

The Promise of the Health Sciences in the 21st Century

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There's a revolution taking place in the health sciences, and it's forcing a different view of human health and health-care in the 21st century.

The roots of this revolution can be found in the rapid and convergent advances in fields of research as diverse as genetics, chemistry, population health and computational science. The increasingly multidisciplinary nature of health research also stems from the full engagement of healthcare "consumers"—patients, the public, healthcare providers and policy-makers—in the health research enterprise. Taken together, these changes have transformed the nature and focus of health research, simultaneously opening the doors to profound complexity, but also holding the promise of comprehensive systems solutions to seemingly intractable problems, whether it's the mysteries of the human body or our health system.

These changes have also created a new imperative for healthcare. The

health sciences revolution is pressuring governments and societies everywhere to rethink and re-engineer existing health institutions and research approaches. In this new universe, it is clear that science must inform the development of public policy. At the same time, public policy and the public interest will increasingly inform and guide the directions of research carried out with public funds. The recent creation of the Canadian Academies of Health Sciences is both timely and necessary; this organization will play a vital role as an adviser and partner, helping navigate the challenges and opportunities in the changing health sciences landscape.

Changes in this landscape had their origins in the colossal advances in deciphering the cellular and molecular basis of life. Deriving the sequence of the human genome and the Canadian discovery of stem cells did more than just advance our understanding of the human body. Virtually overnight,

this new knowledge transformed biology and medicine from a descriptive science to an information science, right in the middle of the revolution occurring in the information and communication technologies.

This revolution in genomics and its sister sciences is not the only scientific and technological revolution going on in the health sciences. Clinical and population epidemiology have had remarkable successes in teasing out the risk factors of disease. Most recently, the Interheart Study by Dr. Salim Yusuf at McMaster University, with his colleagues from around the world, identified dietary factors, exercise, obesity, excessive drinking and so on as risk factors for heart disease, diabetes and stroke. We no longer think of chronic diseases as the inevitable consequences of aging—they are all due to specific, attributable risk factors, and they are not inevitable.

Each of these achievements has set the stage for further advances that will reverberate well beyond the current century. The key to each of these—and, indeed, of the revolution itself—is the convergence between different disciplines to create entirely new approaches to disease understanding, prevention, detection and treatment. For example, the fusion of engineering with nanotechnology, stem cell biology and genomics is creating a dramatically new science of bioengineering with entirely new approaches to the early detection of disease, drug development and delivery and organ repair.

As a consequence of this revolution, medicine is moving rapidly from a reac-

tive to a proactive mode as the genetic, behavioural and socioeconomic risk factors for disease are identified. This transformation will lead to increased emphasis on prevention, health promotion and targeted medicine.

As noted earlier, individual Canadians are playing a central role in this revolution. An educated public, with interest in and immediate access to the very latest in medical and scientific advances via the Internet, will not say: “Whatever you say, doctor. You know best. What do I know?” Rather, they will ask, “Why aren’t you offering Herceptin, as they are at Sloan-Kettering?”

There are numerous challenges and opportunities to be addressed in the midst of this changing health research environment. These include the changing nature of disease, the transformation in Canada’s demographics, the high costs of new technologies and new drugs, the sustainability of our health-care system and the growing health disparities between rich and poor countries.

The research community must respond to these exciting opportunities confidently, boldly and across disciplines. It must protect and nurture public confidence in the motivations driving research and the ethical framework within which it is carried out.

There is also tension within the research community between those who argue that excellence should remain the sole criterion for funding and those who no longer perceive a dichotomy between excellence and relevance. There is room for both posi-

tions if, together, we articulate a vision so compelling, so large, so exciting, so important and so essential to Canada's future that it becomes inevitable. The scientific opportunities are too exciting, the global stakes are too high and the pace is too rapid for the Canadian health research community not to soar above these tensions.

This is an exciting challenge for the entire Academy. The research community must open its doors to the public and provide an equal place at the table where research priorities are debated and decided. The emerging generation of scientists understands this integrative and inclusive vision for health research. Not surprisingly,

young people see the future because, of course, they will create it.

If we succeed in sustaining and expanding this exciting revolution in health research, if we succeed in striking creative global partnerships that will shape and harness this new science to improve health and healthcare and if we succeed in diminishing the disparities between those who have access to this new science and those who do not, then we will pass on a better world to our children.

(Based on the keynote address delivered by Dr. Bernstein at the inaugural meeting of the Canadian Academies of Health Sciences on September 21, 2005, in Vancouver, BC.)

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