

AHSCs: More Important than Ever in the Century of Health Research



COMMENTARY

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ABSTRACT

We are in the midst of a profound revolution in health research, a revolution being driven by our emerging understanding of the molecular basis of life and human disease. This revolution is creating a century of health research, characterized by the convergence of virtually all disciplines, from mathematics to the social sciences and humanities. This convergence of disciplines is introducing radical changes and opportunities in the discovery and R&D process of health research.

Academic health sciences centres (AHSCs) are strategically placed to contribute to, and benefit from, this revolution. To that end, AHSCs require exceptional visionary leadership, a commitment to clinical and research excellence, a full appreciation of the complete tripartite mission of AHSCs, and the development of an outward-looking stance that includes the development of public policy. The federal government's clear and sustained commitment to health research, as demonstrated recently by the 15% increase to the Canadian Institutes of Health Research budget, provides an important opportunity for AHSCs to demonstrate their crucial role in both the development of an innovative and cost-effective healthcare system and to Canada's broader social and economic agenda.

IN THEIR INSIGHTFUL ARTICLE, Jeff Lozon and Robert Fox discuss the challenges and opportunities that lie ahead for academic health sciences centres (AHSCs). They note that, on the one hand, the tripartite mission of AHSCs – patient care, teaching and research – has never been as valued and important as it is today. And yet, on the other hand, they point out the many internal and external challenges that threaten the robustness, if not the actual viability, of AHSCs.

Among the latter are the sheer complexity of AHSCs, the absence or rudimentary nature of their accountability and transparency (in part due to the complexity of the organization and the public mission), severe and ongoing financial constraints coupled with rising public expectations and concerns, and serious questions about balancing the future roles for tertiary and quaternary clinical centres with home care and long-term step-down institutions.

In this period of rapid and pervasive change, AHSCs require, more than ever, strong and visionary leadership to develop new and appropriate structures and strategies. This new organizational agility must be balanced by an appreciation of the core values of AHSCs, including a caring patient and community-centred environment, a commitment to excellence and a problem-based team approach to the tripartite mission.

The central thesis of this commentary will be that despite these pressures and challenges, AHSCs have good reason to be optimistic. Their role in this new century, a century that I have called the century of health research, is more important than ever. AHSCs are strategically and uniquely positioned at the interface

between discovery and practice. Their traditional tripartite role of patient care, teaching and research provides exactly the environment necessary to nurture and incubate the research enterprise, train the next generation of caregivers and researchers in a rich problem-based environment, guide and inform research questions by clinical problems and conversely alter clinical practice through research.

The Revolution in Health Research

We are truly in the midst of a profound and transformative revolution in health research. Unquestionably, health research has become the most promising new frontier in research. The sequencing of the genomes of humans and other species has transformed both what research questions can now be asked and how they are answered. The explosive growth of genomics and proteomics, and the insights into the role of our genes and protein products in our biology, has become possible as a result of the convergence of both academic disciplines and technologies: high-performance computing, robotics, combinatorial and surface chemistry, human and model organism genetics, cell biology and integrative physiology, structural biology, diagnostic imaging. Our biological insights into human health and disease have quite simply been transformed over the past decade. Enriching these insights is a deepening understanding of the social, economic, behavioural and environmental determinants of health.

I have no doubt that these parallel streams – the biological and non-biological determinants of health – will converge over the next few years to create a new

science of epidemiology that implicitly acknowledges that our health as individuals and as a society is the summation of the complex interplay between all of these factors. Clearly, the next 10 to 20 years promises to be a truly golden era of health research, with huge potential for significant scientific advance, new understanding, new diagnostics and treatments, and tremendous commercialization opportunities.

Most important, and most relevant to this commentary, health research is emerging as a significant driver of change and innovation within the healthcare system itself. An individual's susceptibility to disease will be based on genotypic profiling using gene chips and gene wafers, combined with lifestyle analysis. This analysis will lead to a presymptomatic medicine that will, in turn, lead to new approaches to disease prevention and health promotion. Nanotechnologies, coupled with increased computer power, will lead to new ways of directly visualizing inside our bodies to detect and perhaps repair early signs of disease.

Genomics and pharmacogenomics will transform diagnosis and patient stratification. Medicine will increasingly move from a clinical, symptomatic-based diagnosis to a new diagnosis based on understanding the molecular alterations that underlie disease. In addition, an individual's response to drugs will increasingly be incorporated into treatment decision-making. We are entering a new era of individualized medicine, where drugs will be tailor-made to fit both the specific disease and the individual patient.

Clinical trials will also profoundly change to take advantage of this new discriminating power. Patients entering a

clinical trial will be stratified based on the molecular nature of their disease. The new anti-cancer drug Gleevec from Novartis is a case in point. Gleevec was developed as a small molecule inhibitor of tyrosine kinases. Accordingly, it makes obvious sense to assess its efficacy against those cancers associated with alterations in a tyrosine kinase. Indeed, Gleevec is showing very encouraging results against both chronic myelogenous leukemia (CMC) and gastrointestinal stromal tumours (GISTs), two cancers assisted with mutations in the genes that encode the ABL and KIT tyrosine kinases, respectively.

The Emerging Role of AHSCs

This tsunami wave of science, this revolution in health research, coupling the biological, clinical and social sciences with the humanities, computational methodology, nanotechnology, the natural sciences and mathematics, is transforming not just health research. This revolution will transform our health system and our economy. In this period of rapid and pervasive change, AHSCs are ideally positioned to ride this wave by combining their traditional roles and values of patient care, teaching and research, with a problem-based, multidisciplinary approach. This is, indeed, the time to bring diverse disciplines and approaches to bear on important problems.

Intrinsic to the values and culture of AHSCs is exactly this multidisciplinary environment and approach to health. We are truly in an era of convergence where so much of the excitement lies at the border between disciplines. Advances over the coming decades require the meaningful interaction of disciplines. Biologists,

clinical and social scientists, engineers, humanists, ethicists, epidemiologists, mathematicians, and computer scientists, physicists and chemists all have reasons and opportunities to interact. For example, biology and health research is increasingly becoming an information science, while recent exciting advances in high-power computing are coming from the potential use of DNA as a nanocomputer.

Universities can and will provide much of the framework for these interactions. But the real action and excitement will derive from trying out new concepts and reagents in patients, their families and in the population as a whole. AHSCs, working in partnership with their affiliated universities and other partners, provide a public and accessible face to the broader community. The creation of the Canadian Institutes of Health Research and its 13 Institutes has uniquely positioned Canada and our partner host institutions – universities and AHSCs – to be at the leading edge of this exciting new frontier and to harness the combined intellectual power that comes from collaboration and partnership to strengthen AHSCs and to transform the practice of medicine and our health system in this new century of health research.

Canadian AHSCs are well positioned internationally to take a lead, outward-looking role in this century of health research. As much as cost containment is an issue in Canada, the AHSCs in the HMO environment of the United States are facing even tougher cost containment challenges. Federal and provincial governments in Canada have almost tripled the overall levels of support for research over the past five years and despite the immi-

nent downturn in the economy, there is every reason to think that the long-term support for research will continue to grow.

Partnerships

Partnerships are key to the tripartite mission of AHSCs. Partnerships with the host academic institution, with all three levels of government, with the local community, and with research funders in government, the public, industry and the health charities, are all essential to the vibrancy of AHSCs. These partnerships have different needs and expectations, creating a complex landscape for AHSCs. Public funds are typically the single largest source of funds for patient care, education and research. Thus, public accountability, transparency and the appropriate guidelines for the conduct of research in an academic environment are also essential for AHSCs.

While partnerships can certainly be time consuming, they are also the foundation of the true strengths of AHSCs. The richness of these partnerships is one of the best indicators of the vibrancy of an AHSC. The Governing Council of CIHR struck a Working Group on Partnerships, co-chaired by Drs. Michel Bureau and Matt Spence. Their excellent report has now been received by the Governing Council (see www.cihr.ca). It will be used as a starting point to initiate a national discussion on how to implement best practices for partnering for our universities and AHSCs.

Conclusion

The next 20 years will witness profound research-driven changes in our healthcare system. AHSCs will be the primary protagonists and testing sites for these

changes. The most successful AHSCs will be those that develop research-intensive niches that allow them to stand out from community hospitals and other AHSCs. The research culture is international and therefore best flourishes in environments that are outward-looking and that can identify and reward excellence. The costs of health research, and the increasing ethical and public policy issues that emanate from health research, also require host institutions that are outward-looking and understand how public policy is developed.

The recent federal budget tabled on December 10 included a \$75 million annual increase to CIHR and a one-time \$200 million fund to cover the indirect costs associated with the federal support for research. These two welcome measures are particularly noteworthy given the recent downturn in the economy and the global situation. They clearly indicate the government's commitment to sustain and support health research and provide great reason for optimism for health research and the future of AHSCs in Canada.



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