

Health Research Roadmap: Creating innovative research for better health and health care

CIHR's Strategic Plan
2009-10 – 2013-14



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Also available on the Web in PDF and HTML formats
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Cat. No. MR21-141/2009E-PDF
ISBN 978-1-100-13267-9

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Message from the President



CIHR presents its second Strategic Plan during a period of unprecedented economic uncertainty. It has been particularly rewarding, therefore, to see the widespread conviction expressed on both sides of the 49th parallel that investment in research is vital to future growth and competitiveness and will help to stimulate the economy and secure prosperity.

We are building on a solid foundation with this plan. Since 2000, CIHR has energized the health research community, inspired new collaborations across disciplinary and geographic boundaries, and engendered new partnerships between those who conduct research and those who implement its findings.

This could not have been accomplished without the direction and oversight from CIHR's Governing Council and the outstanding leadership from our Scientific Directors who lead the organization's 13 Institutes. They have been instrumental in building Canada's health research capacity through funding strategic multi-institute initiatives, collaborating with partner organizations, and providing forums for discussion, knowledge exchange and direction setting.

The Scientific Council – comprised of the Scientific Directors for each of the Institutes – has offered important guidance in the development of this Strategic Plan. They have strived to strike a balance between the four pillars of health research (biomedical; clinical; health systems and services; and the social, cultural and environmental factors that affect the health of populations) while ensuring the plan is scientifically sound and relevant to the health of Canadians.

In its Science and Technology (S&T) Strategy, *Mobilizing Science and Technology to Canada's Advantage*, the Government of Canada has recognized the centrality of S&T – and of the highly skilled individuals who bring innovation to life – to securing Canada's national competitive advantage.

Through its designation of health and life sciences and technologies as one of the four areas of research strength, the Government has also signalled it understands the importance of health research to the health of Canadians and to the evolution of our health-care system.

Ultimately, health research is about helping people to be healthier. But while there is one definitive destination, there are many paths to get there. It may be through the development of new and better ways to prevent, diagnose and treat disease, or promote population health. It may be through providing the evidence that supports the delivery of the health services Canadians need, when and where they need them. And it may be through the commercialization of a health research discovery to make a new product or service available in the marketplace.

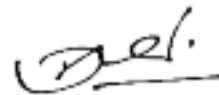
CIHR supports all of these paths to better health. This Strategic Plan – *Health Research Roadmap: Creating innovative research for better health and health care* – is the product of widespread consultations with members of the health research community, careful assessment of CIHR’s strengths and weaknesses, ongoing deliberation about where CIHR would like to be in five years, and a sober assessment of the resources available to get us there. Our *Health Research Roadmap* sets out a vision to secure Canada’s place on the world stage of health research for years to come.

It sets out four strategic directions that will help to achieve CIHR’s goals. These strategic directions will enable CIHR to carry out its full mandate in all its complexity, show leadership within the wider health research community, and demonstrate accountability and results to the people of Canada.

How we intend to meet these goals will be detailed in separate implementation plans to be published annually. These implementation plans will describe specific objectives

to be met and will provide performance metrics against which progress will be monitored. They will also give us the flexibility to adapt to changing circumstances while reporting on our accomplishments. CIHR’s Institutes will also use their strategic budgets – individually, collectively and with partners – to support key initiatives and activities associated with the Strategic Plan. Progress will be reported in the CIHR Annual Report and Departmental Performance Report (both of which are tabled in Parliament) to ensure transparency and accountability.

I would like to thank all of those who contributed to the development of our *Health Research Roadmap* and I look forward to working with all members of Canada’s health research community in its implementation.



Alain Beaudet, MD, PhD
President
Canadian Institutes of Health Research

Executive Summary

As an organization that values innovation, excellence and continuous renewal, CIHR's Strategic Plan, *Health Research Roadmap: Creating innovative research for better health and health care*, builds on the organization's achievements of the past five years to strengthen the areas of health research that Canada excels in and addresses new areas where challenges exist.

CIHR's Governing Council emphasized four underlying principles to guide the process for developing the new Strategic Plan. These included:

Addressing CIHR's full mandate

CIHR will vigorously pursue translating new knowledge into better products and services, enhanced health care and improved health while continuing to support knowledge creation.

Responding to the Federal S&T Strategy

The Government of Canada's 2007 Science and Technology (S&T) Strategy emphasizes building research excellence, translating knowledge into practical applications and deepening the pool of highly skilled individuals. This dovetails with CIHR's overall strategic directions and we will continue to ensure alignment.

Strengthening CIHR's leadership and convenor role

While CIHR collaborates with partners across the country, partnership practices – particularly with the provinces and territories – will be enhanced to support more effectively and promote research and knowledge translation activities that address health and health system delivery threats, challenges and opportunities.

Managing risks and ensuring transparency and accountability

All CIHR programs must be able to withstand rigorous public scrutiny. While support for smaller-scale innovative projects remains, CIHR will establish fewer priorities, and leverage funding from other sources through increased collaborations with stakeholder groups across the country and abroad. CIHR will also enhance the transparency of decision-making and will report on its overall performance using more robust measures and analytical products.

Based on these principles, and cognizant of the health challenges facing Canadians, CIHR will pursue the following strategic directions over the next five years:

1. Invest in world-class research excellence

To conduct research that meets the highest international scientific standards of excellence and that achieves results with impact requires a well-trained base of outstanding investigators, a fair and transparent peer review process, the ability to reach out across disciplines and other countries for innovative proposals, and the assurance that the research is relevant and responds to the challenges and opportunities of the Canadian health system and the health of Canadians.

2. Address health and health system research priorities

CIHR has identified five overarching priorities for the duration of the next plan's mandate:

1. Enhance patient-oriented care and improve clinical results through scientific and technological innovations;
2. Support a high-quality, accessible and sustainable health-care system;
3. Reduce health inequities of Aboriginal peoples and other vulnerable populations;
4. Prepare for and respond to existing and emerging threats to health;
5. Promote health and reduce the burden of chronic disease and mental illness.

3. Accelerate the capture of health and economic benefits of health research

CIHR's role in knowledge translation (KT) is to promote and facilitate the dissemination and application of new knowledge. CIHR will increasingly focus on solutions-based research that involves collaborations between researchers and users of research knowledge to increase the uptake of research findings.

4. Achieve organizational excellence, foster ethics and demonstrate impact

Supporting excellent research requires excellent organizational processes. CIHR will become a leading-edge organization in governance, using innovative practices and state-of-the art technologies.

CIHR will also foster a rigorous ethics approach across the organization and the country by promoting and assisting discussions and applications of ethical principles to health research.

Finally, CIHR will ensure that its decisions are fair and honest, and able to bear close public scrutiny. To report on progress of the implementation of the Strategic Plan, detailed implementation plans will be published annually with clear objectives and performance measures as well as reports on progress.

About CIHR

Mandate

The mandate of CIHR is “to excel, according to internationally accepted standards of scientific excellence, in the creation of new knowledge and its translation into improved health for Canadians, more effective health services and products and a strengthened Canadian health-care system” (Bill C-13, April 13, 2000).

Vision

CIHR’s vision is to position Canada as a world leader in the creation and use of knowledge through health research that benefits Canadians and the global community.

Achieving the mandate and vision

Established in 2000, CIHR promotes a problem-based, multidisciplinary and collaborative approach to health research. Its unique structure brings together researchers from across disciplinary and geographic boundaries through its 13 Institutes. Currently, CIHR supports more than 13,000 health researchers and trainees in universities, teaching hospitals and other health organizations and research centres across the country. The agency supports health research in a transparent process that meets the highest international standards of excellence and ethics in four research areas: biomedical; clinical; health systems and services; and the social, cultural and environmental factors that affect the health of populations.

Institutes

CIHR’s 13 Institutes share responsibility for achieving the fundamental objective of CIHR and have their own distinct strategic plans that are aligned with the overarching directions, mandate and vision of CIHR. The Institutes promote and build upon Canada’s firm foundation of research excellence, engage the research community and encourage interdisciplinary, integrative health research. Through their Scientific Directors and Institute Advisory Boards and under the oversight and guidance of CIHR’s Governing Council, the Institutes work with stakeholders to forge a health research agenda across disciplines, sectors and regions that embraces scientific opportunity and reflects the emerging health needs of Canadians, the evolution of the health-care system and the information needs of health policy decision makers.



13 Institutes

Aboriginal Peoples’ Health
Aging
Cancer Research
Circulatory and Respiratory Health
Gender and Health
Genetics
Health Services and Policy Research
Human Development, Child and Youth Health
Infection and Immunity
Musculoskeletal Health and Arthritis
Neurosciences, Mental Health and Addiction
Nutrition, Metabolism and Diabetes
Population and Public Health

CIHR's Values

To assure Canadians that their investments in health research are used wisely, CIHR embraces values that permeate all aspects of the organization's activities and relationships with others. These core values are:

- **Excellence** – In all aspects of its work including research, knowledge translation and organizational services, CIHR strives to meet the highest international standards of excellence.
- **Scientific Integrity and Ethics** – CIHR upholds and promotes adherence to relevant research and organizational principles with utmost honesty, probity and professionalism. CIHR believes that excellent research, knowledge application and good governance require the development and application of sound ethical principles and processes.
- **Collaboration** – CIHR promotes, encourages and values collaboration among researchers in Canada and internationally. CIHR engages, collaborates and coordinates research activities with federal and provincial/territorial governments and departments, and non-profit and private-sector organizations. CIHR is committed to openness, responsibility, fairness and mutual respect with all its researchers and partners. CIHR cannot fulfil its mandate without the collaboration and support of domestic and international partners.
- **Innovation** – CIHR values new ideas and creative approaches to addressing health and health system challenges in Canada and worldwide.
- **Public Interest** – The public interest is of paramount importance in the creation and use of health knowledge through all research and related activities supported by CIHR.

Context for Strategic Planning

Health advances and challenges

Sustained government investments in health research in recent years have enabled Canada to capitalize on important health discoveries and advances in knowledge. Through these investments, Canada has secured a place on the global stage in such areas as HIV/AIDS, cancer, cardiovascular and respiratory health, neurosciences, diabetes, infectious diseases and immunity.¹ Yet, many health challenges persist while new ones emerge. Increasingly large segments of our population, including First Nations, Inuit and Métis peoples, continue to struggle with heart disease, cancer, diabetes, obesity, mental illness and addiction. Many of these chronic conditions have become increasingly prevalent as Canadians age. And because research shows that many of these chronic diseases begin during fetal life and childhood, we cannot think about the health and health research needs of the aging population without also considering the early causes of chronic disease. A vibrant Canadian population depends on healthy beginnings – starting with maternal, fetal and child health.

Effectively addressing these health issues has become a greater challenge in the wake of the world economic recession. While the North American manufacturing sector has sustained considerable losses of revenue and employment, the recession's impact on health research also has been significant, with many resources and opportunities lost. Fortunately, the Canadian and American governments recognized that to build momentum and ensure future economic sustainability, they needed to invest not only in the traditional economies but also in the knowledge economy. Both governments realize that investing in science and innovation is essential to staying competitive.

However, this realization has increased pressure on Canada's research community and funding agencies to

demonstrate value for money. Demonstrating research impact is not a simple task: the translation of discoveries into new treatments, products and services often can take years. This time lag is further amplified by Canada's large geography, low population density, complex political structure and health system, and diverse health research landscape. Yet, Canada's health researchers have a responsibility to ensure that public investment in their work can improve the lives of Canadians and the future of our country. CIHR also has a duty to raise public awareness about the importance of investing in health research, and to inform the public about the outcomes of that investment.

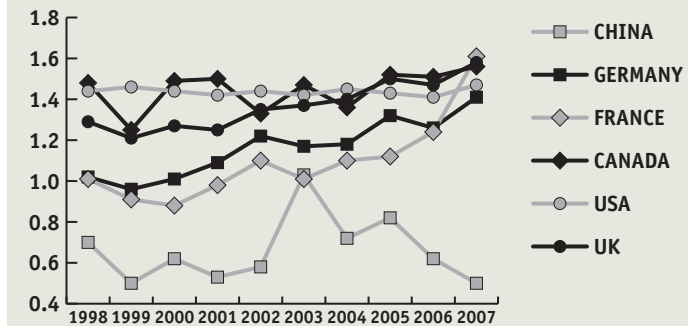
Health research as a lever for better health and a stronger economy

Research and development (R&D) has long been recognized as a potent motor of the economy. Total spending in Canada on R&D in the health field was estimated at \$6.6 billion in 2006, up 6.8% from the previous year.² Most R&D activities are performed at universities, and particularly at university hospitals (63% of all R&D in the health field, representing an estimated \$4.1 billion).³ It is estimated that up to 80% of all health research is conducted in teaching hospitals across Canada,⁴ a setting theoretically ideal for translation of research results from bench to bedside.

Canada has a strong presence in the amount of R&D performed by its postsecondary institutions, ranking second among the Organisation for Economic Co-operation and Development (OECD) countries. Furthermore, Canada is within the top ten countries in terms of citation impact of health sciences papers (Figure 1).⁵

While Canada fares well in academic achievements as measured by peer reviewed publications, there is considerable room for improvement of commercialization of health research results. For instance, as seen in Figure 2,⁶ Canada's

Figure 1. Citation impact of health and medically-related papers



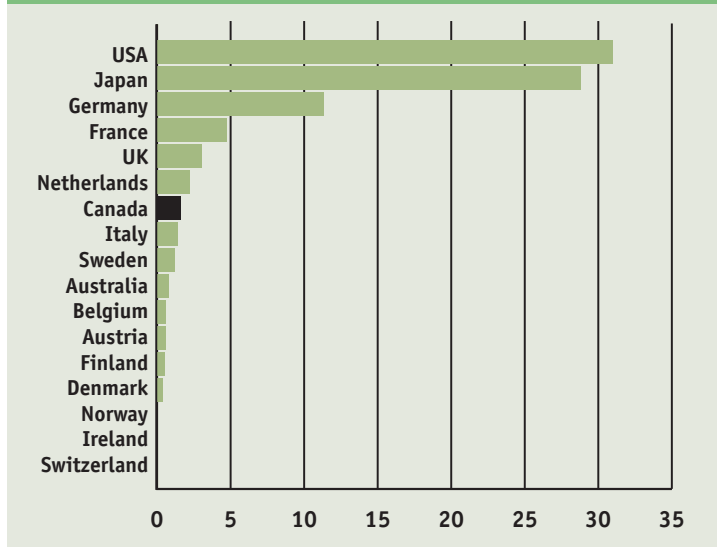
Source: *International Comparative Performance of the UK Research Base*, Report for the Department of Innovation, Universities and Skills, July 2008.

percentage share of world patents pales by comparison with other industrialized countries such as the United States, Japan and Germany.

Several recent studies have confirmed that investing in health research yields significant economic returns. For example, a 2008 UK study⁷ indicated that the GDP return was approximately \$0.30 for every dollar invested in health research each year. A study⁸ conducted in Australia found that every dollar invested in health research between 2003 and 2008 produced net benefits to society (benefits over costs) of \$1.40. The study also suggested any investment in research returns more than double its dollar value in benefits to the Australian society.

The bulk of this return on investment is non-monetary benefits such as extended life expectancy, improved quality of life and reduced inequities in health. This, in turn, translates into increased productivity and a reduced burden on health-care systems. For example, research into new drugs has led to a dramatic increase in breast cancer survival (from 1.5 to 2 years

Figure 2. Canada's share of world patents (country share of world triadic patent families)



Source: Adapted from Conference Board of Canada, How Canada Performs, 2008.

in 1998 to greater than 6 years in 2008). Similarly, the death rate after a heart attack in Canada has decreased by more than 50% in the past decade, due to innovations in treatment and improvements in health systems to provide timely care.

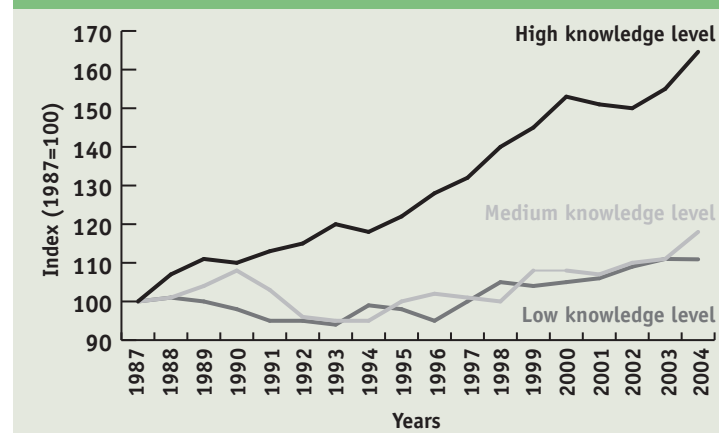
In 2002, a report on the state of the health-care system in Canada established a key link between investment in health research and the quality of health services. Witnesses at the hearings unanimously recommended that the Government of Canada's share of total spending on extramural health research be increased to 1% of total health-care spending in Canada, which, given current spending of more than \$170 billion annually, would amount to \$1.7 billion. With approximately \$1 billion spent in health research through CIHR, this 1% target suggests that a significant gap exists. The 2002 Report of

the Senate Standing Committee on Social Affairs, Science and Technology⁹ concluded that bridging this gap by increasing investment in extramural and in-house health research would bring the level of the federal contribution to health research more in line with that of other OECD countries. More importantly, this would help maintain a vibrant, innovative and leading-edge health research industry.

Health research as a lever for building capacity

One of the main activities of public-sector R&D must be training a highly skilled workforce. As stated by Mike Lazaridis, inventor of the BlackBerry: "The number one reason to fund research well and with vision is to attract the very best researchers from around the world. Once (in Canada), they can prepare Canada's next generations of graduates, masters, PhDs and postdoctorates, including the finest foreign students. All else flows from this."¹⁰ As demonstrated in Figure 3, the level of training is directly linked to the number of jobs created.

Figure 3. Correlation between job creation and level of training (1987-2004)



Source: Statistics Canada, MDEIE

Yet, the current percentage of young people who receive doctoral degrees in Canada remains significantly lower than in other OECD countries.¹¹ While measures such as the Canada Graduate Scholarships and Vanier Scholarships programs are countering this problem, the need to increase enrolment levels at the graduate and postdoctoral levels remains acute, particularly given the pending retirement of many academic researchers. Indeed, the Association of Universities and Colleges of Canada estimates that “Canadian universities will need to replace more than 20,000 faculty members by 2016 due to retirements and attrition.”¹²

The Canadian Research Chairs program also has addressed the challenge of recruiting and retaining academics. Through an investment of \$300 million a year to attract and retain “some of the world’s most accomplished and promising minds,”¹³ more than 550 high-level scientists have been recruited from outside Canada, which represents nearly a third of total recipients.

CIHR must ensure the sustainability of its research community by seeking ways to promote health research among students while increasing the attractiveness of the Canadian research scene and nurturing the mentorship needs of young people already engaged in health research.

International collaboration

The global trend towards greater collaboration in research has become a key ingredient for success in all sectors of science, including health research. A bibliometric study by Science-Metrix shows that international scientific collaboration yields publications with significantly more impact than publications produced by single-nation teams. Canada already performs remarkably well in this regard, with international co-authorship in published scientific articles having tripled between 1985 and 2005.

Recognizing the importance of working at the international level, the *CIHR Act* states that CIHR “should be an international leader in contributing to the global advancement of health research.” CIHR will continue to pursue opportunities and provide support for Canadian researchers to become global leaders. This will be directed by CIHR’s new International Strategy and its priorities to:

- Attract and retain the best international scholars and experts;
- Connect trainees and researchers at the international level;
- Focus on targeted collaborations/consortia that support Canada’s strengths and priorities;
- Facilitate health research capacity building in low- and middle-income countries;



Global Health Research Initiative

CIHR is part of the Global Health Research Initiative (GHRI), a partnership formed by five Canadian agencies. Its mandate is to strengthen Canada’s role in global health research. GHRI funds and facilitates innovative, interdisciplinary research and training programs to address the priorities of low- and middle-income countries.

- Address internationally recognized global health priorities; and
- Proactively respond to emerging health threats.

In this context, the *Health Research Roadmap: Creating innovative research for better health and health care 2009-2014* builds on the established strengths of Canadian health research and addresses those areas where challenges exist or may emerge.

The health research community has been an integral part of the development of this Strategic Plan. CIHR visited university campuses and met with stakeholders throughout the past year. CIHR also conducted a web-based survey, open to all of Canada's health researchers and stakeholder groups and individuals interested in the work that the agency conducts and supports. More than 12,000 individuals and organizations

were invited to participate in the consultations. We are grateful for the contributions of those who chose to participate.

CIHR's *Health Research Roadmap* is grounded in CIHR's mandate and commitment to support excellence across the spectrum of health research – from biomedical; clinical; health systems and services; to social, cultural and environmental factors that affect the health of populations. New knowledge is acquired through innovative ideas and discovery-based health research. CIHR will, through the directions outlined in these pages, continue to support a broad base of the best ideas and the brightest minds as the essential foundation of what it does.



Research in the 21st century is an international undertaking – and, in the area of health, Canada is consistently hitting above its weight. Canadian researchers are, in the words of the Government of Canada's S&T Strategy, performing at world-class levels of scientific and technological excellence. In November 2006, Canadian health researchers won 18 of 39 awards given by the Howard Hughes Medical Institute – awards that recognize the accomplishments and promise of biomedical researchers who are pacesetters in their fields.

Strategic Directions

In this context and cognizant of the challenges and opportunities facing the Canadian health system and the health of Canadians, CIHR will pursue the following four strategic directions over the next five years:

1. Invest in world-class research excellence;
2. Address health and health system research priorities;
3. Accelerate the capture of health and economic benefits of health research; and
4. Achieve organizational excellence, foster ethics and demonstrate impact.

Strategic Direction 1:

Invest in World-Class Research Excellence

Knowledge creation, the first tenet of CIHR's mandate, is the source of changes to our understanding of the world around us. Each new contribution to the field of health science and technology brings us one step closer to understanding the origin of diseases and developing the most effective ways of delivering care and promoting health. Because all scientific progress stems from curiosity-driven questions, CIHR has always provided – and will continue to provide – strong support for discovery-based research.

Excellence is the gold standard for supporting the best ideas and brightest minds and maintaining Canada's competitiveness in today's knowledge economy. As stewards of the public trust, CIHR will spare no efforts to ensure that investments in health research are made on the basis of excellence, a value that encompasses originality and creativity; scientific and ethical soundness; high probability of achieving measurable impact (while ensuring cutting-edge research); and peer review based on international selection standards. This commitment applies to projects that respond to CIHR's open calls for proposals and to competitions that are strategically focused on priority areas. Delivering excellence depends on three critical factors:

1. A well-trained base of investigators with the skills and expertise to design thoughtful and innovative proposals aimed at improving health;
2. A well-managed, fair and transparent process of expert peer review; and
3. The ability to reach out to other disciplines and other countries to promote bold, original thinking and allow for the selection and support of the most innovative and cutting-edge research proposals.

Training, retaining and sustaining a healthy research foundation

Over the next five years, CIHR will sustain a healthy research foundation by: (1) training, attracting and retaining the best talent in health research; (2) providing increased focus on trans-sectoral and multidisciplinary training; and (3) preparing young researchers for non-academic labour markets.

Knowledge creation depends on researchers initiating a constant influx of ideas and innovations. Increasingly, it also depends on their ability to employ new technologies and work in collaboration with other researchers and with research users such as industry partners, community groups, policy makers, patients and clinicians.

This talented workforce – a broad and solid base of the world’s best researchers – supplies the pipeline of ideas that lead to innovation. Other countries around the world are creating attractive work environments and incentives to draw this prized talent. CIHR, in collaboration with key partners, will take specific actions to train, attract, retain and sustain this workforce. Our plan relies on three sets of activities:

1. Providing capacity to attract and retain the best researchers

Canada’s competitiveness depends on the steady entry of highly skilled graduates into the many areas of health research. CIHR must strive to attract the most talented graduate trainees and provide the necessary support to help them succeed in full-time, independent research careers. CIHR is committed to working with its partners at all levels to attract and retain the best health researchers. In particular, CIHR must work with its teaching hospital partners to further attract highly skilled health research professionals with diverse backgrounds to bring fresh views and novel approaches to tackle the present and emerging health challenges and provide unique insights in transferring knowledge into practice.

CIHR will also increase its support for postdoctoral trainees, fellows and early career researchers, both to provide Canadian graduates with international exposure and state-of-the-art training and to attract the best talent from abroad. In addition, CIHR will work with other federal funding agencies and relevant federal departments to resolve current inconsistencies in postdoctoral funding. We will focus specific attention on the level and form of financial assistance as well as its tax treatment. Our challenge then will be to foster and support the early careers of young investigators by providing them with solid mentoring and operational support to maximize their impact on the Canadian research enterprise.



Strategic Training Initiative in Health Research

The Strategic Training Initiative in Health Research (STIHR) was launched in 2001. This six-year initiative for training support represented an important investment by CIHR and its partners, with CIHR and the Institutes contributing close to \$85 million. STIHR was designed with the aim of creating opportunities for successful research teams to strengthen and expand training in cutting-edge research domains by offering training support for health researchers.

2. Breaking professional and sectoral barriers in health research

Health research training requires a new focus on harmonization across professions and sectors that will provide stimulating research environments. Training in pillar one (biomedical) will have to break traditional disciplinary/departmental moulds to better equip young investigators for multidisciplinary and team-based research approaches. Successful development of research will also require robust, multidisciplinary settings that will help bring together experts in health, policy, science and technology. Their skills could include such expertise as: medical, social sciences, humanities and health knowledge; project management; data collection and management; knowledge of ethical, legal and social issues; and patient support. Strong emphasis will be put on encouraging health professionals to return to research by creating appealing clinical research career paths. New resources will be allocated to make certain these professionals are offered appropriate incentives such as designated/protected time to conduct research.

3. Preparing young researchers for various labour markets

CIHR's mandate includes a duty to build "the capacity of the Canadian health research community through the development of researchers and the provision of sustained support for scientific careers in health research." This includes nurturing trainees not only for academic careers, but also for work in the public, private and not-for-profit sectors. They will need a broadened approach that enables them to adapt to changing environments and new ways of thinking. This will also provide Canada's industries with highly qualified personnel, such as scientists, research managers and patent lawyers, who are better suited to their development needs. Because knowledgeable people are key to knowledge translation, this will also help build the receptor capacity needed in various sectors, such as health care, to effectively integrate and use the results of research activities. This commitment also includes sustaining excellence in other non-scientific fields, such as the social, cultural, political and environmental sciences, that may exert an influence on the health of our population.



Working Collaboratively with NSERC and SSHRC

CIHR has collaborated with its research agency partners (Natural Sciences and Engineering Research Council and Social Sciences and Humanities Research Council) on major strategies that include supporting world-class research excellence (e.g., through the Canada Excellence Research Chairs) and training (e.g., Vanier Canada Graduate Scholarships), through the attraction and retention of outstanding researchers (e.g., Canada Research Chairs), the use of partnerships and multidisciplinary approaches (e.g., Business-led NCEs, Industrial R&D Internships, College and Community Innovation) and the provision of state-of-the-art infrastructure (e.g., Centres of Excellence in Commercialization and Research, Indirect Costs of Research Program).

Selecting and sustaining research excellence

Over the next five years, CIHR will enhance international standards of excellence by:

(1) strengthening peer review quality in each of the four health research pillars; and (2) improving the breadth and quality of its peer review panels.

The purpose of peer review is to ensure excellence in the research CIHR funds. The system also guarantees accountability, not only to the Government of Canada and the Canadian taxpayer – the source of CIHR funding – but to the research community at large. The peer review system has served Canadians well, and the members of the health research community who provide hundreds of volunteer hours to work on panels each year are to be commended for their commitment. Our peer review system has been internationally recognized for its design and effectiveness. Therefore, as we move forward, we will make improvements to the system where they are needed, while also building on its strengths.

Peer review is carried out by committees of experts who encompass the four pillars of health research. Whether investigator-initiated, or submitted in response to a specific request for applications, research proposals are selected for funding on the basis of excellence. Judging excellence is no small task. Peer review must be performed by health scientists with proven track records and the ability to use their knowledge to select proposals with the greatest scientific merit. To fully deliver on CIHR's mandate, the definition of "peer" must be expanded to include knowledge users who are experienced in the application of research and capable of judging its potential for impact.

The International Panel mandated to review CIHR's performance in 2005-06 commented on the importance of peer review, noting the current system's fatigue and

the need to re-evaluate it. Health researchers expressed the same concern in 2008-09 during the President's roundtable discussions. A number of participants indicated that some committee members faced challenges with respect to time and expertise, especially given the high volume of applications and the increasing number of multidisciplinary proposals. These concerns will be addressed through CIHR's modernization of its programs and peer review system.

In the coming years, CIHR will continue to ensure that the peer review system is able to meet the knowledge requirements of health researchers across all four pillars. In addition, we will strengthen our processes and criteria for identifying excellence and innovation so that proposals from each pillar of health research are evaluated with the same degree of rigour and fairness.

We will also make certain that programs designed to achieve major impacts are shared outside the health research community – with decision makers, health practitioners, community leaders and the public. Indeed, CIHR's mandate is aimed at supporting health research in all its dimensions, as long as it contributes to improved health, more effective health services and products and a strengthened health-care system.

At the same time, CIHR will ensure an appropriate balance between sustainability and creativity in health research. This can be achieved only by considering both programs and peer review. Steps will be taken to support and sustain in the long term the research enterprise of high-performing investigators who have demonstrated consistent creativity and productivity over the years. As well, our program infrastructure and the peer review system will allow for the scouting of new talent and will ensure that new investigators are provided with the necessary support to undertake successful health research careers.

Finally, better mechanisms will be set up for detection and selection of thoroughly innovative, potentially groundbreaking, albeit uncertain, research proposals. These objectives can only be met if CIHR has the right mix of funding programs in place with a high-performance peer review system. For this purpose, CIHR will take the necessary steps to continue to ensure that review panels: (1) have the necessary expertise and are given reasonable numbers of grants to assess; (2) enlist only the most qualified reviewers and draw more heavily on international experts than has been the practice until now; and (3) are appropriately instructed as to the objectives of the program for which they review and the selection criteria on which they are to draw their conclusions.

Promoting interdisciplinary and international innovation

Over the next five years, CIHR, along with its 13 Institutes, will lead and/or support international collaboration efforts in health research by: (1) attracting and retaining the best international scholars and experts; (2) connecting Canadian scientists with top health researchers in the international community; (3) leading the development of international health research consortia; and (4) facilitating health research capacity building in low- and middle-income countries.

Increasingly, health research is becoming both a multidisciplinary enterprise and a team pursuit. CIHR recognizes that innovative and groundbreaking research is emerging at the borders of fields supported respectively by CIHR, the Social Sciences and Humanities Research Council and the Natural Sciences and Engineering Research Council, especially in areas such as the social determinants of health, nanotechnologies, medical devices and imaging. It is critical, then, that CIHR work more closely with its federal

counterparts, including the Canada Foundation for Innovation, the National Research Council, Genome Canada, the Canadian Health Services Research Foundation and the International Development Research Centre, as well as provincial health research organizations and agencies to foster high-impact research initiatives in trans-disciplinary settings. CIHR will work closely with its partners to provide support for research that has national and international impact. Also, we will foster an interdisciplinary environment that will appeal to the best international scholars and experts.

As global citizens, we must support international health research collaborations that aim to improve the health of all people. For example, in June 2009 CIHR and five other of the world's foremost health research agencies that collectively manage an estimated 80% of the globe's public health research funding came together to form a landmark alliance in the battle against cardiovascular diseases (mainly heart disease and stroke), several cancers, chronic respiratory conditions, and type 2 diabetes.¹⁴ The Global Alliance for Chronic Diseases will act on the findings of the collaborative paper, *Grand Challenges in Chronic Non-Communicable Diseases*.¹⁵ Undoubtedly, collaborations such as this one will continue to strengthen Canada's position on the world stage by connecting our scientists with top international experts.

The Government of Canada's S&T Strategy not only acknowledges Canada's international research contributions in areas such as infectious diseases and regenerative medicine, it also challenges Canada's research community to go further. With only 4.5% of the global pool of knowledge coming from Canada, there is room for the health research community to do more. CIHR is ready to both lead and support strategic international ventures in areas of national strength. We will seek to partner on large-scale innovative collaborations such as the International Collaborative Research Strategy on Alzheimer's Disease and Related Dementias and the Human

Frontier Science Program. This will be done when it is clear that the international collaboration adds value to our own efforts and helps leverage new expertise and resources for our health researchers.

By investing in these types of initiatives with countries that have a reputation for scientific excellence we will help solve some of the most pressing health questions of our time. Through international collaborations, CIHR will also be able to effectively support Canada's researchers on the world stage. Such collaborations encourage mobility between countries and allow students and researchers to access new ideas, techniques and technologies that ultimately benefit Canada.

CIHR has made important progress in building international collaborations by establishing more than 150 partnerships in countries in Africa, the Asia-Pacific region, Europe and the Americas. These activities include joint funding opportunities and programs, joint workshops and international symposia. Nevertheless, there is still more to be done to meet current global health challenges. That is why Canada, through the Canadian International Development Agency and the International Development Research Centre, has endorsed the World Health Organization's Millennium Development Goals. Canada has considerable research strength in this domain and our strength should be leveraged to forge international partnerships and collaborations. CIHR will continue to support health research initiatives that will have a global impact.

In addition, Canada has a role to play in helping low- and middle-income countries develop their science capacity, build health research excellence and develop knowledge translation capabilities. Guided by a new International Strategy (forthcoming), we will meet these responsibilities and build on the progress that has already been achieved.

Strategic Direction 2:

Address Health and Health System Research Priorities

As a relatively small country on the global stage, Canada must choose where to make its mark. Its standing in the knowledge economy will depend on its ability to capitalize on areas of strength and excellence, re-energize identified priority areas, and build research capacity in new fields of health research. CIHR and its 13 Institutes already interact with stakeholders in all sectors and levels of government to prioritize and build strategies that respond to the health needs of Canadians. These strategies also address the needs of the provinces and territories and respond to the priorities of the Government of Canada and its Department of Health. Many also meet the priorities and sub-priorities identified by the Science and Technology Innovation Council as critical to Canada's international competitiveness.

For instance, CIHR leads the Canadian Longitudinal Study on Aging, which brings together major Canadian universities as well as Statistics Canada, Health Canada and many provincial organizations. This large, national, long-term study of adult development and aging will examine health transitions and trajectories and will provide significant opportunities for co-operative research activities globally through, for example, data harmonization. Multiple waves of data releases over the 20-year study will help Canadian researchers and decision makers to better identify modifiable factors that could be developed into interventions to improve the health and quality of life of people as they age.

The impact of the environment on health is another overarching concern. Because embryos, fetuses and young children are highly susceptible, investigating possible adverse effects of exposure to environmental toxins is of

particular importance to ensure healthy pregnancy outcomes and child development. The importance of this is magnified in Aboriginal peoples' communities, which have both a high proportion of infants and young children and higher exposure to many environmental contaminants. CIHR's Institute of Human Development, Child and Youth Health and its partners have funded major strategic health research initiatives to better our understanding of environmental impacts on reproductive health and the health of our children.

CIHR is committed to the emergent field of regenerative medicine through its Regenerative Medicine and Nanomedicine Initiative (RMNI), one of the agency's largest projects. Since its inception, RMNI has been closely aligned with CIHR priorities, working in partnership with most CIHR Institutes and engaging with other granting agencies, government departments, Networks of Centres of Excellence and numerous voluntary health organizations and non-governmental organizations. The focus for research funding support has been on multidisciplinary team-based approaches and innovative projects that could make a significant health impact. Funded projects have spanned the full spectrum of regenerative medicine, from using nanotechnology to develop clinical diagnostics, to the potential use of bioengineering to make repairs to the nervous system. We have supported research into novel drug delivery technology, innovative rehabilitation strategies for spinal cord repair, and the creation of a network of researchers examining the ethical, economic, environmental, legal and social issues involved in regenerative medicine.

Both CIHR's Scientific and Governing Councils have identified a number of major health and health system challenges that currently confront the Canadian population or likely will do so within the next few years. These include:

- Increased demands and costs on Canada's health-care system;
- Health inequities faced by Aboriginal peoples and other vulnerable populations;
- Existing and emerging global threats to health;

- Effects of climate change on the Arctic and Northern populations; and
- Growing prevalence and burden of chronic diseases, including mental illness and neurodegenerative diseases, in an aging population.

These challenges and how CIHR intends to respond to them are detailed in greater length in the pages below.

Setting research priorities

Over the next five years, CIHR will respond to Canadian health and health system challenges by supporting and championing research designed to: (1) enhance patient-oriented care and improve clinical results through scientific and technological innovations; (2) support a high-quality, accessible and sustainable health-care system; (3) reduce health inequities of Aboriginal peoples and other vulnerable populations; (4) prepare for and respond to existing and emerging threats to health; and (5) promote health and reduce the burden of chronic disease and mental illness.

CIHR will focus its activities on five broad priorities and will integrate these priorities into the open operating grants programs and in specific programs designed to maximize the impact of health research in identified areas. They are:

1. Enhance patient-oriented care and improve clinical results through scientific and technological innovations

Canadians expect health research to continue to deliver new technologies, treatments and drugs as a result of government investment in research. Canadians also expect health research to inform improvements in access to timely, affordable and quality health care. Canada has a combination of structural advantages that will help CIHR use the levers of research to help deliver high-quality care and improve health outcomes.

These structural advantages include an ethnically diverse, stable population, a single-payer health system, emerging electronic health record systems and a strong academic health sciences community. To better capitalize on these strengths and encourage translation of discoveries from the bench to the clinic, the community and the marketplace, CIHR is developing a flagship strategy for patient-oriented research. The overall objective of this strategy is to improve health outcomes for Canadians by fostering a culture of inquiry at all levels of the health system through targeted investments that support people, infrastructure and programs devoted to local and leading-edge, patient-oriented research.

To achieve this, CIHR will collaborate with the provinces, our partners at universities and teaching hospitals, health professionals, and decision makers in the health system and industry to develop a common vision and joint processes to both develop knowledge and move it into improved patient care, while making the Canadian health-care system more efficient.

2. Support a high-quality, accessible and sustainable health-care system

Canada's health-care system faces critical challenges, including infrastructure deficiencies, capacity limitations and dwindling human resources. Like many countries, Canada also has an aging population and a growing rate of chronic diseases, both of which place significant pressures on the sustainability of the health-care system.

In addition to directly improving the quality of life of Canadians, prevention research can also unburden health-care systems. For instance, it is estimated that 250,000 patients (one in nine) admitted each year develop hospital-associated infections. Of these patients, 8,000 die. Estimates of the cost of these infections to the Canadian health-care system range from \$435 million to \$1 billion annually. Enhanced preventive health measures that focus on scientific evidence could improve patient safety and reduce health-care costs, while reducing the number of antimicrobial-resistant infections in the community.



Research Breakthrough – ACS

A CIHR-funded study led by Dr. Kellie Murphy of Mount Sinai Hospital has found evidence that will change how women at risk of preterm birth are prescribed antenatal corticosteroids (ACS). While it has previously been established that one course of ACS is beneficial for babies at risk of preterm birth, it was unknown until now whether this treatment continues to be effective in multiple courses. The randomized trial determined that multiple courses of ACS actually increase the probability the baby will suffer adverse effects such as weighing less and having a smaller head circumference. The findings were published in *The Lancet*.

Another essential component for ensuring sustainable health-care systems is the capability of effectively providing decision makers and the research community with high-quality health research evidence and data to inform optimal decision making. Electronic Health Records (EHRs) are a critical input into research, decision making and optimizing the safety and timeliness of care. CIHR is therefore committed to investing in research that will optimize EHRs to bridge existing information gaps. CIHR has already funded 75 EHR-related projects with a combined value of approximately \$9 million. CIHR's Institute of Health Services and Policy Research has specifically identified health information (including EHRs) as a top priority for strategic investment and has sought to forge a partnership with Canada Health Infoway, a key stakeholder in the area of EHRs. Future investments will focus on the use of EHRs to manage and prevent chronic diseases and to improve efficiency, quality, safety and effectiveness in primary care settings.

CIHR will also continue to invest in programs designed to respond to the health system challenges faced by health professionals and health-care decision makers. In 2008, CIHR revitalized its Partnerships for Health System Improvement (PHSI) program. PHSI supports high-quality applied health services research and offers Canada's health system decision makers evidence-informed answers to their

most pressing questions. Every PHSI project involves collaboration between decision makers and researchers interested in working together to address health system challenges. Projects have investigated innovative strategies for primary care reform, quality and safety in long-term care facilities, recruitment and retention of physicians in rural regions and priority setting for new and expensive cancer drugs. CIHR will continue using the PHSI program to help translate health research into decisions that improve the quality, accessibility and sustainability of the health system.

3. Reduce health inequities of Aboriginal peoples and other vulnerable populations

Research into the complex interactions of determinants of health – from socio-cultural factors to biological and environmental ones – is vital to understanding the health of individuals, communities and global populations. Since 2000, CIHR has funded research initiatives that specifically address issues of health disparities related to poverty and income inequality. These studies have benefitted from the perspectives and insights of different health research disciplines, including the social sciences and humanities. CIHR remains committed to supporting excellence across the whole spectrum of health research.



Drug Safety and Effectiveness Network

CIHR, in partnership with Health Canada, will establish the Drug Safety and Effectiveness Network (DSEN) to increase the evidence on the post-market safety and effectiveness of drugs available to decision makers across the Canadian health-care system and increase capacity within Canada to undertake high-quality research in this area. The DSEN is a major health products initiative under the Food and Consumer Safety Action Plan (2007), whose partners (CIHR, Health Canada, the Public Health Agency of Canada and the Canadian Food Inspection Agency) are taking action to enhance the health and safety of Canadians.

Poor health arises from a variety of factors including poverty, exposure to trauma and violence, and lack of social support and resources. These vulnerabilities prevail among people with disabilities, women, new immigrants and refugees, and those living in rural and remote communities.

Many of these factors and conditions are particularly pronounced among Aboriginal peoples. CIHR and its Institutes, led by the Institute of Aboriginal Peoples' Health, is committed to working with First Nations, Métis and Inuit populations to build our knowledge base and develop the tools needed to respond to the unique health challenges they face. Many of Canada's vulnerable populations struggle with critical health issues, including infectious disease, chronic disease, mental illness and poor access to health services. Not addressing these problems often leads to additional and more devastating health consequences. For example, 30% of people diagnosed with a mental illness will also have a substance use disorder in their lifetime, and 37% of people with an alcohol use disorder also live with a mental illness.¹⁶ CIHR will continue to support health research that builds our understanding of the challenges Canada's vulnerable populations face and to provide them with new forms of clinical care.

CIHR also will launch strategic initiatives to examine the health determinants that have an impact on the lives of immigrants and refugees. Immigration is a major driver of Canada's population growth and economic well-being. However, research suggests that immigrants' health may decline after coming to Canada. It is imperative to address the unique problems this vulnerable population encounters, such as the health system challenges presented by language and cultural differences.

4. Prepare for and respond to existing and emerging global threats to health

The many environmental threats, the depletion of potable water in many impoverished countries and the numerous pandemic influenzas and viral outbreaks have all reinforced the notion that health challenges have no boundaries. An influenza pandemic (such as H1N1) for example, would have severe health, economic and social consequences worldwide, with millions falling ill. It is estimated that 4.5 to 10.6 million Canadians could become ill during a major pandemic outbreak.

The threat of a pandemic outbreak compels us to adapt by implementing rapid and effective responses. Increased



International Collaboration – CHVI

The Canadian HIV Vaccine Initiative (CHVI) is a partnership between the Government of Canada and the Bill and Melinda Gates Foundation that supports a coordinated contribution to global efforts to accelerate the development of a safe, effective, affordable and globally accessible HIV vaccine.

CIHR is leading, in partnership with the Canadian International Development Agency, the Discovery and Social Research stream of the CHVI. It will make a significant contribution to research and research capacity focused on: the discovery of HIV vaccines and related issues (e.g., mucosal and innate immunity) and social and behavioural issues around HIV vaccines (e.g., accessibility and acceptability of vaccines, and cultural and other sensitivities to HIV vaccine use).

collaboration is required to enable effective responses by government organizations, agencies and departments.

CIHR's experience with SARS in 2003 demonstrated the importance of a rapid research response to battle outbreaks and keep them from spreading. Researchers mounted an aggressive response and, within 11 weeks, sequenced the genome of the coronavirus – an unprecedented achievement. This information was extremely valuable in identifying possible targets for vaccines. The experience also demonstrated that solid research plays an important role in containing threats such as a pandemic disease.

CIHR's Institute of Infection and Immunity has taken a leading role in initiating funding opportunities for research in these strategic areas. In particular, using the \$21.5 million allocated to CIHR by the Government of Canada to support pandemic influenza research, it has developed a Pandemic Preparedness Strategic Research Initiative that was on the ready to undertake rapid research responses, including the creation of a Public Health Agency of Canada (PHAC)/CIHR Influenza Research Network, when the 2009 H1N1 influenza spread across the globe. Moving forward, this Network will support the research community in coordinating and addressing the H1N1 influenza pandemic.

CIHR will continue to establish initiatives to respond to emerging health threats while at the same time acknowledging that disease prevention and treatment strategies for existing large-scale epidemics such as HIV/AIDS will remain the cornerstone for future research successes.

5. Promote health and reduce the burden of chronic disease and mental illness

Chronic conditions such as heart disease, cancer, diabetes, obesity, asthma, allergy and arthritis, as well as mental illness, addiction and substance abuse, continue to plague millions of Canadians.

For example, at least 6 million Canadians (one in five) are affected by lung disease, which is the third-leading cause of hospitalization in Canada. The World Health Organization estimates that up to 80% of premature heart disease, stroke and type 2 diabetes and 40% of cancer can be prevented through healthy diet, regular physical activity and avoidance of tobacco.

Mental illness continues to affect millions of Canadians. As noted in the 2004 Senate Committee report on mental health in Canada, one out of every ten Canadians aged 15 and over reported symptoms consistent with mental illnesses and/or



Research Breakthrough – Chronic Pain

Between 20 and 30% of Canadians experience chronic pain at some point in their lives. Dr. Yves De Koninck of Laval University has helped demonstrate that chronic pain is not a symptom but a disease itself. Dr. De Koninck's team has identified an ion pump dysfunction in the nervous system that distributes the transmission of pain signals. Based on these discoveries, Dr. De Koninck is developing a new series of painkillers. He is also a co-investigator, with Dr. Michael Salter of the University of Toronto, in a collaborative national training program called Pain Research from Molecules to Community.

substance use disorders.¹⁷ Stigma, discrimination and stereotypes associated with mental health continue to diminish the quality of life of millions of Canadians. While the Mental Health Commission of Canada has made great strides in the short time since its creation in 2007, there are many areas of mental health that need further research, including mental health in the workforce and post-traumatic stress disorders.

CIHR will continue to take innovative measures through strategic investments to address chronic diseases and mental illnesses and will continue to forge strategic partnerships with the Mental Health Commission of Canada. CIHR will also work collaboratively with other departments and agencies, notably PHAC, to tackle chronic diseases such as heart disease and lung disease.



Research Breakthrough – Cigarette Warnings

A study by Dr. David Hammond at the University of Waterloo found that smokers exposed to large, graphic warnings on cigarette labels were more likely to be aware of the risks of smoking than people exposed to small, text-only warnings. Smokers who had to look at pictorial warnings every time they reached for a cigarette were also more likely to think about quitting. This CIHR-funded study suggests that warning labels are effective and that cigarette packages may be a good place to include contact information for smoking cessation services.

Strategic Direction 3:

Accelerate the Capture of Health and Economic Benefits of Health Research

A unique aspect of CIHR's mandate is the "translation of knowledge into improved health for Canadians, more effective health services and products and a strengthened Canadian health-care system."¹⁸ CIHR's role in knowledge translation (KT) is to promote the dissemination and application of new knowledge to improve health and health services and facilitate commercialization of research. The KT process is critical in responding to Canada's health and health system challenges. KT is the mechanism through which the impacts of our investments in research, such as improved health and economic benefits, will be felt.

KT is a dynamic and iterative process that includes knowledge synthesis, dissemination, exchange and ethically sound application. The KT process takes place within a complex system of interactions between researchers and knowledge users. These interactions may vary in intensity,

complexity and level of engagement, depending on the nature of the research and the needs of the particular knowledge user. KT is about making users aware of knowledge or innovations to facilitate its uptake. It is also about closing the gap between what we know from research and what we do with that knowledge.

A key to successful KT is the nature of the partnerships between health researchers who produce knowledge and knowledge users who address real-life challenges. As evident from the description of priorities 1 and 2 under Strategic Direction 2, CIHR intends to focus increasingly on solutions-based research that involves collaboration between researchers and users. This begins with shaping research questions that will generate solutions to pressing problems. It is well documented that bringing creators and users of knowledge together increases the application of research findings. Through continuing to fund knowledge syntheses, dissemination of research findings, integrated KT research and supporting research into the science of KT, CIHR will be making important progress in fulfilling its KT mandate.



Collaborating to Develop a Health Research Framework

In 2006, the International Review Panel assessing CIHR's first five years noted:

A major outstanding challenge for CIHR and health research in Canada is the apparent lack of coordination at the federal and provincial levels of the many different types and sources of funding for different aspects of health research.

In Canada, health research and knowledge translation priorities are developed by many partners, including federal, provincial and territorial governments and agencies, academic healthcare organizations, foundations and charities, the private sector and others. CIHR will work with these partners to develop a health research framework to assist in setting priorities, supporting excellence and innovation, and contributing to evidence-informed public policy to better meet the needs of Canadians.

Reaping socio-economic benefits from research through KT and partnerships

Over the next five years, CIHR will build effective collaborations by: (1) facilitating and strengthening partnerships between researchers and knowledge users and between CIHR and a variety of organizations so that the impact of research is maximized; (2) supporting evidence-informed policy making to improve health and the health system at both the provincial and federal levels; (3) facilitating innovation and commercialization by creating incentives for health researchers to work with private sector partners to translate health research findings into improved health products, technologies and tools for Canadians; and (4) implementing citizen engagement initiatives.

Historically, Canada has benefited from the efforts of federal and provincial governments, voluntary health organizations, industry, teaching hospitals and professional associations, all of whom have made significant contributions to KT through public education, training, professional development, knowledge synthesis, guideline development and dissemination, and commercialization. Guided by our KT and Partnership Strategies, CIHR will focus greater attention on collaborating with a variety of partners to support and facilitate KT aimed at enhancing impact in priority areas.

CIHR aims to support both federal and provincial governments in their efforts to integrate research knowledge into policies that affect health and the health system. We will continue to strengthen our relationships with government partners to support evidence-informed policy making, build linkages with researchers and encourage research needed by government partners. Ongoing work in this area includes the Partnerships for Health System Improvement initiative and the Evidence on Tap pilot program. Both foster partnerships among government, stakeholders, researchers and CIHR to increase linkages between applied research and policy.

Through its commercialization and innovation strategy, CIHR will continue to catalyze collaborations between industry and the research community to translate health research into improved health products, technologies, tools and services. CIHR will continue to provide incentives to researchers to engage the private sector and address its research needs. CIHR will collaborate with federal and provincial departments and agencies, private sector partners and others to move health research along the innovation pipeline into health and economic benefits for Canadians.

In partnering with industry, CIHR will adhere to balanced ethics guidelines that facilitate and promote successful partnerships. Guiding principles will include: accountability, stewardship



CIHR/Rx&D Collaborative Research Program

The CIHR/Rx&D Collaborative Research Program encourages linkages between universities, hospital research communities and research-based pharmaceutical manufacturers. The program helped fund a major international clinical trial involving 5,296 people from 191 clinics spread across 21 countries. In late 2006, researchers from McMaster University announced the first results from the DREAM (Diabetes REDuction Approaches with ramipril and rosiglitazone Medications) trial, revealing that treatment with rosiglitazone reduced the risk of getting diabetes by 60% among those tested. The CIHR/Rx&D investment has been key to a tremendous level of industry support and has resulted in many jobs and training opportunities for research in Canada.

of public resources, transparency, and proper disclosure and effective management of conflicts of interest and intellectual property issues.

The capacity of Canadian research institutions to promote projects that meet the highest ethical standards is being tested by the volume and complexity of health research proposals. Therefore, CIHR will work to reduce delays and duplication in the ethical review process, particularly in regard to large multi-centre trials, as an efficient, streamlined and high-quality ethics review is a key factor to attract foreign investment.

In our role as a convenor, CIHR recognizes the importance of the collective effort and the benefits of bringing people and organizations together to work collaboratively. Engaging citizens in the health research and KT process is an important area of focus for CIHR. Through its Citizen Engagement Framework, the agency is moving forward in realizing a more systematic, ongoing integration of citizens' input in priority setting, governance and funding programs. This Framework consists of a cohesive and consistent approach to

engaging citizens in CIHR research processes, including participating in decision making and informing strategic priorities. We anticipate this Framework will further strengthen the KT of health research in the years to come.

Enhancing the application of research and its evaluation

Over the next five years, CIHR will intensify KT research by: (1) advancing the application of research and its evaluation; (2) building the capacity of both researchers and knowledge users to engage in KT; and (3) increasing the number of researchers to advance the science of KT.

Tens of thousands of health sciences research articles are published every year. Through knowledge syntheses such as systematic reviews, we can determine areas, based on strong evidence, that are ready for application and work with partners to move findings into practice.



Canada Joins International Effort to Provide Access to Health Research

Accelerating the development of discoveries and innovations and facilitating their adoption through free and open access to research findings. This is the aim of PubMed Central Canada (PMC Canada) that will provide researchers and knowledge users free access to a vast digital archive of published health research at their desktop and connect them to an emerging international network of digital archives anchored in the United States.

CIHR, the National Research Council and the US National Library of Medicine have partnered to establish this national digital repository of peer reviewed health and life sciences literature, including research resulting from CIHR funding. This searchable Web-based repository will be permanent, stable and freely accessible. PMC Canada will help researchers build upon one another's work and speed up the discovery and innovation process to address important health challenges.

To enhance the application of research, CIHR must increase the number of health researchers who understand KT and what it means for their work. This will require increasing capacity in the creation of appropriate dissemination plans, the knowledge of how to move research into action, and the understanding of how to engage potential knowledge users in the research process. In this way, we will be better able to meet the needs of knowledge users in the health, public and/or industrial sectors. Knowledge users, through their engagement in CIHR's integrated KT projects, will learn how to incorporate evidence in their decision making and thereby become KT ambassadors who move research with a strong evidence base into practice and policy.

Finally, resources need to be directed to the science of KT to learn more about the determinants of knowledge use and best practices for speeding the uptake of knowledge. We need to know which strategies are effective, to whom and under what circumstances. Implementation science is a growing field and CIHR will play a key role in supporting and training KT scientists.

Strategic Direction 4:

Achieve Organizational Excellence, Foster Ethics and Demonstrate Impact

Over the next five years, CIHR will advance organizational excellence and ensure transparency and accountability by: (1) developing state-of-the-art human resource management practices across the organization; (2) applying technology-based solutions across the organization; (3) evaluating the overall success of CIHR; and (4) developing an annual implementation delivery plan.

Advancing organizational excellence and ensuring transparency and accountability

To support our strategic directions, CIHR's corporate systems must be nimble, effective and driven by excellence. CIHR will become a leading-edge organization in governance excellence and will use innovative practices, which will enhance our accountability to the public and to the Government of Canada. CIHR's Governing Council, with its breadth of experience and diversity, will support adherence to CIHR's strategic directions and priorities.

We will ensure that our multi-year investment strategy is supported by sound financial and risk management practices, including clear accountabilities, timely financial and performance reporting and sufficient operating resources. We will also offer a world-class working environment and engage and retain a motivated, committed and productive workforce through our people practices, policies and programs. We will strive to be recognized as one of Canada's best employers.

Solutions will be implemented to improve client service, increase the quality, efficiency and effectiveness of program delivery systems, and reduce complexity for stakeholders. CIHR will also strengthen activities to reduce our ecological footprint and will implement practices that enable stakeholders to do the same.

CIHR will advance the implementation of ResearchNet, the electronic “application to decision” platform, by developing tools for collaboration, post-award administration and reporting. The agency will also focus on improving its management information systems to support effective and timely decision making. With its partners, CIHR will continue to improve the Canadian Common CV as a tool to support researchers as they apply for funding in Canada. In collaboration with the provinces, CIHR will develop a Directory of Canadian Health Researchers.

CIHR is committed to measuring and reporting on the results related to its strategic directions, core activities and programs. Reporting back to the Canadian public, health research stakeholders and partners supports the values of public interest, transparency and accountability.

As part of the mechanisms set up for ensuring accountability, CIHR will undertake a second external review by an international blue-ribbon panel in 2010-11. This extensive review of CIHR’s 13 Institutes and of the organization as a whole will greatly contribute to illustrating progress over CIHR’s first ten years as well as providing suggestions for improvement in the future.

Fostering a culture of ethics

Over the next five years, CIHR will continue to foster a culture of ethical research by promoting and assisting the discussion and application of ethical principles to health research.

The conduct of research requires a balance between the interests of science and the protection of those involved as research participants. Respect for ethics principles enhances the protection of research participants and enables and promotes sound scientific progress. CIHR is committed to fostering ethics in health research by:

- Building capacity in ethics research;
- Funding research on ethics;
- Promoting the ethics of research;
- Stimulating debate on emerging ethical issues;
- Encouraging health researchers to consider the ethical issues inherent in their research; and
- Developing and implementing ethics and integrity policies and/or guidelines that are in keeping with CIHR’s mandate as a research funder.

In addition to supporting the above mentioned activities, CIHR’s 2009 Ethics Strategy will promote three major directions: governance of research involving humans; inclusion of diverse communities and populations in health research; and the ethics of health research in an increasingly globalized world. In the years to come, CIHR will remain a national leader in the promotion of ethical health research.

Assessing progress and impact

Over the next five years, CIHR will assess progress and impact by demonstrating the impacts of its investments.

Canadians are aware of the benefits of health research, as shown by public opinion surveys that consistently find more than 85% popular support for health research funding. The Kirby Report (2002)¹⁹ and the Romanow Commission (2002)²⁰ recognized the value of health research in terms of health benefits, with the latter also pointing to the significant benefits of health research to the national economy.

Consistent with an international trend to better tracking and capturing of the multi-faceted social and economic benefits associated with these investments, CIHR has sponsored, together with 22 other partners, an assessment by the Canadian Academy of Health Sciences (CAHS) on how to best measure the impacts of health research. Their report, *Making an Impact*, was published in January 2009. It outlines a framework for measuring health research impacts that builds on the Buxton Payback model²¹ and takes into account health, economic and social fallouts. It also illustrates how “research impacts feed back upstream, potentially influencing the diffusion and impacts of other research, and creating inputs for future research.”²²

CIHR will build an impact framework based on the CAHS proposed set of methods to measure the returns on the investment, establish benchmarks and gauge progress in realizing the value of health research. This impact assessment framework will capture results in five areas:

1. **Advance knowledge** – the impacts of research in the areas of discoveries and breakthroughs, and contributions to the scientific literature.
2. **Build capacity** – the impacts of research and participation in research projects and programs on the development and enhancement of the research skills of individuals and teams.
3. **Inform decision making** – the impacts of research in the areas of science, public, clinical and managerial health decision making, practice and policy.
4. **Improve health and the health system** – the impacts of research which include advances in prevention, diagnosis, treatment, palliation, quality of life and improvements to the health system.
5. **Contribute to the economy** – commercialization of discoveries, direct cost savings, human capital gains, and employment.

Next Steps – Implementation of Strategic Plan

CIHR’s Strategic Plan endeavours to build on the organization’s success and to support health research across the whole spectrum. We believe that our efforts to meet the health needs of Canadians will succeed only if we continue to apply the excellence-based, comprehensive approach that has become our trademark. To ensure that our *Health Research Roadmap* truly guides CIHR’s activities, we will develop annual implementation plans that align with the directions and commitments we have set out. The desired outcome of these plans is to provide Canada’s health researcher community with updates on how we are doing. Each plan will detail how the strategic directions have been addressed by highlighting uptake, progress and completion of the identified initiatives.

The annual implementation plans also will identify initiatives that will be undertaken for the next fiscal year. These targeted initiatives will have been identified in consultation with Scientific Directors and senior management. Not only will these initiatives align with CIHR’s Strategic Plan, they will also support the work undertaken by each of CIHR’s Institutes and described within their specific strategic planning documents.

The annual implementation plans will also provide measurements of progress through a series of identified performance indicators developed in association with each strategic direction. We believe that measuring our success is imperative for providing both transparency and accountability to the Canadian public.

Endnotes

- 1 The Committee on the State of Science and Technology in Canada, Council of Canadian Academies, *The State of Science and Technology in Canada*, 2006, p. 5.
- 2 Statistics Canada, 2007.
- 3 Idem.
- 4 Association of Canadian Academic Healthcare Organizations, *Moving at the Speed of Discovery: From Bench to Bedside to Business*, November 2007.
- 5 *International Comparative Performance of the UK Research Base*, Report for the Department of Innovation, Universities and Skills, July 2008.
- 6 Conference Board of Canada, *How Canada Performs*, 2008, <http://www.conferenceboard.ca/hcp/details/innovation/share-of-world-patents.aspx#countries>.
- 7 Wellcome Trust, *Medical Research: What's It Worth? Estimating the Economic Benefits from Medical Research in the UK*, 2008.
- 8 Access Economics, *Exceptional returns: The Value of Investing in Health R&D in Australia II*, 2008; prepared for the Australian Society for Medical Research, www.asmr.org.au/ExceptII08.pdf.
- 9 The Senate Standing Committee on Social Affairs, Science and Technology, Final Report, Volume Six, *The Health of Canadians – the Federal Role*, October 2002, <http://www.parl.gc.ca/37/2/parlbus/commbus/senate/Com-e/soci-e/rep-e/repoct02vol6-e.htm>.
- 10 Mike Lazaridis, *Investing in the Future*, July 31, 2006, <http://www.innovationcanada.ca/en/articles/investing-in-the-future>.
- 11 Organisation for Economic Co-operation and Development, *Science, Technology and Industry Scoreboard 2007*.
- 12 Association of Universities and Colleges of Canada, *Momentum: The 2008 Report on University Research and Knowledge Mobilization*, p. 39.
- 13 Canadian Research Chairs website, http://www.chairs-chaires.gc.ca/about_us-a_notre_sujet/index-eng.aspx.
- 14 Global Alliance for Chronic Disease, News Release, June 15, 2009.
- 15 Various authors, Grand Challenges in Chronic Non-Communicable Diseases, *Nature*, No. 450, pp. 494-496, November 22, 2007, www.nature.com/nature/journal/v450/n7169/full/450494a.html.
- 16 Skinner, W., C. O'Grady, C. Bartha, and C. Parker, *Concurrent Substance Use and Mental Health Disorders: An Information Guide*, 2004, Centre for Addiction and Mental Health.
- 17 Senate Standing Committee on Social Affairs, Science and Technology, *Mental Health, Mental Illness and Addiction: Overview of Policies and Programs in Canada*, November 2004.
- 18 *CIHR Act*, April 2000, (Bill C-13).
- 19 The Senate Standing Committee on Social Affairs, Science and Technology, Final Report, Volume Six, *The Health of Canadians – The Federal Role*, October 2002, <http://www.parl.gc.ca/37/2/parlbus/commbus/senate/Com-e/soci-e/rep-e/repoct02vol6-e.htm>.
- 20 Romanow, Roy, J., Commissioner, Final Report, *Building on Values: The Future of Health Care in Canada*, November 2002.
- 21 Buxton, M.J., and S.R. Hanney, *The Return on Investments in Health Research: Defining the Best Metrics*, Cyril Frank, 1996 – adopted by CIHR in 2005 and 2008 from the Canadian Academy of Health Sciences, <http://www.caHS-acss.ca/e/assessments/completedprojects.php>.
- 22 Canadian Academy of Health Sciences, *Making an Impact: A Preferred Framework and Indicators to Measure Returns on Investments in Health Research*, Report of the Panel on Return on Investment in Health Research, January 2009, p.18.