to work with academic healthcare organizations and the provinces on the re-launch of the \$2 Billion research and innovation sector that exists within these unique healthcare organizations.

Recommendation 3: Pursue the Federal R&D Review recommendation on strategic procurement & venture capital by (a) exploring programs like the US's Small Business Innovation Research Program and the Small Business Technology Transfer Program; (b) aligning organizational, provincial and federal procurement policies to support Canadian jobs, products, and companies while meeting safety and patient care needs;

Recommendation 4: Support and protect health researchers by (a) providing a contingency fund to CIHR earmarked for gaps that become evident as the funding reforms are implemented; (b) establish a mechanism for addressing existing recommendations to improve career paths for clinician scientists and other researchers in Canada (c) increasing the amount of funding available through the granting councils.

Recommendation 5: Strengthen the commitment to basic science by: (a) ensuring that the Federal Granting councils have sufficient budgets to retain promising individuals and ideas; (b) investing in basic science as the source-pool of other research, innovation, commercialization, and patient oriented research endeavours to remain competitive as the US and Europe escalate investments; (c) leveraging academic healthcare environments as platforms for basic science and patient oriented research (d) maintaining support for CFI.

Recommendation 6: Modernize the amount of funding available as well as the structures and strategies through which different types of health research transform health by: (a) doubling the CIHR and Tri-Council budgets, (b) implementing an Innovation Fund intended to pull innovations into the health system, and (c) re-exploring the allocation and mechanisms for funding different types of research to ensure a healthy pipeline.

Recommendation 7: Align tax, health, science, technology and innovation policies by increasing the GST rebate on all eligible purchases made by publicly funded, not-for-profit institutions in the health sector to 100% (like municipalities) and offer the same tax treatment to all health research, as the sector itself.

In conclusion, Canada's 2007 ST&I Strategy provided a solid foundation. We now need sector specific strategies, particularly in health and life sciences; we need to address difficult issues such as the amount and allocation of funding and how we coordinate research and innovation policy with its translation in the field. A health and life sciences coordinating committee of research institute leaders, government, industry and other funders to monitor and coordinate investments and reforms is needed. We also need to utilize the full range of innovation leaders and contributors in the research ecosystem. The newly-merged ACAHO-CHA is prepared to work with the government to help ensure that research and innovation manifest their full contributions to our health and economy. Per the consultation paper, this is indeed "Canada's Moment". We can seize it together.

**MOVING FORWARD IN SCIENCE, TECHNOLOGY, AND INNOVATION
OPTIMIZING OPPORTUNITY & EXECUTION IN THE HEALTH & LIFE SCIENCES SECTOR
RESPONSES TO THE PANEL'S QUESTIONS**

1. Building on the advice provided by the Expert Panel on Federal Support for Research and Development, what more can be done to improve business investment in R&D and innovation?

The Expert Panel on Federal Support for Research and Development (Federal Review of R&D) recommended the establishment of a clear federal voice for innovation, coordination capacity with the provinces, and an Innovation Advisory Committee of stakeholders external to government.¹ We agree with this recommendation and would further suggest a sector-specific Coordinating Committee/Sector Panel be established for the health and life sciences sector.²

A joint national-federal coordinating committee/sector panel for health and life sciences would build on the existing ST&I Strategy, which we believe remains relevant, while offering a sector specific focus.³ It could bring research executives and chief scientific officers from research institutes alongside federal policy leaders from the diverse granting agencies, industry, and other funders. This body would ensure that policy decisions are having their desired impact strategically and operationally. It would provide a cross-sectional view of what needs to be coordinated and a forum for addressing complex issues. For greater clarity, this would not be a call for a prestigious panel to champion the virtues of research and innovation, nor would it be a fact-finding commission. It is a call for the strategic and operational insight needed to bridge the policy-making and operating divide that may be hampering the potential of our research investments, particularly considering the unique aspects of the health sector. Such coordination is necessary for three reasons.

First, as research and innovation become more sophisticated, we develop a larger number of more complex funding structures that need to be coordinated, monitored and modernized as the science advances. For example, innovations in health technology often occur at the intersection of biomedical and engineering research, the domains of the Canadian Institutes for Health Research (CIHR) and the National Sciences and Engineering Research Council respectively (NSERC). Important investments that the Canada Foundation for Innovation (CFI) has made in research infrastructure need operating and maintenance dollars. They also need to be linked to the types of research being funded by CIHR, provinces, industry, health charities and others.

What happens currently? We are aware that leadership within the granting councils work together to coordinate where they can. This should be amplified and formalized as well as integrated with perspectives from relevant stakeholders. In the field, much of the coordinating work happens backstage where research leaders are challenged to cobble programs together *ad hoc*. In this way, different funding sources can feed different budget line items. However, a more deliberate approach nationally and federally would facilitate this. Everyone has the same goals. Everyone wants the highest possible return on investment. We can't leave it to chance.

Second, a coordinating table is necessary to better grasp the full costs of research. When we fail to do so, marginal investments are undermined. It is often noted: 'it takes more than great researchers, to do great research'. Researchers need predictable salaries, equipment, space, infrastructure, technology transfer, legal services, laboratories, access to participants, trainees, staff and supportive environments. Research facilities need operating and maintenance costs once infrastructure is built.

In our reluctance to acknowledge the full costs of research, we run the risk of building a house of cards - attracting more researchers to compete with each other for fewer dollars, who in turn then only survive only as long as their grant. With a common understanding of the full costs of research across the health research and innovation ecosystem, we can develop better coordination across diverse funding bodies, right-size our Indirect Costs program, assess the impact of funding models and develop policies that tie funding to accountability for those organizations making investments in this sector.

Finally, as we are advancing in our commitment towards ensuring collaboration with industry, we are seeing the unintended consequences of new funding models that need to be monitored. For example, where once we began with dyads of researchers or research institutes who would leverage funding strategically from targeted companies, we have now flipped the focus on requiring matching funds as pre-requisites for funding applications. What was once a strategic, scientific and entrepreneurial endeavour has become an often complex administrative exercise for applicants. It runs the risk of over-drawing on limited opportunities for matching funds, increases the risk to industry, and may set granting councils up in a competition for matching funds from a finite number of sources. Similarly, the Peer Review and Grant Program Reforms at CIHR that will unfold over the next seven years will need to be monitored for the way they translate in the field.

These examples are not criticisms of policy and funding innovations, but rather reinforce the call for new level of coordination that is only possible if there is a conversation between research leadership, who witness strategic and operational implications, and policy makers who are looking to act in the best interest of the sector.

Recommendation 1: Pursue the Federal R&D Review Panel's recommendation to establish a clear voice for innovation within the Federal Government and a specific Coordinating Committee/Sector Panel for the Health and Life Sciences Sector that would bring together external stakeholders, government funding agencies and others to ensure optimal coordination of research policy, investments and decisions.

2. What actions could be taken by the government and others to enhance the mobilization of knowledge and technology from government laboratories, universities, colleges, and polytechnics to the private sector?

In a recent poll (2013) of Canadians, conducted by Pollara Research for the Health Care in Canada survey, Canadians at large were asked who they believe has primary responsibility for introducing research and innovation into the healthcare system. Who were the top two groups? The first one was the Federal Government. The second is the country's research hospitals, academic regional health authorities, and their research institutes. The results are consistent when the same questions are asked to physicians, nurses, pharmacists and administrators.⁴ The results for academic healthcare are further supported by lists of hundreds of world firsts and spin off companies derived from the science, technology and innovation role of these organizations.^{5 6}

Academic healthcare organizations are the organizations where close to \$2 Billion of medical research occurs.^{7 8} We assume that the failure to include this important sector explicitly in the framing of this particular question ("government laboratories, universities, colleges and polytechnics") was a simple oversight and we will respond accordingly. At the same time however, the failure to include academic healthcare organizations explicitly in the list, whether oversight or not, underscores the absence of a systematic approach to how we leverage these incredibly important platforms nationally and federally.

With the right policy and funding conditions, these organizations can bring more products and services to market and to patients. They revolutionize the way we address disease, disability, and quality of life issues; provide a mechanism for bending our healthcare cost curve; and generate wealth for decades to come.⁹ Right now we leave it to chance. We fund them through retail operations in hospital lobbies, lump and clump them under universities, and often these organizations are left reading fine print of federal initiatives to determine if they are eligible as research institutes or excluded as healthcare organizations. As a country, we can do better.

How do we address this issue? We need to create a federal policy space that approaches research based healthcare organizations with ease and agility. Perhaps because these organizations are first and foremost responsible for patient care under provincial jurisdiction, Canada has not yet taken the bold move of formally recognizing the role that academic healthcare organizations play in our country.

Using a more comprehensive, purposeful and strategic policy and funding approach, both the provinces and the Federal Government can better leverage the \$2 Billion of research funding flowing through them. As such, we encourage the bold and historic move of launching a new sector from the two billion dollar academic healthcare enterprise that exists in this country.

What difference would this make? First, recognizing academic healthcare organizations for the \$2 Billion research sector they represent, allows the federal government to leverage policies that work in these contexts, indicate globally that Canada's academic healthcare organizations are open for business that advances patient care and new solutions to disease and disability, allow our country to leverage academic health sciences centres for the national role they play; and in the longer term, explore a credentialing system, similar to that in the UK, whereby the government can tie funding to accountability for research and training.^{10 11}

Recommendation 2: Establish a federal policy space that would allow the Federal Government to work with academic healthcare organizations and the provinces on the re-launch of a \$2 Billion research and innovation sector designed to derive the full benefits of health research nationally from these organizations.

In addition, by establishing a policy space for academic healthcare organizations at the federal level, we can provide further tax and intellectual property incentives for companies and individuals who wish to invest in technologies developed within academic healthcare organizations or based on their research.

We can also leverage strategic procurement opportunities. Healthcare expenditures in Canada are substantial. In terms of procuring the technologies, supplies and equipment that are required within healthcare organizations, organizations and provinces adopt a lowest cost policy even though a similar made in Canada product may be available and benefit the overall economy. If healthcare organizations and different levels of governments work together on the goal of procuring products that meet the needs of Canadians while supporting 'made in Canada' products and firms, we can become our own best customers. Our healthcare expenditures could be offset if the dollars we spend are used to support Canadians, Canadian products and their spin-off companies.

The Council of Canadian Academies' 2009 report on innovation proposes that: "Given Canada's single payer health care system, governments have the opportunity to support innovation that goes beyond the decision of whether to approve a new compound at Health Canada or the provincial formularies. Canadian Governments could seek to establish a leading role in using health innovation to improve the productivity and quality of the health care system".¹² We agree with this proposition. If we can increase our capacity to develop good ideas, we have an enormous potential to benefit domestically and internationally, especially given Canada's leadership both in biotechnology and in the reputation of its health care system.

In turn, Canadian products and companies, have a better chance of entering global markets. Otherwise, foreign decision-makers may attribute the failure of companies to penetrate their domestic markets, as a flaw in their products, company or approach. Finally, even the potential of entering the Canadian healthcare market may also have the cyclical effect of attracting venture capitalists and facilitating greater collaboration with industry.

Recommendation 3: Pursue the Federal R&D Review recommendation on strategic procurement by (a) exploring programs like the Small Business Innovation Research Program and the Small Business Technology Transfer Program that have proven successful in the United States; (b) Aligning organizational, provincial and federal procurement policies to support Canadian jobs, products, and companies while meeting safety and patient care needs; (c) Attracting venture capital by facilitating market entry for Canadian health innovations.

3. How can Canada continue to develop, attract, and retain the world's top research talent at our businesses, research institutions, colleges and polytechnics, and universities?

Consistent with the proposition that Canada's ST&I strategy points in the right direction, but that its execution can be deepened, we commend the strategy for its focus on a "people advantage". However, we are also concerned that we are attracting more researchers than we are able to fund; introducing unintended idiosyncrasies through program reforms that are not backed up with change management strategies, and ignoring persistent issues. We have three recommendations to help address this.

First, in the short term, we need to manage the consequences of funding reforms at the Canadian Institutes of Health Research (CIHR). Over the next seven years, CIHR will roll out major reforms in the application and review process through which it administers research funding. The initial two years of the transition include two six-month gaps in the funding cycle. During this period, successful researchers who would normally receive CIHR funding, will be unable to apply for new grants. The organizations hosting these researchers and requiring these funds for salaries and operations will be unable to bridge funding for salaries, trainees, and staff. They are already addressing shortfalls in other areas.

To mitigate negative consequences of the transition, an extension of existing grants for the cadre of researchers who will be affected in 2015-2016 is required. We estimate that this can be done with only a small percentage of the estimated funding normally available during the same time period (for an estimated total of \$20-30 M). This would prevent the potential loss of research institutes and highly qualified personnel, while preserving the remainder as cost savings for the Government, CIHR and all Canadians.

Second, in order for health research to be of benefit to patients, populations and health systems, we need to protect the career paths of researchers and the clinician scientists who stand at the interface of research and care. This is being challenged by a few concurrent and consistent factors.

For the general cadre of researchers, a substantial amount of research time is spent preparing applications. Salaries and operating dollars are unstable and unpredictable. A typical research application can take weeks if not months to prepare, not only because of the substantive elements of the research, but because of the administration required in a typical application. Once the application is submitted, the chances of success of even an outstanding proposal are limited to 5-15% depending on the funder. Successful applicants are expected to serve as peer reviewers for other grants which adds to their workload.

The situation is even more complex for clinician scientists. Many top clinicians are also top researchers. For clinician scientists to succeed, they need a supportive infrastructure. Their interest and capacity in generating and using research shouldn't become untenable. It denies our health system and society of the potential of science applied to healthcare. So what is needed?

As far back as 2002, a group of clinician scientists put together a position paper for CIHR with over 80 recommendations that could be implemented to assist in the generation and use of research and innovation in patient care.⁴ These should be reconsidered. We can also further strengthen initiatives like the Strategy for Patient Oriented Research (SPOR). However, to make a really impactful difference, we need a well-balanced and funded research ecosystem, which we discuss in the next question and subsequent recommendations.

Recommendation 4: Support and protect health researchers by (a) providing a contingency fund to CIHR earmarked for gaps that become evident as the funding reforms are implemented; (b) establish a mechanism for addressing existing recommendations to improve career paths for clinician scientists and other researchers in Canada (c) increasing the amount of funding available through the granting councils.

4. How might Canada build on its success as a world leader in discovery driven research?

Discovery driven research is the source pool of a robust innovation and commercialization pipeline. This government has clearly recognized the importance of basic science in a high performing innovation system. It has recognized that “science powers commerce” and the “classic virtuous cycle” that ensues.¹³ Like our partners to the south and in Europe, we also need to go “all in” on innovation and this means maintaining our commitment to Basic Science.^{14 15} We may not be keeping pace.¹⁶

We also need to recognize that basic science by its nature is unpredictable. By definition, the planning process for managing investments and outcomes in Basic Science, can’t be the traditional assessment of outcomes against preconceived expectations. We need to set up a more flexible process that allows for “discovery driven planning”.¹⁷ This means funding researchers in a manner that allows for the flexibility to follow the directions revealed through the discovery process, not fitting the discovery to the funding model.

Further, we need to leverage what we know about where, when and how basic science has its biggest impacts. In a study by the RAND Corporation, it was found that basic science conducted in patient care environments tends to have broader practical applications.¹⁸ In this regard academic healthcare organizations are important platforms for the generation and use of research and innovation that benefits patients and the economy and again underscores the importance of creating a federal policy space for these organizations (recommendation 2).

Recommendation 5: *Strengthen the commitment to basic science by: (a) ensuring that the Federal Granting councils have sufficient budgets to retain promising individuals and ideas and manifest their full potential to Canada’s advantage (b) Investing in Basic Science as the source-pool of other research, innovation, commercialization, and patient oriented research endeavours to remain competitive as the US and Europe escalate investments (c) leveraging academic healthcare environments.*

However, to fully benefit from basic research in the health system, we need to strengthen the rest of the pipeline as the US, UK, and EU have done. Beginning with a doubling of the tri-council budget, we then need to ensure that there is an adequate funding allocation to clinical, clinical trials, and population level research. This is what’s needed to leverage Basic Science research. It is particularly important if the Government is hoping to utilize the levers of health research to transform the healthcare system. As Minister Ambrose correctly noted, the economics of healthcare creates sustainability issues. The need for innovation is pressing.¹⁹

However, to make this a reality requires some serious questions. Is Canada’s research funding relative to GDP sufficient to sustain an innovation economy from R&D and has it fallen behind most competitor nations?²⁰ Is the focus on attracting private sector investment into R&D coming at the expense of our pipeline of fundamental discovery from basic science and clinical research? If the focus is only on the most marketable products, what happens to the intellectual property supply over time?

Further, is it time to consider separating funding for discovery research, from the funding needed to pull innovations into the health system and evaluate them? The latter involves a greater focus on health system and population health research and could be approached through a separate Health Innovation Fund that would be jointly managed and funded with the provinces and run out of the health systems.²¹ This could complement SPOR and would support large, investigator lead trials, health systems research and health knowledge transfer. These questions further illustrate the strategic value of sector specific focus for health and life sciences in Canada’s ST&I Update.

Recommendation 6: Modernize the amount of funding available as well as the structures and strategies through which different types of health research transform health by: (a) doubling the CIHR and Tri-Council budgets, (b) implementing an Innovation Fund intended to pull innovations into the health system, and (c) re-exploring the allocation and mechanisms for funding different types of research to ensure a healthy pipeline.

5. Is the Government of Canada's suite of programs appropriately designed to support research excellence?

The question of design is a fundamental underpinning of our recommendations. First, we believe the current suite of programs points in the right direction, but we need to better monitor, tailor and update them so that policy intentions translate operationally and strategically in the field. Our landscape is changing as a result of new scientific and technological developments.²² We need to keep up with the times.

We are also engaging in new ways of funding research which are essentially experiments to be monitored. We believe that the best way to assess design issues is to establish the forums that will allow leaders from research institutes, granting councils, industry to look at specific issues and propose a path forward. This is feasible if we take a sector specific approach for Health and Life Sciences, as was recommended earlier.

Second, we need to better align tax policy with policy for health and research in order to derive the human and economic benefits that are possible from ST&I. To do this, the Federal Government should amend the MUSH formula to treat hospitals in the same manner as municipalities that receive a 100% GST rebate. This avoids the situation where the federal government gives with one financial hand and takes with the other. It keeps federal dollars where they were intended – in the organizations dedicated to providing Canadians with timely access to quality services and generating world class research and innovation to solve the health problems of the future.

Effective tax policy supports the already established health, research and innovation policies at the federal level. It cuts administrative red tape and aligns fiscal policy with science and technology policies. Standardizing the range of rebates to 100%, increases overall efficiency and administration at the local level, increases fairness, across Canada and avoids penalizing institutions investing in research and innovation. The additional funds could accelerate further innovation and commercialization; bend the cost curve for healthcare; and transform the delivery of care to Canadians.²³

There are also other programs that should be considered. The Small Business Innovation Research (SBIR) Program in the United States is an example of a program that has launched many successful spin off companies by supporting each phase of the process and enabling strategic procurement of spin off company products by the Federal Government. Its strengths are in its flexibility and in the commitment to the procurement of resulting products from the Federal Government to help launch them. Similarly, the Small Business Technology Program, also in the United States, requires each of the Federal agencies funding research and development to reserve a small amount of funding for technology transfer from small businesses and not-for-profit partners.^{24 25}

Recommendation 7: Align tax, health, science, technology and innovation policies by increasing the GST rebate on all eligible purchases made by publicly funded, not-for-profit institutions in the health sector to 100% (like municipalities) and offer the same tax treatment to all health research, as the sector itself

In conclusion, we believe that Canada's ST&I Strategy and suite of programs provide a solid foundation. Their execution can be deepened through a "whole of Canada" and a sector specific approach as we update the Strategy. We should pursue the Federal R&D Review recommendation to better coordinate research and innovation policy, practice, and investment; establish a health and life sciences coordinating committee of research institute leaders, government, industry and other funders to monitor and coordinate investments and reforms; and better recognize and engage the full range of innovation leaders and contributors in this ecosystem.

The newly-merged ACAHO-CHA and its members are prepared to work with the government and our partners to help ensure that research and innovation manifest their full contributions to our health and our economy. Per the title of the consultation paper, this is indeed “*Canada’s Moment*”. We can seize it together.

ENDNOTES

¹ Federal Review of R&D, 2012. *Innovation Canada: A Call to Action. Review of Federal Support to Research and Development – Expert Panel Report*. Ottawa. Available: www.rd-review.gc.ca

² Depending on the composition and intent of the Wise Person’s panel announced by Minister Ambrose at the Economic Club of Canada: The Economics of Healthcare and the Need for Innovation Thursday, January 30, 2014, Ottawa, ON, a Health and Life Sciences Sector Panel could play a complementary or integrated role.

³ The central argument in this submission is that the Update would benefit from sector specific strategies and deepened and more coordinated execution.

⁴ Health Care in Canada (HCIC) Survey. Eleventh Edition (2013) 2014. HCIC Member Presentation, Ottawa, ON, 05 February 2014. The Health Care in Canada survey is a survey conducted by Pollara research on behalf of the Members of Health Care in Canada, a multi stakeholder group including associations, health charities, industry and others.

⁵ ACAHO, 2008. *From Microscope to Marketplace: Spin-Off Companies from ACAHO Member Institutions*. Ottawa.

⁶ ACAHO, 2008. *Eureka! World First Discoveries and Other Medical Breakthroughs in ACAHO Member Institutions*. Available: www.achao.org.

⁷ Research Infosource, 2013. Canada’s Top 40 Research Hospitals in *Innovation Leaders. Research Money*. Similar estimates were made by ACAHO (now ACAHO-CHA) in 2010 by taking a sum total of research income as publicly posted by the same academic healthcare organizations within ACAHO.

⁸ Myers, J. 2011. *Research Real Estate: Taking Advantage of Prime Location*. Hospital News (September 2012) www.hospitalnews.ca

⁹ Paige, C. 2010. *Why Research Matters*. Hill Times. 01/18,2010.

¹⁰ Ovseiko, P.V, Heitmueller, A., Allen, P., Davies, S. M., Wells, G, Ford, G.A, Darzi, A, Buchan, A.M. 2014. Improving accountability through alignment: the role of academic health science centres and networks in England BMC Health Services Research 2014, 14:24 doi:10.1186/1472-6963-14-24

¹¹ National Task Force on the Future of Academic Health Sciences Networks. *Three Missions One Future Optimizing the Performance of Canada’s AHSCs*. Available: www.achao.org

¹² Council of Canadian Academies, 2010. *Innovation as Business Strategy, Why Canada Fall Short*. p.191

¹³ The Honourable Gary Goodyear, PC, MP Minister of State (Science and Technology): Announcement of Government of Canada Support for Discovery Research and NSERC Grants and Scholarships. Ottawa, Ontario May 21, 2013

¹⁴ President Obama’s *State of the Union Address*, January 28, 2014 <http://www.whitehouse.gov/the-press-office/2014/01/28/president-barack-obamas-state-union-address>

¹⁵ The European Union has also recognized the importance of Basic Research as a pillar of its international ST&I funding program Era-Can+

¹⁶ Chakma, J., Sun, G., Steinberg, J., Sammut, S., Jagsi, R.. *Asia’s Ascent — Global Trends in Biomedical R&D Expenditures* The New England Journal of Medicine New England Journal of Medicine 370;1577-1579

¹⁷ McGrath, R G., McMillan, Ian, C. 1999. *Discovery Driven Planning. Turning Conventional Planning on its Head*. http://ritamcgrath.com/ee/images/uploads/Discovery_Driven_Planning.pdf

¹⁸ Wooding, S, Hanney, S, Pollitt, A, Buxton, M, Grant, J, on behalf of the Retro-sight Project Team, (2011). Project Retrosight. Understanding the returns from cardiovascular and stroke research: The policy report, Cambridge, UK: RAND Europe, Available: <http://www.rand.org/pubs/monographs/MG1079.html>

¹⁹ Minister Ambrose’s address the Economic Club of Canada - *Highlighting the importance of Innovation and Health Partnerships*. January 30, 2014

²⁰ Chakma, J. et al, 2014

²¹ ACAHO, 2013. Seven Years in, A forward looking Review of Progress on Access and Wait Times as we look to a 2014 Health Accord. Available: www.achao.org

²² Such as stem cells and genomics.

²³ This issue is discussed in the Federal Pre Budget 2014 Submission of the Canadian Healthcare Association www.cha.ca and the Association of Canadian Academic Healthcare Organizations www.achao.org

²⁴ More information on this program can be found at the following website. <http://sbir.gov/> and <http://sbtt.gov/>

²⁵ For further discussion, please see ACAHO, 2013. *The Commercialization Opportunity of Academic Healthcare Organizations*. Submission to the House of Commons Standing Committee on Health. Available: www.achao.org