



THE ASSOCIATION OF FACULTIES
OF MEDICINE OF CANADA

L'ASSOCIATION DES FACULTÉS
DE MÉDECINE DU CANADA

AFMC Position Paper on Research

A Re-Envisioning of Health Research in Canada

June 30, 2016

EXECUTIVE SUMMARY

The AFMC represents the country's 17 Faculties of Medicine and is the national voice for academic medicine in Canada. The overarching goals of the AFMC are to provide better health care for Canadians through better health research and to realize sustained economic benefits for the country by fostering innovation.

The AFMC has identified the following five strategic priorities for the future of health research in Canada.

1. Training and development of future leaders in health research

As an organization dedicated to advancing medical education and life-long learning, we believe that the next generation of health professionals will need research training to become innovative and compete in knowledge-based global economies. In order to promote these goals, AFMC supports the following:

- Restoration of integrated MD-PhD and MD-MPH professional training programs (\$2.6m/year).
- Establishment of a national training strategy for clinician scientists.
- Encouragement and support for graduate students committed to a career in research.

2. Research without boundaries

The AFMC through its Faculties of Medicine is ideally positioned to provide leadership in the entire spectrum of health research. In order to keep Canada at the vanguard of health research, the AFMC supports the following:

- a) Operational or strategic funding programs that address the full economic costs of research.
- b) Strategic coordination of funding programs to ensure better return on investment and to sharpen the competitive edge of Canadian researchers on the global stage.
- c) Sustained research funding for both early-career and well-established investigators.
- d) Increased tri-council funding to balance the loss of purchasing power of the Canadian dollar and to make the research enterprise more responsive to emerging global challenges.
- e) Reassessment of matching funds (Private, Provincial or University sources) and whether it is necessary in all cases.
- f) Creation of a Council of advisors drawn from a broad range of research disciplines.

3. Collaborate creatively with health partners to advance science and create new partnerships

Multidisciplinary health research often results in better outcomes. Educating the next generation of health professionals provides an opportunity for the AFMC to partner with other groups to develop innovative training programs that are responsive to the current health care needs of Canadians.

4. Accelerate research through state of the art Infrastructure and core facilities

State of the art research facilities and equipment are critical components of the health research enterprise and enable teams of talented researchers to be globally competitive in the pursuit of science and technology, and much of Canada's research infrastructure is outdated. With these considerations in mind, the AFMC supports the following:

- a) The continued renewal of infrastructure on research campuses through the Innovation Fund.
- b) Development of a strategy to provide infrastructure to early career researchers in a flexible and timely manner.

5. Engage and inspire the Public

The AFMC strives to educate the public about benefits that research can bring to people's health, economy and society. This occurs through multiple avenues including AFMC-sponsored community and outreach programs in order to generate interest and excitement in health research and its value to society.

Conclusion

Faculties of Medicine are an essential part of the solution to boosting innovation in health research and training of highly qualified physicians and scientists. Given the changing research landscape, Faculties of Medicine are facing many challenges going forward in terms of funding, infrastructure, and training the next generation of scientists. Continued investment in health research is essential, and the AFMC serves to communicate the successes, needs, and viewpoints of Faculties of Medicine across Canada in a concerted and integrated manner.

Contributions of the Association of the Faculties of Medicine of Canada (AFMC) to health research

The AFMC represents the country's 17 Faculties of Medicine and is the national voice for academic medicine in Canada. The AFMC supports the core mission of Canadian medical schools to promote medical education, research and clinical care.

Research carried out in constituent medical faculties of the AFMC span the domains of fundamental biomedical science, clinical, health systems and population health including societal, cultural and environmental determinants of health. Faculties of Medicine are an essential part of the solution to boosting innovation in health research and training of highly qualified physicians and scientists.

These contributions have provided an incredible return on investment for government at all levels as revealed by the following¹:

- *Stewardship for \$3 billion in biomedical and healthcare research revenues in 2014*
- *\$66.1 billion in total economic impact in 2014¹*
- *3,260 MSc and 866 PhD degrees awarded in 2014*
- *17,651 current graduate and post-doctoral trainees*

Aside from the economic benefits of research carried out in AFMC faculties and its allied partners within Academic Health Centers, advances by AFMC medical researchers have made a substantial impact on the health and lives of Canadians. In fact the most important outcome of health research is the maintenance of a high quality health delivery system. This is illustrated by the following five examples:

1. Global pandemics

The SARS and Ebola epidemics have constituted two of the most serious global public health concerns of the recent times. The solutions to these threats have come from Canada and its medical researchers in the form of sequencing of the SARS coronavirus and development of a drug (ZMapp) and a vaccine for the Ebola virus (*Dr. Gary Kobinger*). No cases of SARs have been reported for over a decade and Phase 2 and 3 trials with Ebola vaccines show great promise and potential. *Dr. Julio Montaner's* seminal work on identification of the use of HAART (Highly Active Antiretroviral Therapy) as prevention therapy for HIV revolutionized world-wide treatment of this condition.

2. Drug Discovery

Hepatitis B affects 350 million people worldwide. Through *Drs. Bernard Belleau and Lorne Tyrrell's* ground breaking research, the drug lamivudine or 3TC was discovered to dramatically reduce Hepatitis B virus replication by 99% and became the first antiviral therapy for the

treatment of this condition. Studies have demonstrated a 23% decreased risk of liver-related death for each year of exposure to lamivudine.² *Dr. Calvin Stiller* helped pioneer the use of cyclosporine led to help stop rejection of transplanted tissue. Both lamivudine and cyclosporine are now on the *World Health Organization's* List of Essential Medicines.

3. Stem Cells and Therapies

Discovery of blood forming stem cells (by *Drs. James Till & Ernest McCulloch*) set the framework for how stem cells are studied and harnessed for their potential for bone marrow transplantation and treatment of leukemia. Recent work on stem cell expansion has greatly increased the promise of cell therapies (*Dr. Guy Sauvageau*). This research has set the stage for current stem cell clinical trials³ in heart disease and neurological conditions such as Parkinson's and Alzheimer's disease as well as for cancer.

4. Molecular Biology and Medical Genetics

Dr. Michael Smith's discoveries of how the coding sequence of genes can be altered to study the functional role of proteins led to transformative applications in biotechnology to produce insulin from bacteria for the treatment of diabetes that has an extremely high prevalence in the Canadian Indigenous people communities. This research laid the foundation to understand the role of specific genes in hereditary conditions (cystic fibrosis, sickle cell disease, hemophilia). As a result of these advances, life expectancy for children with cystic fibrosis, which as recently as 1980 was only 20 years, has increased to 37.5 years by 2006.⁴ Clinical trials of gene therapy for sickle cell disease in humans were started in 2014.

5. Cancer Research and Treatment

Canada is host to some of the top Cancer Centres in the world (in Toronto, Montreal, Vancouver, Edmonton, Calgary, Ottawa, Halifax) that have a stellar record of research contributions and participation in clinical trials, thus enabling Canadians access to novel and emerging treatments for cancer. The Princess Margaret Cancer Centre is the largest cancer research and clinical program in Canada, which treats 17,000 new patients per year and is ranked in the top 5 Cancer Centres world-wide based upon its research performance metrics (highly cited publications, publications in top ranked cancer journals).

These examples of the innovations and discoveries that improve health outcomes and health care place *AFMC as a leader and an important voice in the Canadian health research landscape*. The AFMC is poised to make a greater impact in health research thereby benefiting all Canadians through better health outcomes and care for patients, enhanced training of the next generation of health professional and scientists, and innovation driving economic output and benefit. *The overarching goal of the organization being to provide better health care for*

Canadians through better health research and to realize sustained economic benefits for the country by using innovations in health research

The AFMC has identified the following as its strategic priorities underpinned on the notion that health and wealth creation occur through investment in health research:

- 1. *Training and Development of future leaders in health research***
- 2. *Research without boundaries***
- 3. *Collaborate creatively with health partners (Health Research Institutes, Hospitals, NGOs) to advance science and creating new partnerships***
- 4. *Accelerate research through state of the art infrastructure and core facilities***
- 5. *Engage and inspire the Public.***

1. *Training and development of future leaders in health research*

Training of physicians occurs best when they are trained in a research rich environment that fosters innovation and creativity. These clinician researchers/scientists, who are versed in multiple disciplines, possess a unique set of skills that set them apart from other health professionals. This makes them an invaluable asset for translating discoveries in medicine into day to day delivery of clinical care.⁵ These individuals meet a pressing national need, are economic drivers by early adoption of health care cost reduction strategies-technologies, and as future leaders in health research are crucial in identifying best practices for the delivery of health care, which is changing at a rapid pace.

A critical need for medical leadership versed in research was identified in the Report of the Advisory Panel on Health care Innovation⁶ and as such our clinician scientists in training are the future leaders who will make the discoveries and innovate to improve the health of Canadians. These individuals however face significant challenges in the form of total length of professional training that includes research training, funding during prolonged period of training, post-training debt, future career prospects and life-long mentorship.⁷ As an organization dedicated to advancing medical education and life-long learning, we believe that the next generation of health professionals will need research training to become innovative and compete in knowledge-based global economies.

Training of the next generation of graduate students (PhDs) is critical for the future of health research and economic development.⁷ An increasing number of graduate students in health disciplines are seeking job opportunities outside of Universities and there is a growing need for programs to support career development in other sectors such as industry and business. Training such highly skilled individuals to be fluent in science and business will stand to make Canada an attractive destination for foreign investments in any health-related sector.

In order to promote these goals, AFMC supports the following:

a) In the short term, restore integrated MD-PhD and MD-MPH professional training programs (\$2.6m/year) that are key structural elements for health professionals who are dedicated to the pursuit of research focused careers and will assume the mantle of future medical leadership. In the longer term, support establishing a national training strategy for clinician scientists. Such a plan would include a) setting national standards and metrics, including oversight, of the continuum for developing an independent clinician scientist; b) competitive programs in which both students and mentors should show exemplary characteristics; c) leverage opportunities and partnerships to create sustainable support for clinician scientist programs; d) address issues of salary and time protection, debt relief and sustainable research funding; e) a mentoring program that spans the entire career track of the clinician scientist.

b) Promote and encourage institutional identification and support of graduate students committed to a career in research and provide appropriate opportunities and training for those graduate students contemplating careers outside of academia. As a longer-term goal, assist the Federal Ministers of Health and Science and their provincial partners in **developing a pan-Canadian strategy for a sustainable support for training of future health research scientists and clinician scientists.**

2. Research without boundaries

The AFMC through its constituent Faculties of Medicine is ideally positioned to provide leadership in the entire spectrum of health research spanning from fundamental discovery-driven research to the translation and applicability of these findings to clinical care, their impact on public health and informing health delivery systems. The examples cited earlier provide a measure of the excellent contributions of Canadian researchers across the entire range of health research domains. In addition, Canada possesses unique demographics that lend themselves to the study of important public health problems in specific populations such as *Indigenous peoples* and people living in northern, remote, rural and marginalized communities through population health, health services/health system research and the use of emerging technologies for personalized medicine and evidence-based health outcomes.

In order to keep Canada at the vanguard of health research, the AFMC supports the following positions:

a) The development of operational or strategic funding policies or programs that address the issue of full economic costs of research and development, including an overhead policy that reflects the realities of institution-based research. By contrast with other jurisdictions where

research funding covers the full economic costs of research, Canada is very poorly served by a system in which 50% of costs are covered.

b) On-going and new investments in health research that serves to strike an appropriate balance between fundamental research to generate new discoveries and the application of such discoveries to advance the health and economic well-being of Canadians. As the major recipient of health research funding, Faculties of Medicine have an abiding interest in the funding programs and strategic direction of the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC), the Social Sciences Health Research Council (SSHRC), the Canadian Foundation for Innovation (CFI), The Canada Research Chairs (CRC) program, the Canada Excellence Research Chairs (CERC) programs and the Canada First Research Excellence Fund (CFREF). These programs have provided outstanding opportunities for the recruitment and retention of the best and brightest researchers to Canada. However, *strategic coordination and integration* of these programs is needed in order to ensure better return on investment and sharpen the competitive edge of Canadian researchers on the global stage.

c) Sustainable operational funding of health research at all career stages based on excellence and a high quality peer-review process. This includes ensuring sustained research funding for early career investigators (at least 5-7 years post initial appointment) with a dedicated envelope of health research funding and support for established investigators with a proven record of accomplishments and who continue to contribute to the health research enterprise and the resulting improved health care for Canadians.

d) Investment of new research dollars through increased tri-council (CIHR, NSERC and SSHRC) funding a) to balance loss of purchasing power of the Canadian dollar for competitive salary awards for researchers, state-of-the-art equipment and supplies b) to make the research enterprise more nimble and responsive to emerging global challenges where Canada has a demonstrated record of outstanding accomplishments e.g. SARS epidemic, Ebola and Zika virus outbreaks.

e) Reassess the issue of matching funds (from private, provincial or university sources) and eliminate this requirement or *only* target it for large scale initiatives where there is a pre-agreed formula for provincial-federal partnerships. In many instances, the criteria of excellence may not necessarily apply to provision of the matching funds. We also believe that elimination of matching funds will improve the regional and institutional disparity in research funding and infrastructure between provinces.

f) Support the creation of a Council or Academy of advisors drawn from a range of research disciplines that include health, engineering, social, technological and environmental sciences. Such a Council or Academy could be chaired by the Chief Scientific Officer for Canada to provide

the Government with the highest caliber of independent and authoritative advice on matters related to science.

3. Collaborate creatively with health partners (Health Research Institutes, Hospitals, NGOs) to advance science and creating new partnerships

Permeability between the AFMC and its partners increases the opportunity for multidisciplinary health research. The contemporary emphasis on transdisciplinary research initiatives at the international level provide a compelling rationale for the integration of Health research with the Physical Sciences (and Engineering) and the Social Sciences (and Humanities) into the overall research strategy for Canada. The AFMC is ideally positioned to catalyze interactions with medical schools, other health sciences and non-health sciences university faculties, research institutes, hospitals and other organizations dedicated to health research and training.

The U-15 (representing Research-intensive Universities), HealthCareCan (representing Research Hospitals and Institutes), Research Canada and the Canadian Academy of Health Sciences are natural partners in developing and promoting common research strategies and operational goals that can provide health, economic and societal benefits to Canada. Industry provides partnerships for large scale projects and infrastructure that are critical to realizing the full potential of Canada's contributions to big science.

Given the impetus to commercialize important scientific discoveries and best health practice algorithms, collaboration with industry is increasingly important and the AFMC can take a leadership role in identifying guidelines and best practices in engagement with industry partners. Educating the next generation of health professionals, who are versed in research and technologies, provides an opportunity for the AFMC to collaborate with other organizations to develop innovative training programs that are reflective of and responsive to the contemporary health care needs of Canadians.

4. Accelerate research through state of the art Infrastructure and core facilities

State of the art research facilities and equipment are critical components of the health research enterprise and enable teams of talented researchers to be globally competitive in the pursuit of science and technology. This investment pays dividends in the form of new products and services, new drugs and medical devices and novel ways to address complex biological issues that result in improved health of Canadians (as identified through the four examples at the beginning of the document).

Over the past 15 years the Canadian Foundation for Innovation (CFI), through its provincial partnerships, has had a transformative impact on health research conducted at Universities,

Research Institutes and affiliated research-intensive hospitals. The development of core facilities and integrated administrative services has optimized the use of infrastructure and in instances avoided duplication of equipment and services. Partnerships between federal and provincial governments to set up national containment facilities such as the National Microbiology Laboratory (in Manitoba) and the Prion Centre (in Alberta) have provided the capability for Canada to respond to important international and national health crises in human and animal health such as the recent Ebola outbreak and the “Mad Cow” epidemic, respectively.

In spite of these “wins”, Canada’s research infrastructure has aged, and in many instances is outdated, with no clear strategy to either renew or sustain laboratories and essential equipment beyond the three-year life of a CFI infrastructure operating fund. Retention of highly qualified personnel to operate, maintain or provide training to students is emerging as a critical need for the Canadian health research enterprise. Thus, this is an appropriate time for a measured renewal of original investments and targeted new ones with the goal of making such investments pay long term dividends in the form of improved health and economic benefits for Canadians.

With these considerations in mind, the AFMC supports the following:

a) Launch of the current Canada Innovation Fund to address the key issues of a) renewal of infrastructure on research campuses across Canada along the lines announced in the 2016 Federal Budget b) identify and support existing national cores and establish new ones that support cutting-edge basic research as well as address emerging health issues with national and international impact c) striking the right balance between capital and operating funds/expenditures. The current 30 % Infrastructure Operating Fund (IOF) normally spread out over 3-5 years needs to be re-visited with a view to looking at formulae (in collaboration with provinces and institutions) to extend this timeframe to up to 10 years.

b) Develop a strategy to provide infrastructure (equipment and laboratory/research space) to new and early career researchers in a flexible and timely manner. A simplified application process that aligns requirements, application forms and other documentation across funding agencies would streamline the health research enterprise. This approach would also capitalize on existing, but at times unrecognized, synergies within existing and new funding programs for operating costs of research, salary support, equipment and space to conduct research.

5. Engage and inspire the Public

The tripartite mission of faculties of medicine to train physicians and researchers, engage in innovative health research and partner in the delivery of clinical care places the AFMC in a unique position of engaging and inspiring the public. The AFMC through its past and present

trainees, constituent faculty members and staff strives to educate and enlighten the public about benefits that research can bring to people's health, economy and society. Additionally, the AFMC will promote community and outreach programs in order to generate interest and excitement in health research and its value to society. Health researchers with the skill, opportunity and desire to engage the public in their work do so through public lectures, forums and courses. The AFMC also serves to engage policy-makers to encourage a high level of public and political support for health research and its benefits to the health and wealth of Canadians.

Conclusion

Faculties of medicine in Canada represented by the AFMC are the leaders in health research and train tomorrow's doctors and scientists. Given the changing research landscape, faculties of medicine and other health sciences organizations are facing many challenges going forward in terms of funding, infrastructure, and training the next generation of scientists. Continued investment in basic as well as applied health research is essential, and the AFMC serves to communicate the successes, needs, and viewpoints of faculties of medicine across Canada in a concerted and integrated manner. These are exciting times for the AFMC to interact with other key stakeholders in developing common vision and goals, and to provide leadership in shaping future science and health research policies of the Government of Canada.

As the voice of the faculties of medicine, which are the hub of health research and the producers of the physicians and scientists of tomorrow, the AFMC must be at the table, with other partners, to help the Government of Canada to shape the future of health research and innovation with the ultimate goal of improving the health and prosperity of Canadians.

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1. *The Economic Impact of Canada's Faculties of Medicine and Health Science Partners, August 2014*
https://afmc.ca/pdf/Economic_Impact_Study_Report_FINAL_EN.pdf
 2. Puoti et al., *Clin Infect Dis.* (2008) 46 (3):367-369.doi: 10.1086/525532
 3. Trounson et al. *BMC Medicine* (2011) 9:52 DOI: 10.1186/1741-7015-9-52
 4. <https://www.nationaljewish.org/healthinfo/conditions/cysticfibrosis/life-expectancy/>
 5. R. T. Lewinson, M. B. Keough, P. L. Beck, M. D. Hollenberg, B. G. Yipp, *Lost: Young Canadian physician-scientists need a map. Sci. Transl. Med.* 8, 329fs6 (2016)
 6. *UNLEASHING INNOVATION: Excellent Healthcare for Canada Report of the Advisory Panel on Healthcare Innovation.* <http://www.healthycanadians.gc.ca/publications/health-system-systeme-sante/report-healthcare-innovation-rapport-soins/index-eng.php>
 7. *NIH RePORT - Physician Scientist-Workforce Report 2014*
<https://report.nih.gov/workforce/psw/index.aspx>