Terry Fox's legacy: a case for translational research

M. Chasen MBChB MPhil (Pall Med)

In 1980, Terry Fox dipped his artificial leg into the cold Atlantic water in St. John's, Newfoundland and Labrador, to launch his run across Canada to support cancer research. His dream was to raise enough money to make a real difference in the shared universal hope: find a cure. Terry Fox's Marathon of Hope and the annual school and community runs held in his name over the last 30 years have raised more than $550 million worldwide for cancer research. Breathtaking advances in technology and discoveries in cell biology, biochemistry, proteomics, genetics, genomics, and bioinformatics have occurred during that interval. The origin and progression of cancer are now understood in detail that could not have been imagined three decades ago.

For example, technological advances such as high-throughput DNA sequencing have made it possible to identify all the mutations that drive cancer progression in a single individual's disease. Optimists believe that the cost of such sophisticated technologies can be brought down to an affordable level for our health care system. At the same time, pharmaceutical companies have leveraged the explosion in cancer knowledge to develop drugs that target molecules specific to cancer cells. Such therapies can be tailored to the genetic makeup of individuals. The strategy is straightforward: a full-force, targeted attack on cancer cells, with minimal collateral damage to a patient's normal cells. These therapies are the holy grail of personalized medicine: predictable pre-selection of patients for effective, targeted interventions. The need for predictive oncology has spawned enormous effort worldwide to identify clinically useful biomarkers for that purpose.

Despite these obvious reasons for optimism, it is difficult to avoid the thought that, historically, scientific discoveries do not translate easily into improved patient outcomes. A classical example is trastuzumab, a humanized monoclonal antibody that blocks HER2 tyrosine kinase signalling and cancer cell proliferation, and that was the first targeted therapy for HER2-positive metastatic breast cancer. It took more than 20 years from the laboratory discovery of the HER2 oncogene before the targeted drug trastuzumab became a reality. That reality resulted from focused and relentless translational research by committed individuals, pushing trastuzumab to clinical trials and, finally, adoption by the heath care system. The lesson learned is that transformative changes are needed if breakthroughs such as trastuzumab are to happen more regularly.

What changes are required?

The journal *Nature,* the paragon of communicating basic discoveries, stated in a recent editorial [1] that more funding is required for translational research. It acknowledged the "uncomfortable truth" that "scientists and clinicians have been unable to convert basic biology advances into therapies." It noted that researchers and physicians "speak in separate tongues." And so translation is needed, as is much more investment in this area.

Ahead of the curve, here in Canada, the Terry Fox Research Institute (TFRI, www.tfri.ca) was created three years ago by the Terry Fox Foundation to focus on translational cancer research. With a promised $50 million, the Institute's mandate is to partner with others, to be nimble, and to create a model for effective translation—that is, to identify the most effective and cost-efficient ways to move innovation into the clinic sooner to benefit patients.

Many players need to work together in that effort: clinicians, scientists, health system managers, policymakers, caregivers, regulatory agencies, and professional bodies. So far, the Institute has signed memoranda of understanding (MOU) with more than 42 cancer research and control institutions, universities, and hospitals across the country to create a TFRI "without walls." These MOU partners have agreed to collaborate and to move the translational vision forward.

Large-scale tumour-site-specific studies are TFRI's focus, with the goal of producing evidence of measurable improved health outcomes. These studies are milestone driven and pan-Canadian in scope. An

Dr. Chasen is Managing Editor of Current Oncology *and Medical Director Palliative Rehabilitation at the Élisabeth Bruyère Hospital in Ottawa.*

Copyright © 2010 Multimed Inc.

example is the Early Lung Cancer Detection study launched in partnership with the Canadian Partnership Against Cancer, which aims to accrue 2700 study subjects across the country. Other biomarker-focused, pan-Canadian projects in ovarian, prostate, and oral cancer are in their initial stages. The Institute is creating a blueprint for a national translational infrastructure that, to our knowledge, has no parallel. We all hope that TFRI will be successful.

Although improving the mechanism for translating science rapidly into the clinic is necessary, it is not sufficient. Transformative change must also be made to yield better results at the whole-systems level. This year, TFRI set out, in a series of three pan-Canadian dialogues, to illuminate to the public and the Canadian health system the complexities and challenges of personalized medicine. *Current Oncology* has been pleased to publish, in its October and December 2010 issues, meeting reports of the dialogues held in the Atlantic and West Coast regions. The Ontario dialogue will be published in an upcoming issue (February 2011). The journal hopes to raise the consciousness of readers in regard to the preparations for personalized medicine that all Canadians must collectively make. The dialogues have been insightful. We have learned that the ethical, social, clinical, and economic complexities are enormous, and that tough choices will have to be made.

The science is here. The technology is here. "But are we prepared for personalized medicine?" ask TFRI and its dialogue participants. "Do we know what lies ahead?"

Clearly, the answer to both questions today is "no." At every level and across every sector, but especially within their own fields of practice, all members of the health care system need to consider how they are going to prepare themselves, their patients, and others for this transformational change in cancer care.

Thirty years after Terry Fox began his incredible journey, the Marathon of Hope, in St. John's, Newfoundland and Labrador, we are at the "tipping point" of a new journey, of applying science and technology to truly change cancer care, and of creating a future of improved outcomes for individual patients. These are exciting times!

REFERENCES

1. Hope in translation. *Nature* 2010;467:499.

Correspondence to: Martin Chasen, Division of Palliative Medicine, Élisabeth Bruyère Hospital, 43 Bruyère Street, Ottawa, Ontario K1N 5C8.
E-mail: mchasen@bruyere.org