



Ontario Institute
for Cancer Research

ONTARIO
CANADA

Unique Opportunities **ONCOLOGY ASSET MAP**

AN ANALYSIS OF ONTARIO'S R&D EXCELLENCE AND COMMERCIALIZATION CAPACITY

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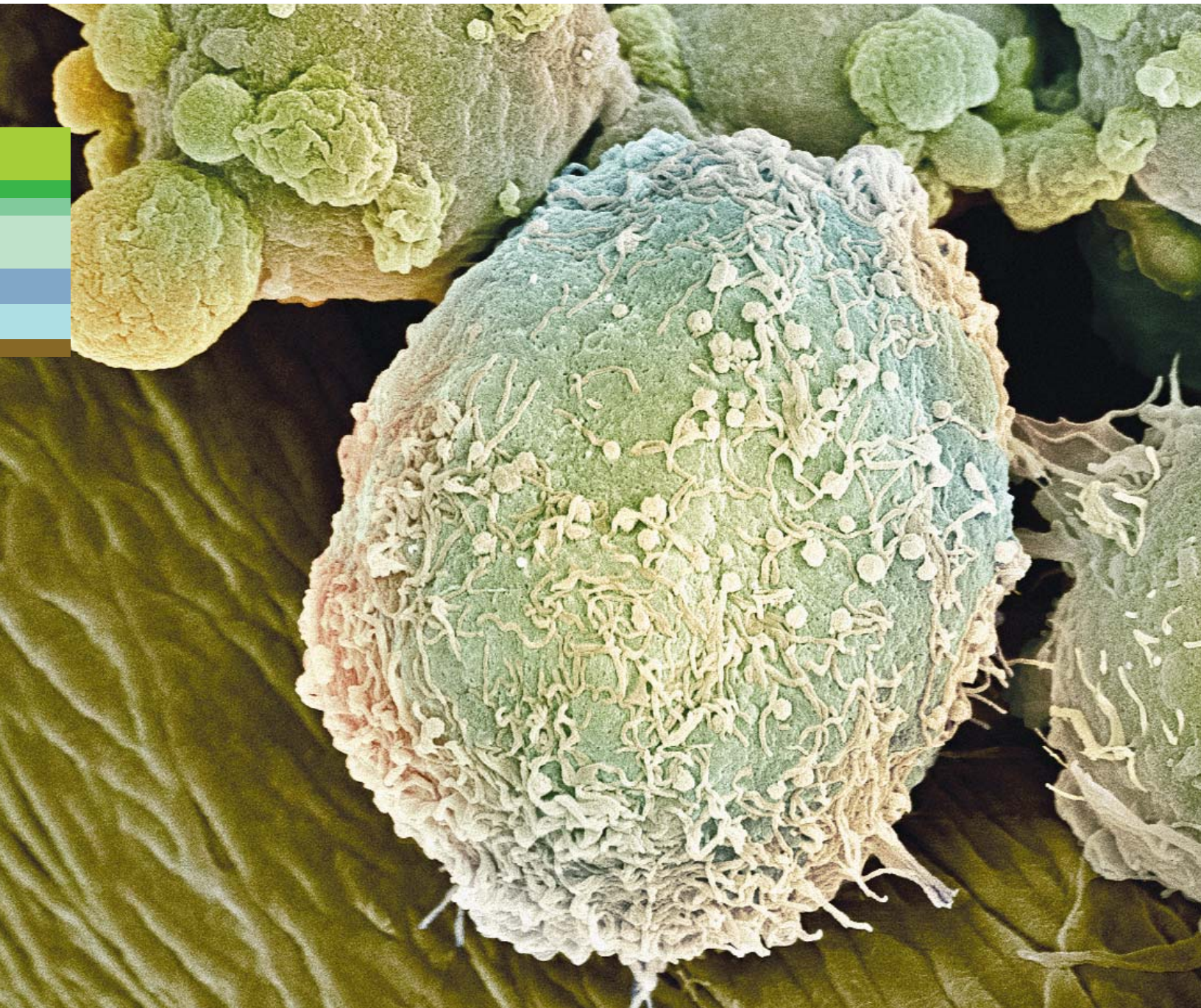


Cover image: Lymphoma lymph cell. Coloured scanning electron micrograph (SEM) of a lymphoblast from a patient with lymphoblastic lymphoma. This form of cancer is most often found in children and teenagers, and involves the replacement of normal lymphocytes (a type of white blood cell) by lymphoblasts. These lymphoblasts develop from lymphocytes, interfering with the patient's normal immune system. This malfunction can then develop into lymphoblastic leukemia, with excess production of lymphoblasts. Lymph nodes, the spleen and liver can all become enlarged, and the weakening of the immune system allows life-threatening illnesses.

“We’re developing dynamic international partnerships in Ontario that bring together the minds and the means to tackle complex research questions in cancer. And we’re quickly moving our discoveries from the bench to the clinic.”

– Dr. Tom Hudson, President and Scientific Director, Ontario Institute for Cancer Research, Toronto





EXECUTIVE SUMMARY



Ontario is one of the leading centres for biomedical research in North America. It is home to an outstanding academic community comprised of approximately 650 cancer scientists actively conducting research in more than 20 types of cancer at 16 universities, 5 independent research centres, 22 hospitals and 37 affiliated research institutions/cancer centres. Expertise emanates from all regions in the province and is distinguished by a hub of academics in the Greater Toronto Area (GTA). The established presence of internationally renowned experts in clinical trials, stem cells, genomics, imaging and oncolytic viruses signals not only the calibre of local research, but also the presence of a critical mass of networks and state-of-the-art technologies that facilitate research.

A key challenge in translating discovery and developing novel agents into safe commercial products is having the clinical trials infrastructure to bring products to market and improve the quality and affordability of healthcare. Ontario is able to rise to that challenge through its organized cancer system and outstanding clinical trials groups: the National Cancer Institute of Canada Clinical Trials Group (NCIC CTG) at Queen's University in Kingston; the Ontario Clinical Oncology Group (OCOG) at McMaster University in Hamilton; and the Princess Margaret Hospital Consortium in Toronto. The Clinical Trials Program and Ontario Cancer Research Ethics Board of the Ontario Institute for Cancer Research (OICR) have enhanced the ability of these groups to conduct better trials. The successful coordination on the part of these and other networks and consortia can be measured by the doubling of the number of patients enrolled in cancer clinical trials in the province since 2003.

The Government of Ontario has created a haven for commercialization opportunities within the province. Vital infrastructure in place includes the provincial commitment to funding biomedical research and commercialization; an abundance of tax credits supporting R&D; the creation of pivotal organizations linking and coordinating existing cancer centres within the province; the MaRS convergence centre for business and investment services; and the MaRS Innovation commercialization engine.

Ontario's strengths in biomedical research support a network of commercialization. Cutting-edge cancer research conducted in many fields, including imaging, biomarkers and high-throughput sequencing, affords unique opportunities for commercial ventures within the province. Together with homegrown Ontario industries such as VisualSonics Inc., known for its novel mouse ultrasound imaging system, and DVS Sciences Inc., known for its proteomics platform, the academic community in Ontario is actively seeking to build on its successes by translating discoveries into innovative applications for the future of cancer care.

INTRODUCTION

The province of Ontario has identified cancer as an area with unique opportunities for supporting research and innovation. Exploitation of these opportunities is expected to impact the burden of cancer and also lead to the creation of innovative industries and commercial partnerships.

Over the past 50 years, many funding institutions, hospitals and universities have played pivotal roles in nurturing cancer research in Ontario. The Canadian Cancer Society (CCS) and National Cancer Institute of Canada (NCIC) stand out as the first major sources for cancer funding in the province and continue their support via their recent amalgamation to form the CCS Research Institute. Other important sources of funding for cancer research are the following: the Terry Fox Foundation; the Canadian Institutes of Health Research (CIHR), previously the Medical Research Council; and the Canadian Breast Cancer Research Alliance (CBCRA). In 1958, Ontario officially opened the Ontario Cancer Institute (OCI), a pioneering hospital-based cancer research centre with strong connections through many academic appointments to the University of Toronto. OCI has been a tour de force in cancer research in the province and has had a hand in training many of Canada's leading scientists. As the research arm of the University Health Network's (UHN) Princess Margaret Hospital, the OCI continues to grow in international stature as one of the leading cancer research institutes in the world. In the sphere of academia, McMaster University has gained historical stature for its early clinical trials program and the University of Toronto for its epidemiology program. The Department of Public Health Sciences at the University of Toronto is also particularly recognized for having spearheaded the Canadian National Breast Screening Study.

Ontario has had a centrally organized cancer care system since 1943, when the Government of Ontario created the Ontario Cancer Treatment and Research Foundation (OCTRF). The OCTRF received a mandate to create cancer centres specializing in cancer treatment, coordinate basic and clinical cancer research, stimulate public education and provide overall management of the cancer system. Following its launch, OCTRF created a provincial network of cancer programs and regional centres linked to all of the faculties of medicine in Ontario. Through the Ontario Cancer Registry, OCTRF was acclaimed as a pioneering resource for research outcomes.

By 1996 the increased complexity of treating cancer required a reorganization of the cancer system to ensure its integration with other aspects of the healthcare system. To address this issue, the Government of Ontario reshaped OCTRF to create Cancer Care Ontario (CCO) in 1997 with a comprehensive mandate to improve cancer services in the province by linking the universities and hospitals in each region.

The commitment to biomedical research and commercialization in Ontario runs deep. In the Toronto region alone, more than \$1.3 billion is spent annually on biomedical R&D by the public and private sectors. The Government of Ontario is investing in an aggressive innovation agenda to ensure that Ontario's economy is one of the winning economies in the 21st century through more than \$3 billion in spending over eight years. In its 2009 budget the provincial government again reinforced its priorities by increasing the budget of the Ministry of Research and Innovation (MRI) by \$715 million. The investment from the Government of Ontario greatly exceeds that of any other province in Canada (see Figure 1 and Table 3), and the Ontario investments synergize with federal organizations and programs to stimulate biomedical research and commercialization (see Table 2).

Ontario is noted as one of the most tax-friendly jurisdictions for biotechnology, as evidenced by the more than 69 R&D centres involved in oncology research across the province. Further incentives were demonstrated with the introduction in January 2009 of a 10-year Ontario income tax exemption (OTEC). The first of its kind in Canada, OTEC encourages Ontario entrepreneurs to turn home-grown ideas developed by Canadian academic institutions and research institutes into new corporations, jobs and products in the province. In addition, the 2009 Budget proposes a tax reform package that will cut Ontario's marginal effective tax rate on new investment in half. This would make Ontario one of the most competitive jurisdictions in the industrialized world for new investments. In combination, the provincial and federal tax credits have the capacity to reduce the after-tax cost of a \$100 R&D expenditure to less than \$36.

The Ontario Government's dedication to cancer research was underscored by the creation of the Ontario Institute for Cancer Research (OICR) in 2005. With a commitment of \$357 million for its first five years, OICR's mandate is to facilitate translational research among all cancer-related centres in Ontario by serving as the bridge between existing centres and promoting the translation of their discoveries into innovations impacting the cancer burden.

The epicentre for Ontario's plans to advance the commercialization of biomedical research is the MaRS Centre. Occupying 700,000 square feet of prime office and laboratory space in downtown Toronto, this convergence innovation centre is in close proximity to the University of Toronto, major teaching hospitals, research hospitals and the offices of the provincial government. MaRS, which opened in 2000, boasts more than 65 tenants, including biomedical companies, research institutes, investors, legal and financial services and technology transfer offices. Funded with \$100 million of private and public money, it provides a wide range of business and investment

services to assist researchers and new companies to commercialize their technologies. MaRS and its developer partner plan to double the space of the current complex to better accommodate the needs of existing and emerging biotechnology enterprises.

The federal Centres of Excellence for Commercialization and Research (CECR) recently awarded a \$15-million grant over five years to MaRS Innovation, a newly established commercialization engine co-founded by MaRS and 13 research centres in the GTA. MaRS Innovation, which serves Toronto's Discovery District, is the lead commercialization portal for participating institutions in the area and has expanded its outreach and infrastructure capability to provide Ontario-wide activities and services for commercialization.

This Oncology Asset Map provides a sampling of what Ontario offers biopharmaceutical and biotechnology companies interested in taking advantage of the abundance of in situ strengths concentrated around oncology research, translation and R&D within the province.

Table 1: PROVINCIAL PROGRAMS SUPPORTING BIOMEDICAL RESEARCH IN ONTARIO

Provincial Program	Description
Biopharmaceutical Investment Program	<ul style="list-style-type: none"> → part of the \$1.15-billion Next Generation of Jobs Fund supporting incremental R&D and advanced drug manufacturing → pays up to 20% of eligible project costs of \$5 million or more
Ontario Research Fund: Research Excellence Program	<ul style="list-style-type: none"> → R&D and commercialization funding for public research institutions, with \$730 million budgeted over four years for public research institutions to encourage innovation and private sector collaboration → pays up to 30% of operating costs
Ontario Venture Capital Fund	<ul style="list-style-type: none"> → \$205-million government-supported venture fund committed to stimulating venture capital investment in Ontario → largest of its kind in Canada
Advanced Manufacturing Investment Strategy	<ul style="list-style-type: none"> → \$500-million incentive loan program targeted at innovative activities in advanced manufacturing
New commitments announced in 2009 Budget	<ul style="list-style-type: none"> → \$715 million for various programs involving venture capital funding and infrastructure

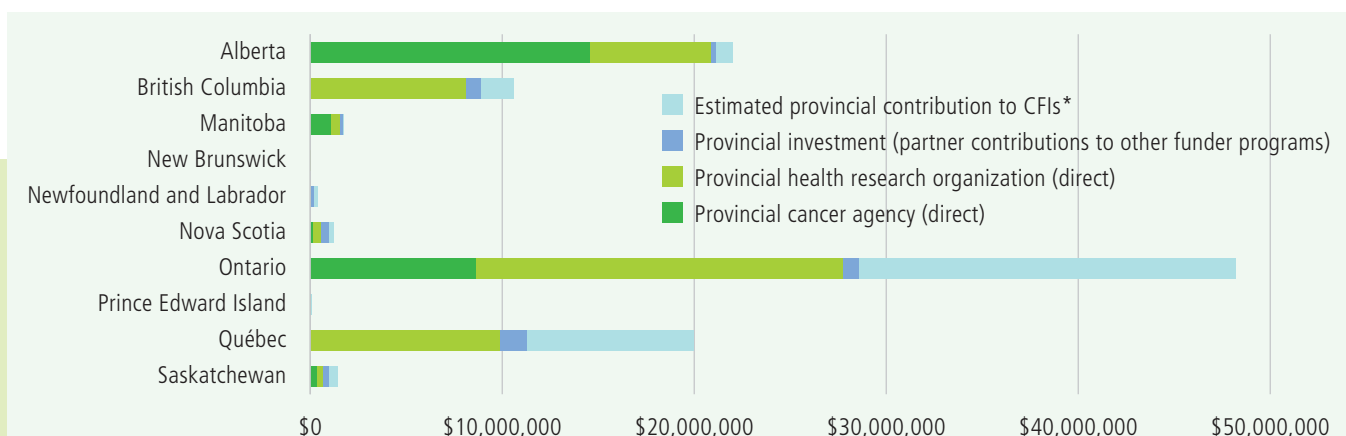
Table 2: CANCER RESEARCH INVESTMENT IN ONTARIO BY FEDERAL GOVERNMENT ORGANIZATION/PROGRAM

Centres of Excellence for Commercialization and Research*	→ Funds to establish 11 nationwide centres in 2008 → \$163,000,000
Canadian Institutes of Health Research	→ Proof-of-principle program for academic investigators → \$47,983,980 (2007)
Canada Foundation for Innovation	→ Funds up to 40% of academic research infrastructure → \$19,618,125 (2007) → funding in multi-funded initiatives (e.g., Canadian Breast Cancer Research Alliance, Prostate Cancer Research Initiative, Canadian Tobacco Control Research Initiative) → \$952,276 (2007)
Indirect costs program	→ \$8,771,654 (2006)
Canada Research Chairs Program	→ \$8,557,501 (2007)
Genome Canada	→ \$3,565,165 (2007)
National Sciences and Engineering Research Council	→ Ideas to Innovation Program for academic investigators → \$2,282,968 (2007)
Public Health Agency of Canada	→ Financing, advisory and partnering services for small- and medium-sized enterprises (SMEs) → \$1,584,161 (2007 contributions to cancer research projects)
National Research Council	→ \$1,298,428 (2007, Genome & Health Initiative)
Networks of Centres of Excellence	→ \$499,338 (2007)
Social Sciences and Humanities Research Council	→ \$278,324 (2007)
Scientific Research and Experimental Development Tax Incentive Program**	→ Refundable tax credit for private-sector scientific R&D
Business Development Bank of Canada**	→ Financing for SMEs with focus on technology and export sectors

Sources: custom analyses from the Canadian Cancer Research Alliance database provided for calendar year 2007; Toronto Region Research Alliance and Ontario Ministry of Research and Innovation.

* Includes all disciplines and jurisdictions ** Includes all disciplines

Figure 1: CANCER RESEARCH INVESTMENT BY PROVINCIAL GOVERNMENTS (2007)



Source: custom analyses from the Canadian Cancer Research Alliance database provided for calendar year 2007.

*Canada Foundation for Innovation projects

Table 3: SITE-SPECIFIC CANCER RESEARCH INVESTMENT BY ALL FUNDING MECHANISMS FOR SELECTED CANCERS (2006)

Cancer site	British Columbia	Alberta	Ontario	Quebec	Canada Total
Investment in site-specific cancer research	\$ 32,304,518	\$ 18,363,508	\$ 92,860,370	\$ 43,355,359	\$ 198,391,918
Brain	\$ 192,967	\$ 2,929,953	\$ 8,581,213	\$ 2,757,968	\$ 15,552,815
Breast	\$ 3,997,267	\$ 6,467,355	\$ 27,021,073	\$ 12,301,529	\$ 54,034,116
Colorectal	\$ 607,493	\$ 1,368,021	\$ 6,926,552	\$ 3,507,190	\$ 13,736,703
Leukemia	\$ 3,616,328	\$ 699,693	\$ 11,973,580	\$ 6,711,468	\$ 24,066,178
Lung	\$ 3,650,598	\$ 1,073,234	\$ 6,018,860	\$ 2,558,389	\$ 13,852,731
Prostate	\$ 6,591,242	\$ 852,506	\$ 6,624,301	\$ 2,807,101	\$ 17,342,853

Source: custom analyses from the Canadian Cancer Research Alliance database provided for calendar year 2007. Provinces not in table have a total investment of \$11,508,164.

Table 4: ONTARIO TAX CREDITS SUPPORTING R&D

- Ontario Innovation Tax Credit (OITC) provides a 10% refundable credit for corporate R&D in Ontario.
- Ontario Business Research Institute Tax Credit (ORBITC) provides a 20% refundable credit for R&D expenditures in Ontario under contract with an eligible research institute.
- Ontario New Technology Tax Incentive (ONTTI) provides a 100% income tax write-off of the cost of acquiring intellectual property by a corporation for the purpose of implementation in Ontario.
- Retail Sales Tax Exemption on R&D and manufacturing equipment
- Ontario Tax Exemption for Commercialization (OTEC) provides a 10-year income tax exemption for new corporations that commercialize intellectual property developed by Canadian academic institutions.



Image courtesy of John Loper/Mount Sinai Hospital

DISCOVERY



Image courtesy of John Loper/Mount Sinai Hospital

I. CRITICAL MASS OF TALENT

Ontario has a global reputation for excellence in life sciences research. The Toronto area alone represents Canada's largest concentration of biomedical research, ranking third in North America after San Francisco/Silicon Valley and the Greater Boston area. The province's more than 650 cancer researchers investigating more than 20 types of cancer are clustered around 16 universities and 22 hospitals, with 37 affiliated research/cancer centres and 5 independent research centres (see appendices 1 and 8). The main foci are in the Greater Toronto Area, Ottawa, Waterloo/Cambridge and London, with new clusters evolving in Sudbury and the North Bay region. The breadth of cancer research taking place in Ontario is wide-ranging, with 89 well-established programs that span all disciplines of cancer research and care (see Appendix 2).

HIGH-PROFILE RESEARCHERS



Dr. Tony Pawson

DR. TONY PAWSON, MA, PhD

Distinguished Investigator, Samuel Lunenfeld Research Institute, Mount Sinai Hospital

Dr. Pawson revolutionized the understanding of cell communication and intracellular signaling through the discovery of the SH2 domain and contributed to the development of drugs halting the replication of certain types of cancer cells. He has been named an Officer of the Order of Canada and is the first Canadian recipient of the Kyoto Prize in Basic Sciences, in 2008. Dr. Pawson has also received the Gairdner International Award and the Premier's Platinum Medal for Research Excellence and was awarded by Queen Elizabeth II with the Companion of Honour.



Dr. Tak W. Mak

DR. TAK W. MAK, OC, PHD, DSC, FRSC, FRS

Director, The Campbell Family Institute for Breast Cancer Research, Princess Margaret Hospital

Dr. Mak gained worldwide prominence for cloning genes of the human T-cell antigen receptor and has contributed to the understanding of key cellular pathways through breakthroughs in developing transgenic mice. He is a Member of the Order of Ontario, an Officer of the Order of Canada and a recipient of the Gairdner International Award.



Dr. Elizabeth Eisenhauer

DR. ELIZABETH EISENHAUER, MD, FRCPC

*Clinician Scientist, Queen's University
Director, Investigational New Drug Program,
National Cancer Institute of Canada Clinical Trials Group
Chair, Research Action Group, Canadian Partnership Against Cancer*

Dr. Eisenhauer spearheaded more than 170 studies of new anti-cancer agents and established Canada as a major centre for clinical trials. She is the recipient of the O. Harold Warwick Prize for conducting research that has had a major impact on cancer control in Canada.



Dr. Mark Henkelman

DR. MARK HENKELMAN, BSc, MSc, PhD

*Founding Director, Mouse Imaging Centre
The Hospital for Sick Children*

The first Canadian to work with magnetic resonance imaging, Dr. Henkelman is also a pioneer of sub-molecular pi-mesons for radiation treatment and the builder of a substantial research program at Sunnybrook Hospital. He is a Fellow of the Royal Society of Canada and is the only Canadian to win the gold medal of the International Society of Magnetic Resonance Imaging.



Dr. John C. Bell

DR. JOHN C. BELL, PhD

*Senior Scientist, Ottawa Health Research Institute
Director, Ontario Institute for Cancer Research's
Immuno- and Bio-therapies Program and Ontario
Regional Biotherapeutics Program
Member, Board of Directors, Canadian Cancer Society*

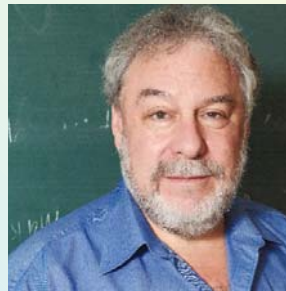
Dr. Bell is a leader in the field of oncolytic viruses for use as cancer therapies and for studying the role of the immune system in enhancing and inhibiting oncolytic virus activity.



Dr. Aaron Fenster

DR. AARON FENSTER, MSc, PhD

*Director & Scientist, Imaging Research Laboratories,
Robarts Research Institute, University of Western Ontario*



Dr. Martin Yaffe

DR. MARTIN YAFFE, BSc, MSc, PhD

*Senior Scientist, Sunnybrook Health Sciences Centre
Professor, Department of Medical Biophysics, University of Toronto*

Dr. Fenster and Dr. Yaffe bring together Ontario's imaging research community to develop new technologies to diagnose and treat cancer. They co-direct both the OICR Imaging Pipeline Platform that develops new technologies to detect cancer earlier, and the One Millimetre Cancer Challenge that develops technologies to detect cancer earlier and more accurately. Dr. Fenster is a Fellow of the American Association of Physicists in Medicine and holds a Canada Research Chair at the Canada Foundation for Innovation. He is also a recipient of the Ontario Innovation Trust's Distinguished Researcher Award. Dr. Yaffe is a Tory Family Chair in Cancer Research and a Fellow of the American Association of Physicists in Medicine.



Dr. Frances Shepherd

DR. FRANCES SHEPHERD, MD, FRCPC

Scott Taylor Chair, Lung Cancer Research, Ontario Cancer Institute, Princess Margaret Hospital

Dr. Shepherd is a world-leading expert in clinical trials that have changed the standard of treatment for lung cancer patients worldwide. She is an immediate past chair of the Lung Cancer Site Committee of the National Cancer Institute of Canada Clinical Trials Group, as well as a past president of the International Association for the Study of Lung Cancer. Dr. Shepherd has been honoured with an Order of Ontario and also received the 2008 Premier's Summit Award for Medical Research.



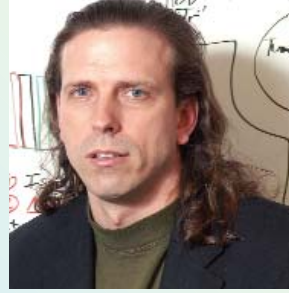
Dr. John Valliant

DR. JOHN VALLIANT, BSc, PhD

Scientific Director & CEO, Centre for Probe Development and Commercialization

*Acting Director, McMaster Institute of Applied Radiation Sciences
Associate Professor, McMaster University*

Dr. Valliant has led the world's first facility focused on all areas relating to the development of molecular imaging probes, such as new radio-labeling methods and compound discovery strategies to create clinically relevant molecular imaging probes and therapeutic radiopharmaceuticals.



Dr. David A. Jaffray

DR. DAVID A. JAFFRAY, PhD

Head of Radiation Physics, Princess Margaret Hospital

Dr. Jaffray specializes in image-guided technologies that improve clinical practices and develops novel imaging systems and concepts that enhance the precision of therapy by generating images at the time of treatment. He is the recipient of the University of Western Ontario's Alumni Award of Merit and the Top 40 Under 40 Award.



Dr. Tom Hudson

DR. TOM HUDSON, MD

*President and Scientific Director,
Ontario Institute for Cancer Research*

Dr. Hudson led the physical mapping team of the Human Genome Project and the Canadian Group of the International HapMap Consortium. He also co-founded the Public Population Project in Genomics (P3G) and launched the OICR pancreatic cancer project for the International Cancer Genome Consortium. A Fellow of the Royal Society of Canada, Dr. Hudson has also received the Top 40 Under 40 Award and the Armand-Frappier Foundation's Prix de la Santé.



Dr. Lincoln Stein

DR. LINCOLN STEIN, PhD

*Director, Informatics and Bio-Computing Platform,
Ontario Institute for Cancer Research*

Dr. Stein is a world-renowned authority in the fast-growing field of bioinformatics and a pioneer of software for computational biology and genome bioinformatics. He is currently developing a new state-of-the-art bioinformatics cluster at the OICR and conducting research that involves harnessing new computer technologies to solve problems related to cancer biology. In 2004 he was the recipient of the Bioinformatics Organization's Benjamin Franklin Award.



Dr. John McPherson

DR. JOHN McPHERSON, PhD

*Director, Cancer Genomics Program & Genomics
and High-Throughput Screening Platform,
Ontario Institute for Cancer Research*

Dr. McPherson is world-renowned as a key member of the consortium that generated the first sequence of the Human Genome Project. He is also the founder of Orion Genomics. The OICR recruited Dr. McPherson from the Baylor College of Medicine in Houston, Texas to focus on state-of-the-art sequencing related platforms – ABI SOLiDs, Illumina/Solexa GAII, Sequenom MassArray, real-time QPCR, Illumina BeadStation, Nimblegen Sequence Capture, HPLC, Laser capture microdissection, automated liquid handling devices – that catalogue genetic alterations occurring in different types of cancers in order to better classify tumours and to refine and develop new targeted treatments and diagnostic tools.



Dr. John E. Dick

DR. JOHN E. DICK, PhD

*Senior Scientist, Ontario Cancer Institute,
Princess Margaret Hospital
Director, Cancer Stem Cell Program,
Ontario Institute for Cancer Research*

Dr. Dick has garnered international recognition for having proved the existence of cancer stem cells. He is focused on the identification of cancer stem cells for various types of cancer and the development of therapies to target cancer stem cells, prevent recurrence and lessen the toxicity of cancer treatment. Over the years, Dr. Dick has been honoured on numerous occasions by his peers. He has received the National Cancer Institute of Canada's Robert L. Noble Prize and the special, one-time Diamond Jubilee Award; the Canadian Institutes of Health Research's Michael Smith Award; the American Association for Cancer Research's G.H.A. Clowes Memorial Award; the American Society of Hematology's Dameshek Prize; and the Premier of Ontario's Summit Award.

2. ONTARIO INSTITUTE FOR CANCER RESEARCH

Funded by the Government of Ontario through the Ontario Ministry of Research and Innovation, the Ontario Institute for Cancer Research (OICR) is a not-for-profit corporation with the mandate of conducting research on the prevention, early detection, diagnosis and treatment of cancer. Together with its partner academic centres, OICR is at the global forefront of new developments in cancer diagnosis and treatment, and provides a “one-stop-shopping” entry into the translational research community in Ontario. OICR’s innovative and ambitious programs and platforms effectively link and coordinate all the provincial cancer programs to accelerate the innovation process (see Figure 2). Armed with world-class research, extensive international connections and networks, and the scale and infrastructure to make a major impact, OICR is well positioned in translating the most promising ideas and new discoveries into effective interventions and viable commercial products. It is strengthening Ontario’s research capacity by attracting exceptional talent from around the world and developing and commercializing innovative diagnostic, interventional and therapeutic products and procedures to meet growing global demand.

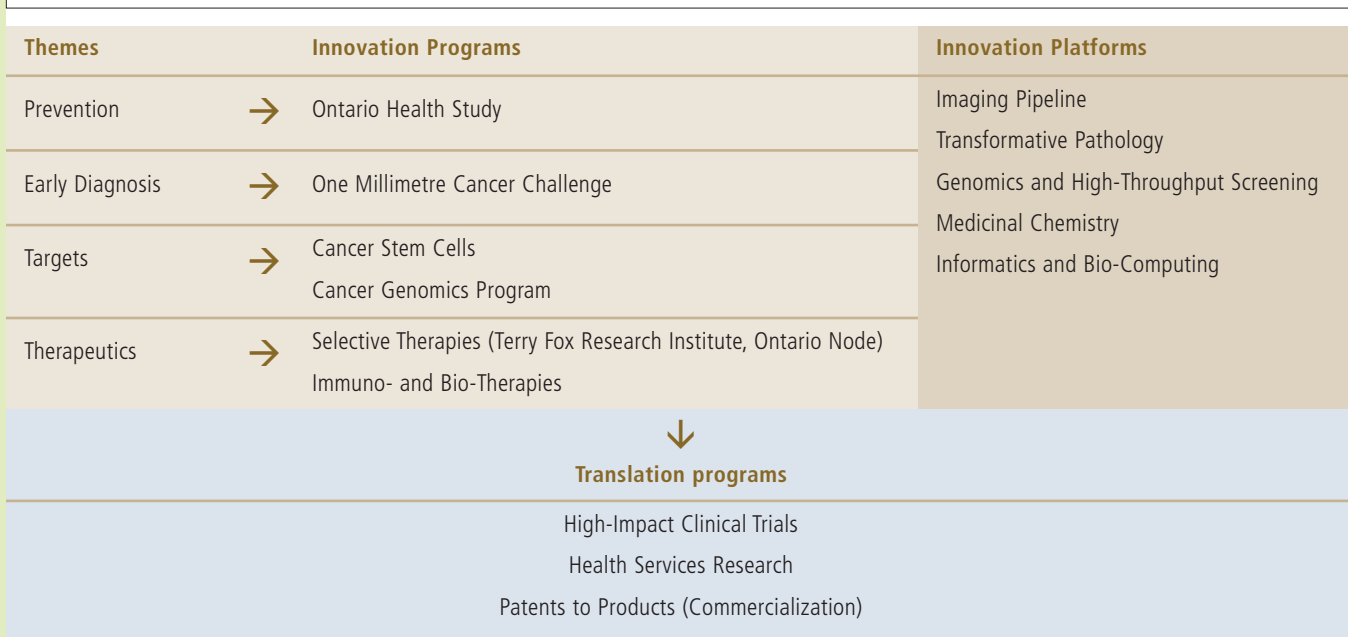


OICR launched a medicinal chemistry platform in 2008 with a state-of-the-art laboratory. It will efficiently translate cancer-related academic/industry discoveries into novel oncology therapies. (Photo: CP Images/S. Lake)

INTERNATIONAL CANCER GENOME CONSORTIUM

The goal of the International Cancer Genome Consortium (ICGC), which was launched in April 2008, is the creation of a catalogue of genetic alterations occurring in 50 types of cancer to aid in the development of new diagnostic tools and targeted treatment. Eleven funding organizations on four continents have made commitments to generate comprehensive high-resolution analyses of genomic, transcriptomic and epigenomic changes in various types of cancer. The first cancer genome projects being launched are investigating chronic lymphocytic leukemia, breast tumour types and cancers

Figure 2: OICR PROGRAMS AND PLATFORMS



of the pancreas, stomach, liver and oral cavity. OICR is a founding member of the ICGC and was selected by the Executive Committee to house the consortium's Data Coordination Centre (DCC) and host the Secretariat. OICR has earmarked funds from its base budget of approximately \$20 million, as well as a \$10-million supplement from the Ontario Ministry of Research and Innovation for the ICGC. These funds will be used over the next four to five years for the cancer genome project targeting pancreatic adenocarcinoma and to support the ICGC's Secretariat and DCC.

CANCER STEM CELL CONSORTIUM

OICR's research strategy includes a major effort on cancer stem cells (CSC). Early in 2008 the institute partnered with Genome Canada, the Canadian Institutes of Health Research, the Canada Foundation for Innovation (CFI) and the Stem Cell Network to co-found the not-for-profit Cancer Stem Cell Consortium (CSCC). The CSCC will focus on identifying CSC biomarkers and therapeutic molecular targets and will invest significantly in translational activities to accelerate the evaluation of CSC-specific biomarkers and the discovery of anti-CSC therapies. These discoveries are expected to lead to the creation of a wave of new companies to commercialize the findings. The CSCC signed a memorandum of understanding with the California Institute for Regenerative Medicine for joint competitions, and the two organizations have since entered into a formal partnership.

CANADIAN PARTNERSHIP AGAINST CANCER

To develop a better understanding of the risk factors that initiate or accelerate cancer, OICR launched the Ontario Health Study, a longitudinal cohort endeavour that will involve detailed questionnaires regarding lifestyle and behavioural factors; the collection of extensive biological specimens, including tumours when they develop; and environmental exposures/measures. OICR joined an initiative of the Canadian Partnership Against Cancer (CPAC) to support cancer cohort initiatives across Canada through funding and harmonized protocols. The Canadian Partnership for Tomorrow Project is comprised of a confederation of provincial cohorts currently under construction or underway in British Columbia, Alberta, Ontario, Quebec and Atlantic Canada. Its operational objective is to enrol 300,000 Canadians over the next five years beginning with the current provincial initiatives, but allowing the potential to add other provinces/territories. The expected numbers of participants from British Columbia (40,000), Alberta (50,000), Ontario (150,000), Quebec (minimum 27,000) and Atlantic Canada (30,000) will comprise a total cohort size of approximately 300,000. Strong links will also be forged with other international cohorts and consortia. In June 2008 CPAC's board of directors approved \$42 million over five years for the Canadian Partnership for Tomorrow Project, of which approximately 25% will be allotted for recruitment in Ontario and 10% for national activities that will benefit all cohorts.

TERRY FOX RESEARCH INSTITUTE

The Terry Fox Research Institute (TFRI), established in 2007 with funding from the Terry Fox Foundation, focuses on translational research resulting in positive outcomes at the clinical and population level. During the same year, TFRI and OICR's Selective Therapies Program entered into a collaboration to fund and manage an Ontario program whose goal is to identify and validate novel new targets for therapy. Both organizations have agreed to co-fund the program for up to \$3 million each per year. In June 2008 the boards of directors of both OICR and TFRI approved a \$1.5-million Seed Fund, funded 50:50 by the two organizations, to support The RNAi Consortium and small-molecule screening platforms in three research centres – HTS Lab, McMaster University; SMART Facility, Samuel Lunenfeld Research Institute; and COLT (CCBR-OICR Lentiviral Technology) Facility, Centre for Cellular and Biomolecular Research, University of Toronto – for a one-year period, pending the submission of a large-scale business plan currently in development.

RNAi CONSORTIUM

In 2007 OICR joined The RNAi Consortium 2 (TRC2) with the Broad Institute of MIT and Harvard. The Broad Institute is a world leader in RNAi technology, an essential technology for the validation of potential therapeutic targets. The creation of this program has provided an opportunity for OICR's Genomics and High-Throughput Screening program and the University of Toronto, not only to build capacity but also to be active players in the consortium, along with the Broad team and its other international partners. This partnership provides significant resources for the target validation platform developed with the TFRI and OICR's Selective Therapies Program. The Toronto team has taken a leadership role and is working closely with TRC2 members at the Broad Institute and two international industrial partners to develop cost-effective genome-scale RNAi screening technology. TRC2 has made steady progress towards validating all of the 180,000 constructs in its RNAi tool box, and the COLT screening facility is in a good position to take advantage of this unique set of resources to identify a multitude of cancer gene targets using functional screens.

CANCER CARE ONTARIO

OICR formalized several collaborations with Cancer Care Ontario (CCO) related to OICR's innovation and translation programs, including the Ontario Health Study and Health Services Research program. The Ontario Health Study will create a large cohort of 150,000 individuals from Ontario who will be followed over 20 years to identify the risk factors influencing the development of cancer. CCO and OICR have created a health services research program devoted specifically to cancer in recognition of the difficulty of integrating new knowledge, treatments and devices into the healthcare system.

3. COMMERCIALIZATION OPPORTUNITIES

Research institutes and cancer centres are actively seeking further collaborations with industry, akin to those that have already come to fruition, such as cutting-edge radiation treatment planning software, prognostic tests for non-small-cell lung cancer and biophotonic imaging technology.

RADIATION TREATMENT PLANNING SOFTWARE

- Web-based radiation therapy software licensed by Philips Medica Systems and the University Health Network (UHN) is supporting more than 50 Pinnacle3 workstations and providing substantive workflow efficiencies to Philips' entire worldwide installation base of more than 2,000 Pinnacle3 customers
- Developed by David Jaffray, a senior scientist at OCI, the research arm of the UHN Princess Margaret Hospital
- Offered for sale worldwide in spring 2008.

DYNEMO

- A new technology tool that analyzes networks of proteins in cells to predict outcome in newly diagnosed breast cancer patients and to assist clinicians in tailoring treatment
- Developed by Jeffrey Wrana, a senior investigator at Mount Sinai Hospital's Samuel Lunenfeld Research Institute.

CANCER RESEARCH FUND

OICR's Cancer Research Fund supports investigator-initiated translational research projects based on excellence in translational cancer research. Funds are made available through annual grant competitions, with selections based on the outcome of a scientific review panel. OICR also funds collaborative grants between academic centres and industry.

PATENTS TO PRODUCTS PROGRAM

OICR's Patents to Products program helps to transform discoveries into novel treatments and devices for patients. Guided by the "Ontario First Policy," the program's team encourages maximum participation from the province's firms in the development, uses and commercialization of investments arising from OICR research projects.

INTELLECTUAL PROPERTY DEVELOPMENT AND COMMERCIALIZATION PROGRAM

OICR has created a targeted investment funding mechanism called the Intellectual Property Development and Commercialization Program (IPDC). It aims to accelerate the advancement of innovations by de-risking translational hurdles and providing timely funding along with expert commercial, industrial and regulatory guidance. To date, 10 such investments have been made, five in 2007–2008 and five early in 2009. Of these, two have already raised seed ("A" round) financing to advance their business models. Another has realized initial sales of \$1 million and is ready for private equity investment. These projects represent attractive industry partnering as well as investment opportunities to private equity investors. OICR is seeking to build a network of angel investors and venture capital collaborators who may have an interest in providing seed and first-round funding to investee projects as they mature and require an injection of private equity capital.

In April 2008, OICR invested in four promising early-stage technologies – a new diagnostic, an imaging and therapeutic platform, and two new treatments for cancer. The following recipients will each receive \$500,000 to continue the early commercial development of their discoveries:

- University Health Network, Toronto – Dr. Li Zhang's novel cellular immunotherapy for leukemia
- Robarts Research Institute, University of Western Ontario, London – Dr. Aaron Fenster's 3-D ultrasound-guided intra-operative and dynamic minimally invasive brachytherapy and biopsy platform
- ArcticDx Inc., Toronto – development of a colon cancer risk prediction diagnostic tool
- Sunnybrook Health Sciences Centre, Toronto – a revolutionary MRI-guided transurethral ultrasound therapy for localized prostate cancer, developed by Dr. Michael Bronskill and Dr. Rajiv Chopra.

4. CLINICAL TRIALS IN ONTARIO

Clinical trials are a vital step in translating the discovery and development of novel agents into safe and effective medical products. There are numerous challenges involved in bringing these products to market more quickly, thereby reducing the overall cost of development and improving the quality and affordability of healthcare. For example, despite thousands of potential drug hits, only a very small proportion make it into clinical trials; of the cancer agents that enter clinical trials, fewer than 5% emerge as approved drugs. As well, from the 1960s to the 1990s, the time from discovery to approval nearly doubled, to more than 15 years, which is in part due to delays in activating and completing clinical trials. According to CenterWatch, a Boston-based publishing and information services company

focused on the clinical research industry, from 1997 to 2003 the percentage of clinical trials that were completed on time decreased from 18% to 6%.

To meet these challenges, OICR created the Clinical Trials Program (CTP) which puts in place infrastructure and processes that promote speed, quality and access to clinical trials in the province. Currently 12% of cancer patients participate in clinical trials – one of the highest rates of participation in North America. The resulting increase in capacity and efficiency is commensurate with a reduction in the time, cost and duplication of effort associated with running the multi-centre clinical trials.

Figure 3: ONTARIO CENTRES AFFILIATED WITH OICR'S CLINICAL TRIALS PROGRAM (CTP)

North and West

Barrie

The Royal Victoria Hospital

Kitchener-Waterloo

Cambridge Memorial Hospital
Grand River Hospital

Hamilton

Juravinski Cancer Centre

London

London Regional Cancer Centre

Orillia

Soldiers' Memorial Hospital

St. Catharines

Hotel Dieu Hospital

Sault Ste. Marie

Sault Area Hospital

Sudbury

Sudbury Regional Hospital

Thunder Bay

Thunder Bay Regional Hospital

Windsor

Windsor Regional Hospital



Toronto Area

Toronto Central

Mount Sinai Hospital
Princess Margaret Hospital
Sunnybrook Health Sciences Centre
St. Michael's Hospital
Women's College Hospital

Toronto East

North York General Hospital
Southlake Regional Health Centre
Toronto East General Hospital
The Scarborough Hospital

Toronto West

Credit Valley Hospital
Humber Regional Hospital
Trillium Health Centre
St. Joseph's Health Centre
William Osler Health Centre

East

Kingston

Kingston General Hospital

Oshawa

Oshawa General Hospital

Ottawa

The Ottawa Hospital

Table 5: KEY ORGANIZATIONS FACILITATING CANCER CLINICAL TRIALS IN ONTARIO

National Cancer Institute of Canada Clinical Trials Group (NCIC CTG)	→ A large national network of more than 75 centres where more than 4,000 patients enrol per year, mostly in phase II studies
Ontario Clinical Oncology Group (OCOG)	→ An Ontario-based network with unique expertise in radiation therapy trials and imaging trials
Ontario Institute for Cancer Research (OICR)	
Clinical Trials Database (http://www.CanadianCancerTrials.ca)	→ Provides up-to-date information to patients and healthcare providers about all clinical trials currently open in Ontario and Canada, with the goals of improving access and increasing recruitment
Clinical Trials Program (CTP)	<ul style="list-style-type: none"> → A collaboration of more than 450 research professionals across 29 oncology trial sites in Ontario → Collaborated with 29 hospitals in Ontario to provide resources to hire additional trial nurses, data managers, research pharmacists and other personnel → Contributed to doubling enrolment in clinical trials in Ontario to more than 5,000 patients per year by initiating and funding (approximately \$25 million) new personnel and a series of programs, including the Ontario Cancer Research Ethics Board (OCREB), to provide researchers in the province with tools, information and processes to conduct more cancer clinical trials, and to enrol more study participants in a timely and efficient manner → Developed uniform standard operating procedures and training programs for clinical trials and funded recruitment of additional personnel to improve management of clinical trials → Established a central office to coordinate multi-centre clinical trials with a single contract, a single budget and a single ethics approval
Electronic Data Capture/Management (EDC/EDM)	<ul style="list-style-type: none"> → Provided funding for NCIC CTG and OCOG to upgrade to new electronic data management systems that include electronic data capture → Provided clinical trials management software to multiple centres to improve management of patients and budgets in trials
Ontario Cancer Research Ethics Board (OCREB)	(see next section for details)
PMH Phase I/II Consortia	→ Consortia of sites in Canada and the U.S. conducting phase I and phase II studies

OCREB has “demonstrated its commitment to a centralized research ethics review board function in Ontario. The single review on behalf of several centres has the potential to be more efficient than several individual submissions and reviews in terms of time and resources, and has the potential to shorten study start-up timelines and support clinical trials completion.”

– Connie Dupuis, Country Study Manager, Roche Canada

Ontario is fortunate to have three outstanding clinical trials groups: the National Cancer Institute of Canada Clinical Trials Group at Queen’s University in Kingston; the Ontario Clinical Oncology Group at McMaster University in Hamilton; and the Princess Margaret Hospital Consortium in Toronto. OICR’s CTP was designed to enhance the ability of these groups to conduct trials rather than to create a new clinical trials group. The CTP is a network of trials professionals who work together to share best practices and coordinate new initiatives to improve and enhance clinical trials in Ontario. The success of these programs is demonstrated by the doubling since 2003 of the number of patients enrolled in cancer clinical trials, and by the gradually increasing number of industry-sponsored trials conducted in Ontario. Table 5 (see page 16) outlines the specific goals of the various clinical trials groups and the CTP. The clinical trials groups in Ontario have also led or participated in many groundbreaking clinical trials that have changed clinical practice and improved cancer therapy. Major examples are trials in breast, lung and colon cancer (see page 18).

ONTARIO CANCER RESEARCH ETHICS BOARD (OCREB)

OCREB is an expert provincial cancer-specific research ethics board (REB) – often referred to as an institutional review board (IRB) in the U.S. – providing high-quality, efficient ethical review and oversight of multi-centre oncology clinical trials. By centralizing the review process, OCREB is able to improve the overall time to ethics approval of multi-centre clinical trials across Ontario (see Figure 4), thereby improving access to oncology research for participants and their physicians, reducing the workload and administrative burden on investigators and local REBs, and making Ontario a more attractive place for a sponsor to conduct clinical trials. Over the five years it has been in operation, OCREB has gained the respect and trust of many stakeholders across the province. Currently, 17 of 27 institutions/centres in Ontario conducting clinical trials in adult cancer are authorized to delegate OCREB as their REB or board of record for multi-centre oncology trials (see Figure 5).

Figure 4: COMPARISON OF TIME TO RESEARCH ETHICS BOARD (REB) APPROVAL BETWEEN OCREB AND LOCAL REBs/IRBs

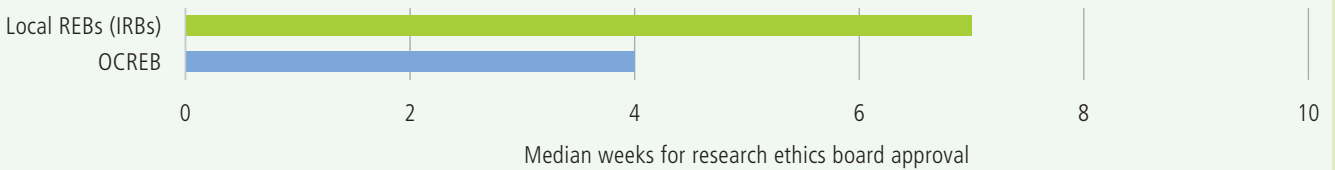
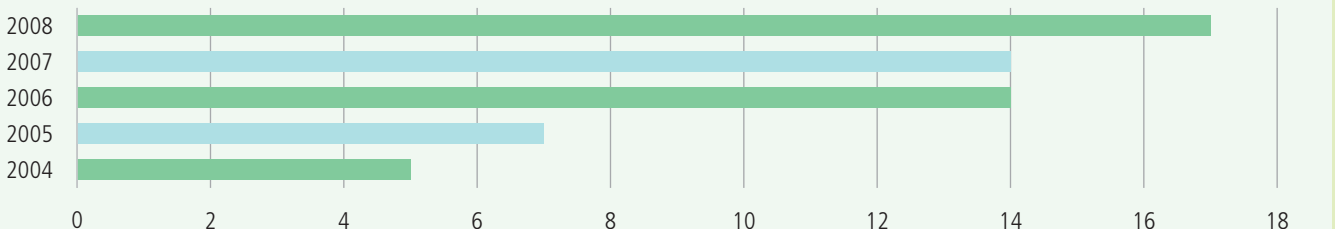


Figure 5: NUMBER OF INSTITUTIONS USING OCREB



PRACTICE-CHANGING
CLINICAL TRIALS

MA17: LETROZOLE EXTENDED ADJUVANT TRIAL

The MA.17 trial was led by the National Cancer Institute of Canada Clinical Trials Group and included the North American Breast Intergroup and the Breast International Group. MA.17 was a phase III, randomized, double-blind, placebo-controlled trial of letrozole as extended adjuvant therapy in postmenopausal women with primary breast cancer who had completed approximately five years of adjuvant tamoxifen therapy. The aim of the trial was to determine whether letrozole improved outcome after the discontinuation of adjuvant tamoxifen therapy. So significant was the disease-free survival benefit (median time to follow-up: 2.4 years) that the study was unblinded approximately one year early. The results of the pivotal MA.17 trial have changed current clinical practice. Thousands of women who completed five years of adjuvant tamoxifen are now receiving extended letrozole protective therapy.

BR10: LUNG ADJUVANT TRIAL

BR.10 was a North American Intergroup trial led by the National Cancer Institute of Canada Clinical Trials Group. Patients with completely resected Stages IB and III non-small-cell lung cancer were randomized to receive either a brief course of chemotherapy with four cycles of vinorelbine/cisplatin over three months or observation alone. Chemotherapy resulted in a significant 30% reduction in death and an absolute 15% survival benefit at five years. Quality of life returned to the level of that in the observation arm within a few months of stopping treatment, and there were almost no long-term negative effects of chemotherapy. This landmark paradigm-shifting Canadian trial changed treatment worldwide and improved the cure rate for early-stage lung cancer.

CO17: CETUXIMAB ADVANCED COLORECTAL TRIAL

The CO.17 trial was co-run by the National Cancer Institute of Canada Clinical Trials Group and the Australasian Gastro-Intestinal Trials Group. Patients with advanced colorectal cancer whose disease no longer responded to chemotherapy were randomized to cetuximab (Erbix) plus best supportive care, or to best supportive care alone. All patients had tumours with EGFR detectable by immunohistochemistry. Patients' tumours were assessed every eight weeks by computed tomography (CT) scan until their cancers began to progress. Cetuximab plus best supportive care resulted in a 23% improvement in overall survival and increased the median survival from 4.6 months to 6.1. These promising results have paved the way for future clinical trials combining cetuximab with other therapeutics to treat metastatic colorectal cancer. This trial also helped to establish the role of the K-ras oncogene testing to select patients who will benefit from therapy with cetuximab and similar drugs.

5. DISEASE MODELS

The availability of suitable experimental animal models is an essential component for meaningful cancer research. Towards that goal, the Centre for Phenogenomics generates numerous mouse models from repositories of mutant and transgenic mice, as well as through its participation in an international project to provide knockouts of every mouse gene, which will spawn numerous new mouse models for cancer research. Numerous institutions are involved in creating immune-deficient mouse models, which are used to develop xenograft models of human tumours suitable for both biological and therapeutic studies. Several Ontario-based laboratories are also developing novel in vitro models for human cancers.

REPOSITORY OF MUTANT MICE

- mutant mice
- knockout mice
- embryonic stem cells

IMMUNE-DEFICIENT ANIMALS

- non-obese diabetic/severe combined immunodeficient mice (NOD/SCID) – e.g., to model colon cancer and acute myeloid leukemia (AML)
- severe combined immunodeficient/beige (SCID/Beige) – e.g., to model neuroblastoma and its metastases
- nude mice – e.g., to support both mouse and human models

IN VITRO MODELS

- spheroid models – e.g., to measure stem cells and study hypoxia
- embryonic stem cell models – e.g., to test toxicity
- several tissue culture models of human cancers



The Toronto Centre for Phenogenomics' exclusion and modified barrier suites maintain colonies of mice ensuring a high-security, disease-free environment essential for the comfort of animals and facilitating scientific discovery.

6. UNIQUE OPPORTUNITIES

The Ontario Institute for Cancer Research's Cancer Genomics Platform is equipped with the latest next-generation sequencing technologies. OICR researchers work closely with the companies that develop sequencers to continually improve the equipment and increase their capacity. (Photo: CP Images/S. Lake)



Successful translation of outcomes into clinical applications requires not only excellent scientists, but also unique platforms and other types of infrastructure. Ontario has many of these critical systems already in place.

IMAGING

In imaging, much of the focus revolves around early detection of cancer with the sought-after goal of performing *in vivo* diagnoses and disease characterization to detect tumours at an early, curable stage to individualize treatment and monitor responses to therapy. Innovative new tools are being developed to increase the sensitivity and specificity of conventional technologies such as ultrasound, magnetic resonance (MR), X-ray tomography, optical endoscopy and nuclear medicine. New methods such as hyperpolarized ¹³C pyruvate, MR Paracast and stem cell imaging are also being developed. Particularly amenable to translation is the use of targeted microbubbles and nanodroplets in ultrasound to report on angiogenesis and breast tomosynthesis, which provides higher resolution of structures and also mitigates false positives. The ¹³C pyruvate technology shows much promise in terms of performing real-time metabolic imaging of cancer because of its exquisite signal-to-noise ratio compared with conventional MRI. One of the only three ¹³C systems in the world is located at Sunnybrook Health Sciences Centre and is being used to image changes in pyruvate associated with prostate cancer. A recent survey of unique imaging resources in the province is shown in Appendix 5.

BIOMARKERS

Many centres are also studying and developing new biomarkers to enhance the diagnosis, prognosis and treatment of cancer. The Ontario Cancer Biomarker Network, established with funding from OICR and the Ontario Ministry of Research and Innovation, provides ready access to translational research teams across the province and beyond for high-throughput mechanisms for evaluating biomarkers in clinical studies and animal systems.

HIGH-THROUGHPUT SEQUENCING AND INFORMATICS

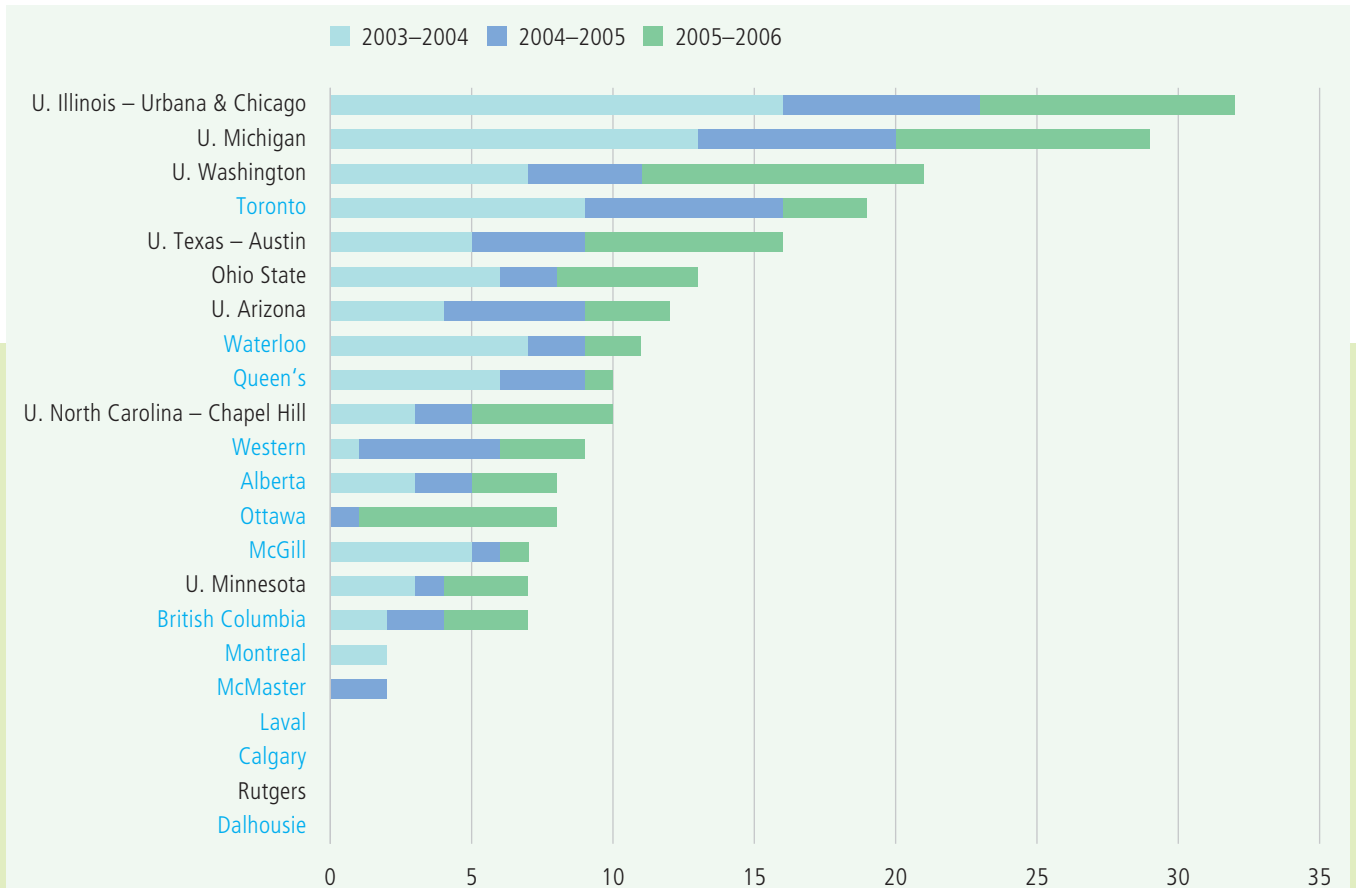
Ontario boasts significant high-throughput sequencing capabilities that facilitate the deployment of “omics” facilities using robotics and informatics to generate high-throughput screens of DNA, RNA, protein tissue and chemicals. Almost all biomedical research laboratories make use of these technologies and facilities to explore biological processes in more global ways. OICR's new facility at MaRS Centre in Toronto has the most recent sequencing technologies for extremely high-throughput sequencing, and the sequencing facility at The Hospital for Sick Children has capacity for routine high-throughput screening. For the analysis of genomic and other large databases, OICR has also created a novel informatics centre at MaRS. Filling the pivotal role of supporting sophisticated high-performance computing facilities is ORION's invaluable large-bandwidth high-speed networking facility that links all Ontario universities, research institutes and networks.

INTELLECTUAL PROPERTY RESULTING FROM ONTARIO DISCOVERIES

An important indicator of whether research can reach beyond the borders of universities and research institutes is the creation of start-up and spin-off companies that launch new inventions and generate more widespread social and economic benefits. By that standard, Ontario is well on its way, with six of its universities rated among other Canadian and Association of American Universities (AAU) peer institutions for creating spin-off companies over a five-year period (see Figure 6).

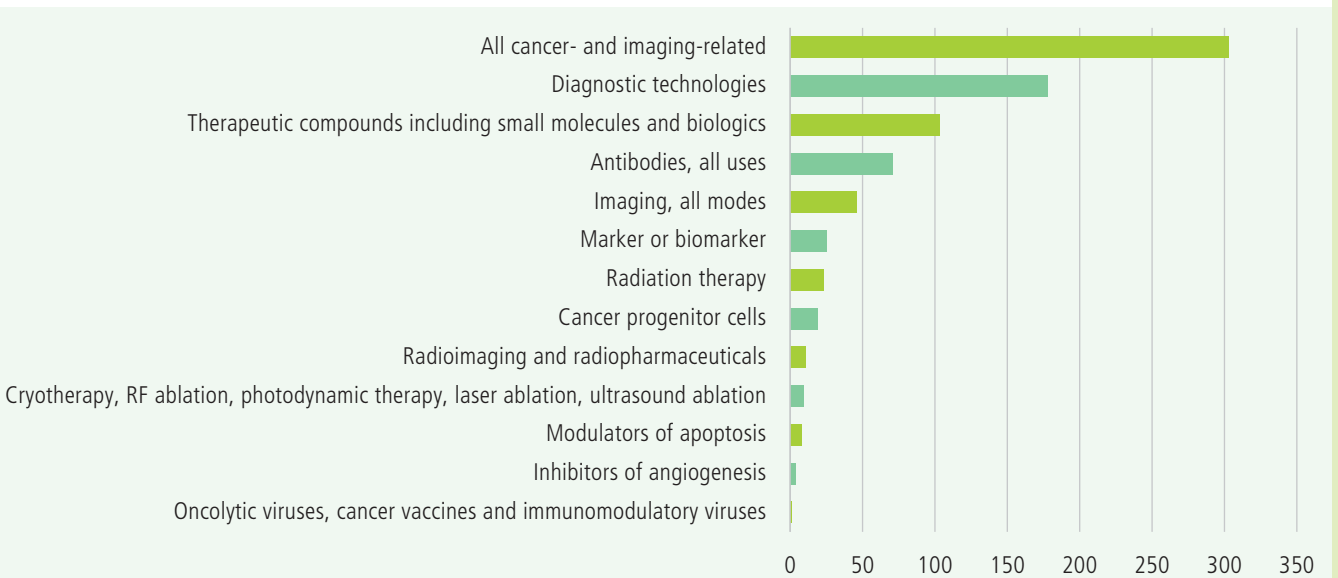
According to the *2008 Performance Indicators for Governance: A Summary* – a survey of companies started at the University of Toronto – there were “114 active companies employing more than 4,000 people and an estimated annual revenue of \$1 billion.” Many additional opportunities for commercialization and knowledge transfer exist in Toronto and elsewhere in Ontario (see Figure 7). Academic centres in the province exhibit a strong appetite for increased interactions with the commercial sector to ensure that their discoveries are exploited to secure the benefits of research, improve health and enhance knowledge-based industry in Ontario. To this end, many universities and research groups in the province are working together to streamline their technology-transfer activities. For example, 10 institutions in Southwestern Ontario – including McMaster University, University of Western Ontario, Guelph University, University of Waterloo and University of Windsor – have formed the C4 group to coordinate activities in the commercialization of research. Similarly, MaRS Innovation carries out this function in the GTA.

Figure 6: SPIN-OFF COMPANIES FOR CANADIAN AND AMERICAN ASSOCIATION OF UNIVERSITIES (AAU) PEER INSTITUTIONS (2003–2007)



Association of University Technology Managers Survey (fiscal years 2004, 2005 and 2006); 2008 Performance Indicators for Governance: A Summary, University of Toronto
Canadian universities are highlighted

Figure 7: UNIQUE INVENTIONS IN ONTARIO



Derwent World Patent Index

7. RESEARCH HIGHLIGHTS

Ontario researchers rank among the top in the world for publications and citations relating to cancer research. According to a citation analysis from online academic database ISI Web of Knowledge, the number of scientific publications in the field of cancer arising from Ontario's institutions from 2004 to 2008 is 14,992, of which 1,426 were in journals with an impact factor of ≥ 10 . From among the high-impact publications, the total number of citations was 34,399, with an average of 24 citations per paper. According to the September–October 2005 edition of *ScienceWatch*, Research Services Group's subscription newsletter, within Canada, "Ontario's universities ranked among the top three spots when Canada's universities were ranked by the average citations per academic paper in the fields of clinical medicine and immunology." As well, an Ontario university also claimed the top rank in the fields of microbiology, biology and biochemistry, genetics and molecular biology, neurosciences and pharmacology.

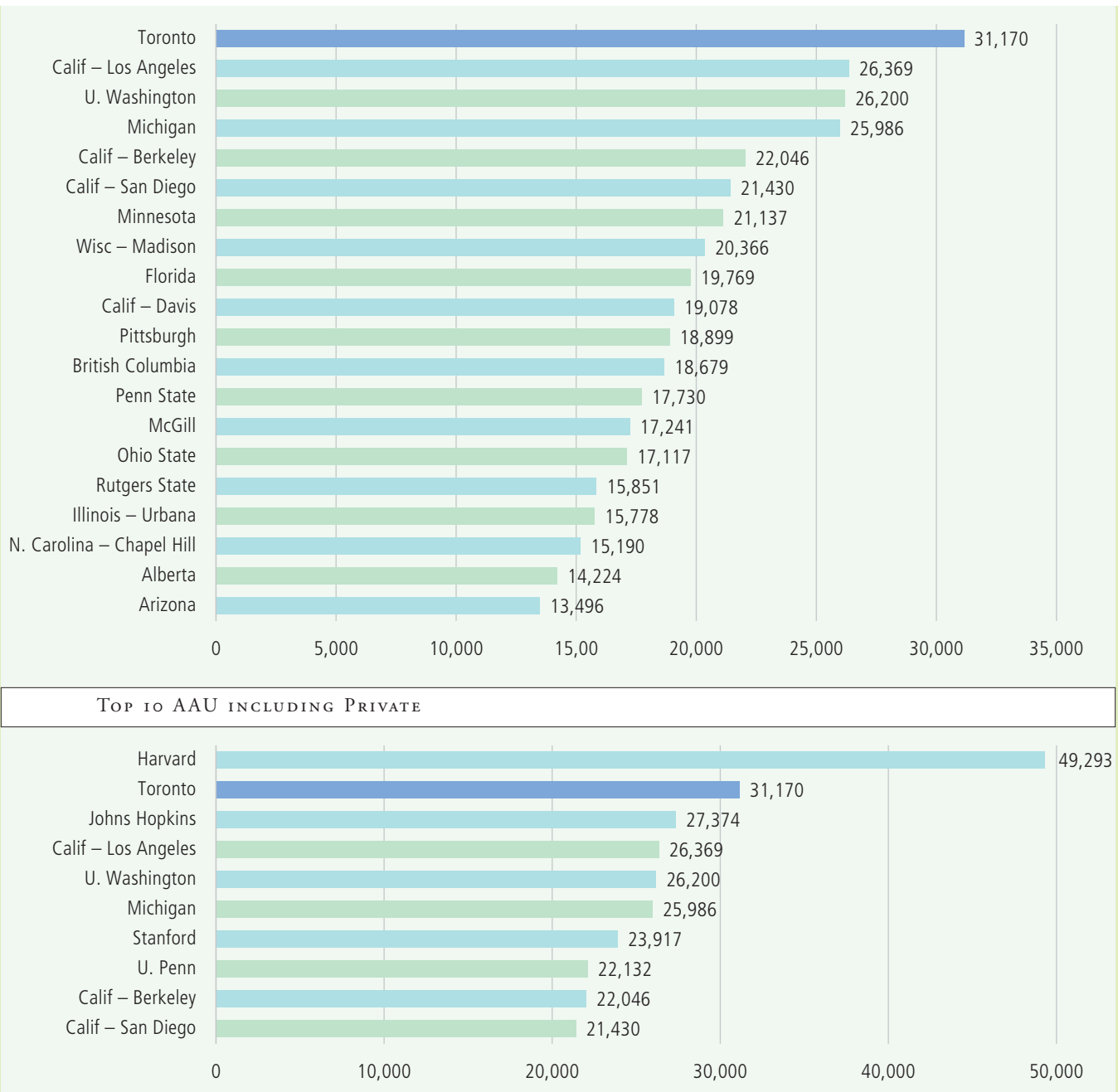
In 2006, Thomson ISI published the results of an exhaustive study undertaken by the University of Toronto on the impact of research by citation analysis. As 70% of cancer researchers in Ontario are affiliated with the University of Toronto, it is meaningful to compare its rank against other international universities. Toronto ranked first for publications relating to all science fields, and second after Harvard in the top 10 publication ranking for public and private universities in the American Association of Universities (AAU), an indication of both the vigour and high quality of publications (see Figure 8). A measure of scientific excellence in a selection of science-based fields is also demonstrated by University of Toronto's position on publications and citations relative to its Canadian peers, AAU public peers and all AAU institutions (see Table 6). Appendix 3 presents oncology publications representative of the breadth of research findings in Ontario.

Table 6: SUMMARY OF RANKINGS FOR THE UNIVERSITY OF TORONTO (2003–2007)

	G13 (Canada)		AAU Publics		AAU All	
	Publications	Citations	Publications	Citations	Publications	Citations
All science fields	1	1	1	3	2	6
Health and life sciences	1	1	1	2	2	4
Cell biology	1	1	2	3	5	9
Materials science, biomaterials	1	1	1	3	2	6
Biotechnology and applied microbiology	1	1	7	6	2	11
Engineering	1	1	6	9	8	12
Nanoscience and nanotechnology	1	1	17	17	24	28
Optics	1	1	3	2	8	13
Environmental engineering	1	1	2	1	2	1

Association of University Technology Managers Survey (fiscal years 2004, 2005 and 2006); 2008 *Performance Indicators for Governance: A Summary*, University of Toronto

Figure 8: PUBLICATION RANKING FOR AMERICAN ASSOCIATION OF UNIVERSITIES (AAU) PUBLIC AND CANADIAN PEER INSTITUTIONS (2003-2007)

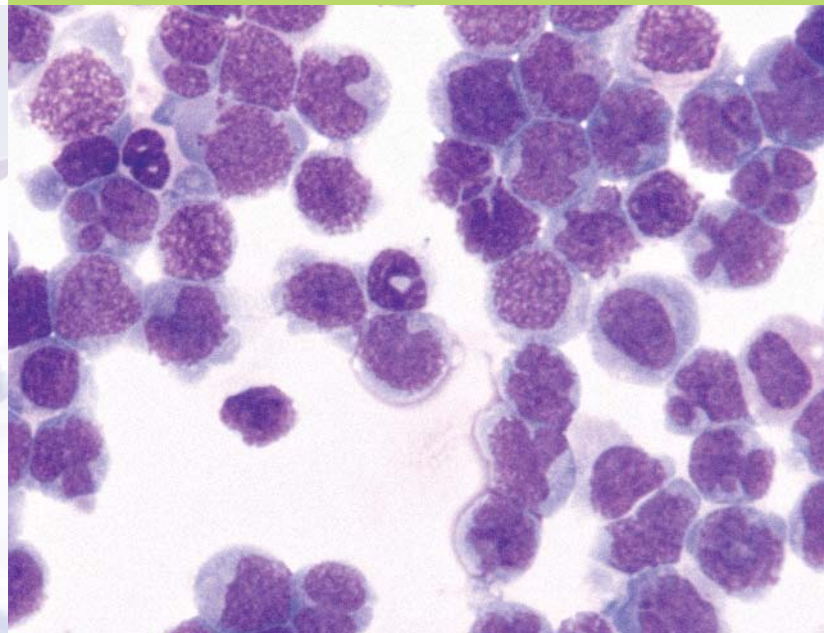


Sources: Thomson-Reuters U.S. and Canadian University Indicators – Deluxe and Standard Editions 2007

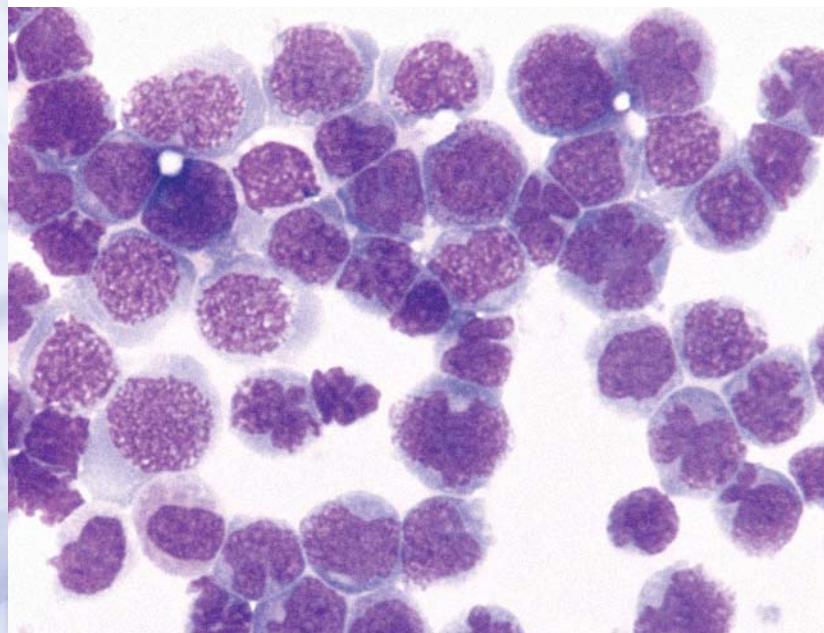
Inside the Ontario Institute for Cancer Research's state-of-the-art Medicinal Chemistry Platform. (Photo: CP Images/S. Lake)



INTEGRATED TRANSLATIONAL DEVELOPMENT CAPABILITIES



Above and below: Acute myeloid leukemia (AML) grafted in immunodeficient mice, (Images courtesy of Dr. John Dick of the Ontario Cancer Institute, Princess Margaret Hospital)



KEY COMPANY PROFILES

Ontario is well endowed with academic platforms and facilities that provide the province with a diversity of tools for genomics, proteomics, imaging, clinical, psychosocial and other important cancer-related services (see appendices 4 and 5). The benefits of shared research facilities synergize to maximize efficiency, streamline costs and fuel a steady state of translation from basic research to clinical outcomes and commercial opportunities. Among the many companies that focus on cancer in the province (see Appendix 6), three are of particular note for having homegrown technologies that have flourished into viable commercial opportunities in Ontario. Providers of essential services for biomedical research in Ontario are listed in Appendix 7.



Hamilton was selected by GE Healthcare as the world's first site to receive a new prototype technology that uses molecular imaging probes that target breast cancer. From left to right: Dr. John Valliant, scientific director and CEO, Canadian Centre for Probe Development and Commercialization; Murray T. Martin, president and CEO, Hamilton Health Sciences; Dr. Peter George, president, McMaster University; Peter Robinson, general manager, GE HealthCare Canada; Dr. Tom Hudson, president and scientific director, Ontario Institute for Cancer Research. (Photo: CP Images/S. Wilson)

DVS SCIENCES INC.

Who we are: Developer and manufacturer of the innovative CyTOF™ Mass Cytometer and the MAXPAR™ reagents that it reads, satisfying the need for massively multi-parameter biomarker analysis of individual cells not achieved by conventional flow cytometry; founded in 2004 as a spin-out from MDS Sciex, where the founders led the elemental mass spectrometry program; partnering with luminary labs to validate beta instruments prior to commercial launch this year

Our technology: Applies the elements of the periodic table as immunotags measured at high fidelity and sensitivity by mass spectrometry; up to 100 elements and their stable isotopes allow massively multi-parameter single-cell analysis without compensation with data files compatible with third-party cytometry software

Its application to cancer: Facilitates the characterization and identification of cancer and/or cancer stem cells for research, drug discovery and diagnostics; recognition of information-rich biomarker fingerprints enables patient-specific diagnosis and prognosis, the basis of personalized healthcare

PHARMA RESEARCH TORONTO

Who we are: Recently bought by Hoffmann-La Roche Ltd., Pharma Research Toronto – formerly Arius Research – is a leader in personalized cancer therapy through its monoclonal antibody strategy

Our technology: FunctionFIRST platform, which develops cytotoxic anti-cancer monoclonal antibodies, will allow Roche to further strengthen its developmental portfolio, initially within the areas of oncology and inflammatory diseases where this new technique offers potentially broad therapeutic applications for patients in need of differentiated medicines

Its application to cancer: More than 400 functional anti-cancer monoclonal antibodies are in development for treatments for leukemia and melanoma, as well as breast, prostate, lung, ovarian, colorectal and pancreatic cancer

UNIQUE FACILITIES

SENTINELLE MEDICAL

Who we are: Leader in breast cancer management with research and development of Sentinelle Vanguard® breast MR imaging coil; developer of advanced software for efficient analysis and intervention

Our technology: Transforms GE, Siemens and Toshiba MRIs into dedicated systems for breast MR imaging and intervention, using several technologies not available in traditional tabletop coils

Its application to cancer: Improves health outcomes for patients, reduces healthcare costs and provides healthcare professionals with easy access to high image quality of all relevant areas of the breast and accommodates the greatest range of breast and patient sizes; improves workflow in the MR suite; increases patient comfort and satisfaction

TORONTO CENTRE FOR PHENOGENOMICS (TCP)

- Canada's largest (120,000-square-foot) mouse facility, which is located in Toronto's Discovery District and is home to three of Canada's national resource programs in mouse phenotyping, imaging and archiving
- A contract research organization for advanced technologies related to creation, holding, technical, research and bio-banking aspects of genetically engineered mouse models to biotechnology and pharmaceutical companies engaged in drug development and discovery

CENTRE FOR PROBE DEVELOPMENT AND COMMERCIALIZATION (CPDC)

- World's first facility focusing on all areas related to the development of molecular imaging probes that provide a non-invasive means to diagnose disease at its earliest stage
- High-quality probe development and production services for universities, institutions, biotechnology and pharmaceutical companies around the world, with expertise ranging from chemistry to preclinical, and clinical testing to commercialization



Centre for Probe Development and Commercialization (CPDC) scientist Neva Lazarova demonstrates how remote manipulation is used to produce molecular imaging agents in the CPDC's high-level lab facilities.

NATIONAL CANCER INSTITUTE OF CANADA CLINICAL TRIALS GROUP TUMOUR BANK (NCIC CTG)

- A unique national resource of well-characterized malignant tumour tissue, with extensive, well-validated matching clinical dataset for a better understanding of the biology of cancer and its response to therapy
- Disease-specific collections are housed within the Department of Pathology at Queen's University in Kingston

ONTARIO INSTITUTE FOR CANCER RESEARCH – ONTARIO TUMOUR BANK

- An Ontario-wide biorepository and data bank focused on the collection of tumour-related human biospecimens and related data of high quality, diversity and integrity
- Linked to patient data in the Ontario Cancer Registry, allowing rapid collection of data at diagnosis and for follow-up during treatment, including outcomes



The Mouse Imaging Centre (MICE) adapts magnetic resonance and other imaging technologies for imaging of mouse models. The equipment in this photo allows scientists to image multiple mice in the same scan, greatly increasing the efficiency of their research. (Photo: CP Images/S. Lake)

MOUSE IMAGING CENTRE (MICE)

- A state-of-the-art facility at The Hospital for Sick Children using digital imaging technologies to study mouse models of human disease and for mouse phenotype discovery
- 25 principal investigators employ MRI, ultrasound bio-microscopy, micro-computed tomography and optical projection technologies

UNIVERSITY HEALTH NETWORK MICROARRAY CENTRE

- A high-throughput screening facility developed as a consortium of the Ontario Cancer Institute, Mount Sinai Hospital, The Hospital for Sick Children and the University of Toronto
- Dedicated to providing researchers with quality microarrays via six highly accurate arrayers (2,500 arrays with up to 36,000 features per week), as well as training and support to more than 300 labs around the world and developing technologies for access to leading-edge tools

THE CENTRE FOR APPLIED GENOMICS (TCAG)

- A genomics facility at The Hospital for Sick Children dedicated to conducting and promoting groundbreaking research in genomics with a philosophy of supporting researchers in any discipline from any sector
- A core facility that uses all major commercial next-generation platforms and conventional capillary sequencing; supported by a comprehensive bioinformatics and database support group utilizing TCAG's high-performance computing facility comprised of approximately 1,200 processors

McMASTER HIGH-THROUGHPUT SCREENING FACILITIES

- A national resource for small-molecule screening with a mandate to provide excellence and innovation in biomolecular screening

- Purpose-built 2,000-square-foot laboratory features wet-lab space for methods development and state-of-the-art robotics and a library containing more than 200,000 compounds; close to McMaster's Centre for Chemical Biology for first-rate cell biology, analytical and synthetic chemistry laboratories

SMART (SINAI-McLAUGHLIN ASSAY AND ROBOTICS TECHNOLOGY) FACILITY

- Located at the Samuel Lunenfeld Research Institute; provides academic communities with a wide array of high-throughput technologies for output comparable to that of advanced biotechnology and pharmaceutical companies
- Fosters multidisciplinary collaborations and houses two fully integrated robotic systems, complemented by additional stand-alone instrumentation dedicated to certain routine protocols and assay development and validation efforts

GMP (GOOD MANUFACTURING PRACTICES) FACILITY

- A state-of-the-art 1,000-square-foot facility at the Ottawa Health Research Institute dedicated to manufacturing cells and viruses to be used in phase I clinical trials
- The Oncolytic Virus Research Laboratory manufactures a variety of viruses, including a vaccinia-based oncolytic virus expressing an imaging gene, adenovirus vectors expressing melanoma antigens, and a novel rhabdovirus

IMAGE-GUIDED BIOPSY

- An imaging device accurate within two millimetres, developed by Dr. Aaron Fenster and his colleagues at the Robarts Research Institute in London, Ontario
- Improves on regular biopsy for prostate cancer by allowing physicians to guide the needle to a specific location and detect prostate cancer in its earliest stages, when treatment is more effective

ONTARIO CANCER BIOMARKER NETWORK

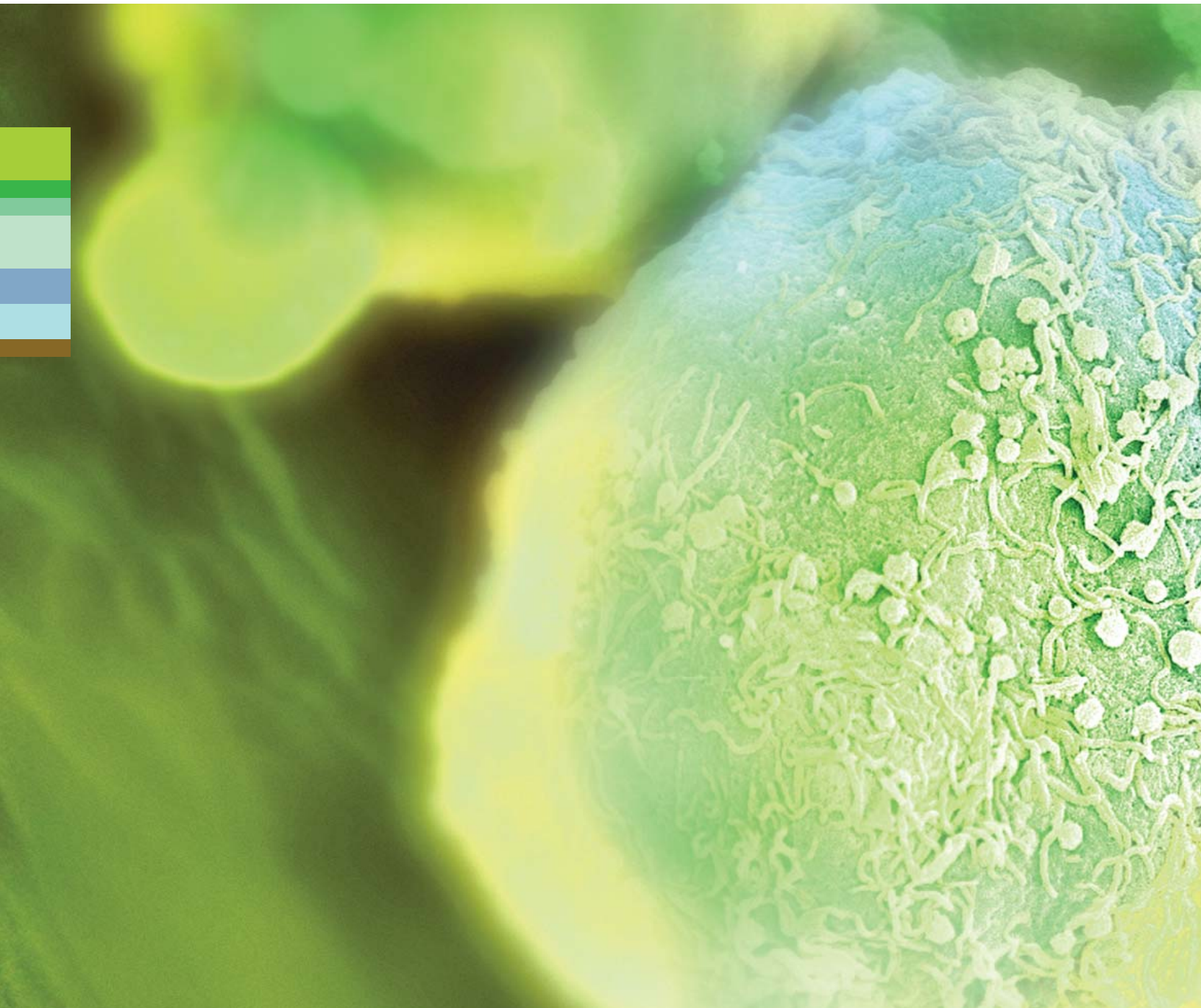
- A not-for-profit corporation focused on the discovery and development of novel biomarkers for diagnosis, prognosis and treatment response in cancer, designed to accelerate proteomic and genomic biomarker research efforts in the province
- Regulatory-compliant processes and state-of-the-art facilities, including the Toronto Integrated Proteomics Laboratory (TIPLab), provide high-quality, cost-effective proteomics services to academic and industry scientists

STARR (SPATIO-TEMPORAL TARGETING AND AMPLIFICATION OF RADIATION RESPONSE) INNOVATION CENTRE

- A world-leading platform for cutting-edge multidisciplinary radiotherapy located in Toronto's Discovery District and partnered with Princess Margaret Hospital's Radiation Medicine Program
- Services include cellular core; animal imaging and precision radiation facility core; human imaging and precision facility core; and image analysis and registration core



Small-animal NanoSPECT/CT scanner at the STARR facility in Toronto's Discovery District. (Photo: CP Images/S. Lake)



APPENDICES

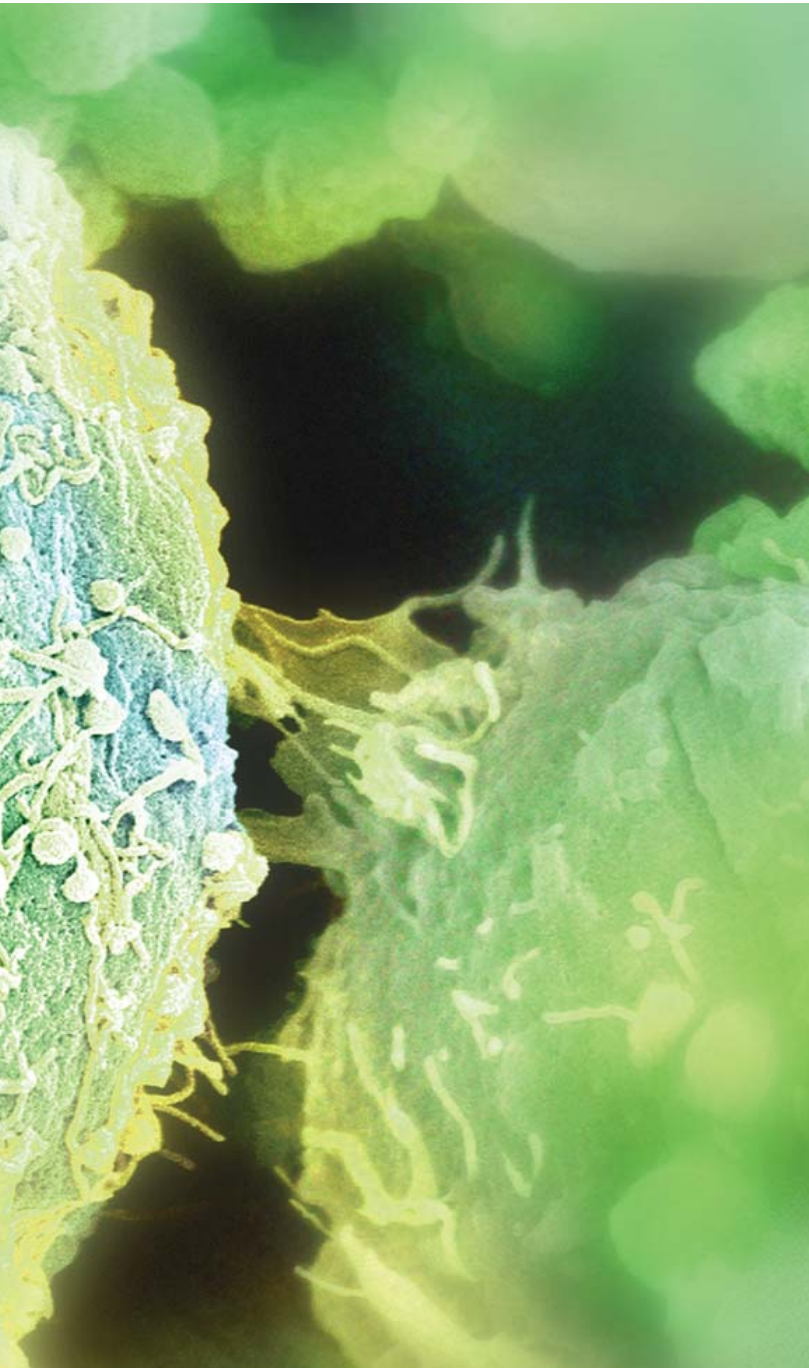


Image courtesy of John Loper/Mount Sinai Hospital

APPENDIX I: MAJOR INSTITUTIONS INVOLVED IN CANCER RESEARCH IN ONTARIO

Region	Type of Institution	Primary Institution	Affiliated Institutions
Barrie	Hospitals with affiliated research/cancer centres	Royal Victoria Hospital	Simcoe Muskoka Regional Cancer Centre
Hamilton	Hospitals with affiliated research/cancer centres	Hamilton Health Sciences	Juravinski Cancer Centre
	Universities	McMaster University	Michael DeGroote Centre for Learning & Discovery
Kingston	Hospitals with affiliated research/cancer centres	Kingston General Hospital Hotel Dieu Hospital	Cancer Centre of Southeastern Ontario
	Universities	Queen's University Royal Military College	Cancer Research Institute
Kitchener– Waterloo/ Wellington	Hospitals with affiliated research/cancer centres	Grand River Hospital	Grand River Regional Cancer Centre
	Universities	University of Guelph University of Waterloo Wilfred Laurier University	Centre for Behavioural Research and Program Evaluation International Tobacco Control Policy Evaluation Project (the ITC Project) Schlegel–UW Research Institute for Aging
London	Hospitals with affiliated research/cancer centres	London Health Sciences Centre	Lawson Health Research Institute London Regional Cancer Program – Royal Victoria Hospital
	Universities	University of Western Ontario	Robarts Research Institute
Newmarket	Hospitals with affiliated research/cancer centres	Southlake Regional Health Centre	Stronach Regional Cancer Centre
Oshawa	Hospitals with affiliated research/cancer centres	Lakeridge Health	R.S. McLaughlin Durham Regional Cancer Centre
	Universities	University of Ontario Institute of Technology	

Region	Type of Institution	Primary Institution	Affiliated Institutions
Ottawa	Hospitals with affiliated research/cancer centres	Children's Hospital of Eastern Ontario Ottawa Hospital	Children's Hospital of Eastern Ontario Research Institute Ottawa Health Research Institute Ottawa Regional Cancer Centre
	Independent Research Centres	National Research Council of Canada	
	Universities	Carleton University University of Ottawa	
Sudbury	Hospitals with affiliated research/cancer centres	Hôpital régional de Sudbury Regional Hospital	Northeastern Ontario Regional Cancer Centre
	Universities	Laurentian University	Northern Ontario School of Medicine
Thunder Bay	Hospitals with affiliated research/cancer centres	Thunder Bay Regional Health Sciences Centre	Northwestern Ontario Regional Cancer Care – Thunder Bay Regional Research Institute
	Universities	Lakehead University	Northern Ontario School of Medicine
Toronto	Hospitals with affiliated research/cancer centres	Credit Valley Hospital	Carlo Fidani Peel Regional Cancer Centre
		Mount Sinai Hospital	Samuel Lunenfeld Research Institute
		The Hospital for Sick Children	The Hospital for Sick Children Research Institute
St. Michael's Hospital		Li Ka Shing Keenan Research Institute	
Sunnybrook Health Sciences Centre		Sunnybrook Research Institute; Odette Cancer Centre; Institute for Clinical and Evaluative Sciences	
Princess Margaret Hospital		Ontario Cancer Institute; Advanced Medical Discovery Institute; Campbell Family Cancer Research Institute; Campbell Family Institute for Breast Cancer Research	
Toronto General Hospital		Toronto General Hospital Research Institute	
Toronto Western Hospital	Toronto Western Hospital Research Institute		
Women's College Hospital	Women's College Research Institute; Women's College Familial Breast Cancer Research Unit		
	Independent research centres	Cancer Care Ontario; Centre for Addiction and Mental Health; MaRS Centre; Ontario Institute for Cancer Research	
	Universities	Ryerson University; University of Toronto; York University	
Windsor	Hospitals with affiliated research/cancer centres	Windsor Regional Hospital	Windsor Regional Cancer Centre
	Universities	University of Windsor	

APPENDIX 2: SELECTED CANCER PROGRAMS IN ONTARIO

Location	Programs
Hamilton	<ul style="list-style-type: none"> → Cancer and Thrombosis Group → Centre for Gene Therapeutics → Clinical Trials Methodology Group → Experimental Therapeutics Program → Musculoskeletal Oncology Research Program → Optical Diagnostics and Therapeutics Research Group → Program in Evidence-Based Care → Radiation Biology Research Group → Stem Cell and Cancer Research Institute → Supportive Care research → System-Wide Quality Improvements in Surgical Oncology → Tumour Metastasis Research Group
Kingston	<ul style="list-style-type: none"> → Cancer biology and genetics → Cancer care and epidemiology → Cancer clinical trials
London	<ul style="list-style-type: none"> → Basic and Clinical Cancer Research (biology, imaging, training, cancer therapeutics and clinical trials) → Cancer Imaging and Minimally Invasive Therapies → London Regional Transgenic and Gene Targeting Facility → London Strategic Training Initiative in Cancer Research → Prostate Cancer Centre → Translational Breast Cancer Research Unit
Samuel Lunenfeld Research Institute – Mount Sinai Hospital	<ul style="list-style-type: none"> → Angiogenesis research → Basic metabolism and cancer growth → Cancer genetics, molecular epidemiology → Cell cycle and genome instability → Cell cycle and mechanisms contributing to genome instability → Embryonic stem cell and recombinant technologies → Molecular etiology of breast cancer → Protein structures → Surgical methodology, clinical research studies, diet and behaviour, genetic epidemiology → Transforming growth cell beta factor → Wnt and PI3' kinase pathways in breast and colon cancer
Ontario Cancer Institute – Princess Margaret Hospital	<ul style="list-style-type: none"> → Advanced Medical Discovery Institute – genetic instability and cancer cell survival → Applied Molecular Oncology → Campbell Family Institute for Breast Cancer Research → Drug Development Program → Program in Psychosocial Oncology and Palliative Care → Spatio-Temporal Targeting and Amplification of Radiation Response Program → Stem Cell Biology → Structure Biology and Medical Chemistry → T. Robert Beamish Family Convergence Centre of Medical Discovery – integrated projects in genomics, proteomics, systems biology and informatics

Location	Programs
Ontario Institute for Cancer Research	<ul style="list-style-type: none"> → Cancer Genomics (ICGC) → Cancer Stem Cells → Immuno- and Bio-therapies → Informatics and Bio-computing → One Millimetre Cancer Challenge → Ontario Cancer Cohort → Selective Agents (Terry Fox Research Institute)
Ottawa	<ul style="list-style-type: none"> → Apoptosis Research Centre → Oncolytic Virus Program → Program in Cancer Therapeutics → Stem Cell Genomics Project – new research initiative, Ottawa Hospital → Therapeutics targeted to apoptosis regulators
Sudbury	<ul style="list-style-type: none"> → Clinical trials → Environmental, genetic and lifestyle issues in cancer → Prognostic indicators for cancer → Tumour bank of breast tumours → Tumour Biology Group → Women's Northeastern Ontario Study of Health and Environment
Sunnybrook Health Sciences Centre	<ul style="list-style-type: none"> → Breast Cancer Research Centre → Molecular and cellular biology; radiation physics; clinical trials; health services research; psychosocial and behavioural program → Ontario Centre of Excellence in Breast Imaging Research → Ontario Consortium for Image-guided Therapy and Surgery → Toronto Angiogenesis Research Centre
The Hospital for Sick Children	<ul style="list-style-type: none"> → Canadian Centre for Applied Cancer Genetics → Centre for Applied Genomics → Integrative Genomics for Health Research → Mass-Spec Based Proteomics of Ontario → Molecular Neuro-Oncology and Brain Tumour Research Centre → Mouse functional genomics → Mouse Imaging Centre (MICe) → Signalling and Degradation Network of Toronto
Thunder Bay	<ul style="list-style-type: none"> → Basic and translational research → Clinical trials → Medical physics → Psychosocial research
University of Toronto	<ul style="list-style-type: none"> → Cancer control, cancer epidemiology, cancer screening tests → Dietary factors, susceptibility genes in cancer development → Drug resistance in cancer chemotherapy → Fundamental mechanisms of disease → Genome-wide studies of protein-protein interactions and signaling using yeast as a model eukaryote → Tobacco research unit
Waterloo	<ul style="list-style-type: none"> → Biostatistical methodologies related to cancer research → Computational oncology → Diagnostic technologies and image analysis → Information management → International Tobacco Control Policy Evaluation Project

APPENDIX 3: REPRESENTATIVE ONCOLOGY PUBLICATIONS IN ONTARIO

BIOINFORMATICS

An experimentally derived confidence score for binary protein-protein interactions. Braun P, Tasan M, Dreze M, Barrios-Rodiles M, Lemmens I, Yu H, Sahalie JM, Murray RR, Roncari L, de Smet AS, Venkatesan K, Rual JF, Vandenhaute J, Cusick ME, Pawson T, Hill DE, Tavernier J, Wrana JL, Roth FP, Vidal M. *Nature Methods* 2008 6(1):91-7.

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CLINICAL TRIALS

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K-ras mutations and benefit from cetuximab in advanced colorectal cancer. Karapetis CS, Khambata-Ford S, Jonker DJ, O'Callaghan CJ, Tu D, Tebbutt NC, Simes RJ, Chalchal H, Shapiro JD, Robitaille S, Price TJ, Shepherd L, Au HJ, Langer C, Moore MJ, Zalberg JR. *N Engl J Med.* 2008 Oct 23;359(17):1757-65.

Use of a targeted oncolytic poxvirus, JX-594, in patients with refractory primary or metastatic liver cancer: A phase I trial. Park BH, Hwang T, Liu TC, Sze DY, Kim JS, Kwon HC, Oh SY, Han SY, Yoon JH, Hong SH, Moon A, Speth K, Park C, Ahn YJ, Daneshmand M, Rhee BG, Pinedo HM, Bell JC, Kirn DH. *Lancet Oncol.* 2008 Jun;9(6):533-42. Erratum in: *Lancet Oncol.* 2008 Jul;9(7):613.

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APPENDIX 4: MAJOR ONCOLOGY SERVICES, FACILITIES AND PLATFORMS IN ONTARIO

Hamilton	<ul style="list-style-type: none"> → Centre for Gene Therapeutics and Centre for Functional Genomics → Centre for Probe Development and Commercialization → Centre for Supportive Cancer Care Research → GLP Correlative Assay Core Facility → Institute for Molecular Medicine and Health → Laboratory for Computational Biophysics and Bioinformatics → Mass Spec-Based Proteomics of Ontario → McMaster high-throughput lab – biomolecular screening
Kingston	<ul style="list-style-type: none"> → Biomolecular NMR facility → CTG tumour bank used nationally and internationally → Gene function and facility → Head and neck cancer database → Mass spec-based proteomics facility with Ottawa → State-of-the-art gastrointestinal research unit provides support to cancer researchers → Tumour bank, NCIC CTG national source for biological correlation studies
London	<ul style="list-style-type: none"> → Biological Mass Spec Lab (part of an Ontario-wide protein-identification facility) → London Core Facility for Translational Genomics and Proteomics → London Regional Transgenic and Gene Targeting Facility London Region Genomics Centre → Molecular Imaging and Dynamics of Cell Signaling Networks → Protein and peptide analysis, peptide sequencing, protein identification → Protein Identification Core Facility
MaRS	<ul style="list-style-type: none"> → MaRS Innovation: collaboration of technology transfer offices in the GTA → Ontario Cancer Biomarker Network
Samuel Lunenfeld Research Institute – Mount Sinai Hospital	<ul style="list-style-type: none"> → Biospecimen Repository → Centre for Comparative Models in Human Disease → Centre for Health Research → High-throughput screening sample facility → Infrastructure for Biochips and Biorobotics, Imaging and Patient → Mass Spectroscopy → Preclinical Models of Cancer → Sample Repository and Database
Ontario Cancer Institute at Princess Margaret Hospital	<ul style="list-style-type: none"> → Advanced Optical Microscopy Facility → Analytical Genetics Technology Centre → Applied Molecular Profiling Lab → Biobanking/Tissue Biobanking → Cell Therapy Centre → Microarray Centre → STTARR Facility (Spatio-Temporal Targeting and Amplification of Radiation Response) → Structural Biology and Fragment-based Screening

APPENDIX 4: MAJOR ONCOLOGY SERVICES, FACILITIES AND PLATFORMS IN ONTARIO (CONTINUED)

Ontario Institute for Cancer Research	<ul style="list-style-type: none"> → Bio-repositories and Pathology → Genomics and High-Throughput Screening → Informatics and Bio-Computing → Medicinal chemistry
Ottawa	<ul style="list-style-type: none"> → GMP Manufacturing Facility → High-Throughput DNA sequencing Facility → Mass Spec-Based Proteomics of Ontario → MRI/PET cancer imaging → National Solid-State Ultrahigh Field → Nuclear Magnetic Resonance Facility → Ottawa Genome Innovation Centre – microarray technology, bioinformatics expertise, mass spec-based proteomics facility
Sunnybrook Health Sciences Centre	<ul style="list-style-type: none"> → Array Facility → Breast Cancer Research Centre → Flow Cytometry → Hypoxic Chamber → Institute for Clinical Evaluative Studies (largest in Canada) → Molecular Medicine Research Centre → Myelodysplastic syndrome biobank and clinical database → Odette Cancer Centre and Cancer Clinical Trials → Toronto Angiogenesis Research Centre
The Hospital for Sick Children	<ul style="list-style-type: none"> → Advanced Bioimaging Centre → Advanced Protein Technology Centre → Centre for Computational Biology → Embryonic Stem Cell Facility → Flow Cytometry → Mouse Imaging Centre → Pritzker electron microscopy services → The Centre for Applied Genomics Microarray Facility → The Centre for Applied Genomics: DNA sequencing and synthesis; bioinformatics; gene isolation and expression → The Transgenic Facility
University of Toronto	<ul style="list-style-type: none"> → Bio-Imaging facilities → CAMH PET Centre → Centre for Applied BioSciences and Biotechnology → Centre for Research on Diet and Cancer → Facility for Design and Development of Novel Polymer Materials and Technologies for the Delivery of Anti-Cancer Agents → Functional Imaging Research Network → High-Throughput Proteomics Facility → Institute of Biomaterials and Biomedical Engineering → National GLP core facility to monitor immune responses in humans to prophylactic and/or therapeutic vaccines against infectious diseases, cancer and autoimmunity → Proteomics Core Facility → Toronto Centre for Phenogenomics
Waterloo	<ul style="list-style-type: none"> → Biostatistical methodologies related to cancer research → Computational oncology → Diagnostic technologies and image analysis → Information management

APPENDIX 5: UNIQUE IMAGING RESOURCES IN ONTARIO

LAWSON HEALTH SCIENCES CENTRE

Chemistry equipment

Waters Quattro Micro-MassLynx MS

McMASTER UNIVERSITY

Chemistry equipment

- 50 MW nuclear reactor
- RDS 112 cyclotron

Hardware and software

- Gamma Medica SPECT/CT (small animals)
- Siemens Mosaic MicroPET

ROBARTS RESEARCH INSTITUTE

Biological and tissue resources

3D Pathology Lab, tissue sectioning/staining/digitized imaging

Hardware and software

- 3 Micro-CTs for small-animal imaging
- 3T fMRI, research, whole body human
- 7T fMRI, research, whole body human
- 9.4T fMRI, research, animal, up to non-human primates
- Four 3D ultrasound imaging systems for prostate, breast and liver imaging, biopsy and therapy
- Micro-CT/SPECT GE for small animals
- Spinmaters – FFC 2000 1T Field Cycling NMR Relaxometer

SUNNYBROOK HEALTH SCIENCES CENTRE

Biological and tissue resources

- 3D Pathology Lab, research: tissue processing and staining (routine/special/antibody), whole-mount sections
- Pathos Automated Microwave, ESBE – Histopathology lab Microwave Histos 5 Processo, ESBE

Chemistry equipment

- Malvern Nanosizer S (zeta potential and dynamic light scattering system)

Hardware and software

- 0.5T, small-sample relaxation and polarization measurements
- 7T, animal, 1H, 13C (installation summer 2009)
- ART SoftScan breast imager Fulcrum high-resolution film digitizer

APPENDIX 5: UNIQUE IMAGING RESOURCES IN ONTARIO (CONTINUED)

Sunnybrook Health Sciences Centre (continued)

- C13 DNP Polarimeter
- Cary-5000 UV-Vis-NIR Spectrophotometer TissueScope 4000 slide scanner
- Cone beam CT (sandbox), 100mm³, research, tissue, phantoms
- EVS Micro CT
- GE 2000D Digital Mammography Unit GE DS Digital Mammography Unit/Tomosynthesis Prototype
- High-frequency ultrasound scanner (Visual Sonics VEV0770-RF)
- Horiba Jobin Yvon FluoroMax-4 Spectrofluorometer
- Pulsed copper vapour laser (Oxford lasers)

THE HOSPITAL FOR SICK CHILDRENHardware and software

- 1.5T for human whole body
- 3T for human whole body (being purchased)
- 7T for mouse
- Micro-CT for specimens
- Prototype OPT for fixed specimens Fluorescence Caliper for mice Registration and Analysis Software
- Vevo 700 for mouse
- Vevo 2100 for mouse IVIS 300 (3D) Caliper for mice Bioptonics OPT Optical CT for fixed specimens

UNIVERSITY HEALTH NETWORKHardware and software

- 7T MRI, research, animal (whole body murine up to NHP brain) – anatomical, quantitative, DCE
- Anatomical and perfusion microCT (>15um resolution), research
- Aperio Scanner (Aperio ScanScope XT)
- Fluorescence Molecular Tomography, research, small animal (murine, rodent) – NIR probes
- High-Frequency Ultrasound (1.3 cm penetration depth)
- Image-Guided Radiation Therapy (research, animal)
- Media Cybergenetics Image Pro Plus MathWorks Matlab Altair HyperWorks ITT IDL Simulia Abaqus Pinnacle Inveon Research Workplace
- MicroCT (150um resolution), research, animal (whole body murine up to NHP brain)
- MicroPET, research, animal (whole body murine up to small NHP)
- NanoSPECT/CT, research, small animal (murine, rodent)
- TISSUEScopeTM 4000 Hyperspectral Fluorescence, research, small animal (murine, rodent)
- Two-Photon (Zeiss LSM510 META)
- Xenogen (Xenogen IVIS Imaging System 100) Bitplane Imaris

UNIVERSITY OF WESTERN ONTARIOChemistry equipment

- Waters LCT Premier MS System

APPENDIX 6: INNOVATIVE ONTARIO COMPANIES FOCUSING ON CANCER

Company	Focus	Technology	Lead Products	Website
AlphaRx Inc., Markham	Drug delivery, pharmaceuticals	Drug delivery	Teposolin™ NDS hybrid lipid-polymer nanoparticulate drug delivery system for paclitaxel	http://www.alpharx.com/docs09/index.php?submenuid=index_menu&category=home/mainindex
Ambit Biosciences, Toronto	Cancer therapeutics	Protein kinase profiling service	Service, and own FLT3 kinase, AURORA kinase and BRAF kinase	http://www.ambitbio.com/
ArcticDx Inc., Toronto	Cancer risk assessment	Non-familial colorectal cancer associated nucleotide polymorphisms	ColoRisk™ risk assessment tool for colorectal cancer	http://www.arcticdx.com/
Axela Biosensors, Toronto	Discovery	Discovery and clinical research platform	dotLab™ system for evaluating inter-molecular interactions	http:// www.axelabiosensors.com/
Bioniche Life Sciences Inc., Toronto	Therapeutics	immunomodulation	Urocin™ mycobacterial cell wall-DNA complex for the treatment of bladder cancer	http://www.bioniche.com/
Bradmer Pharmaceuticals, Toronto	Biotechnology/ Biopharmaceutical	Radiolabeled monoclonal antibody	Neuradiab™ radiolabeled anti-tenascin monoclonal antibody for detecting brain tumour margins	http:// www.bradmerpharma.com/
Chemaphor Inc., Ottawa	Cancer drug therapies	Non-vitamin A carotenoid oxidation products	OCL-1 small molecule	http://www.chemaphor.com/
Critical Outcome Technologies, London	Drug discovery, optimization and pre-clinical development using computer models	Computer modeling optimized screening of small- molecule libraries	Service and own pipeline of small molecules	http:// www.criticaloutcome.com/
DVS Inc., Toronto	Analytical equipment	High-parameter flow cytometer ICP-MS	CyTOF™ instrument with MAXPAR™ reagents	http://www.dvsscience.com/
GeneNews Inc., Richmond Hill	Diagnostics	Early disease detection biomarkers	ColonSentry™ blood test for colorectal cancer detection	http://www.genenews.com/ about/overview
Helix BioPharma Corp., Aurora	Drug delivery, drug development	Immunomodulator, therapeutic enzyme	Topical interferon alpha-2b, DOS47	http:// www.helixbiopharma.com/

APPENDIX 6: INNOVATIVE ONTARIO COMPANIES FOCUSING ON CANCER (CONTINUED)

Company	Focus	Technology	Lead Products	Website
Lorus Therapeutics Inc., Toronto	Clinical stage cancer drug development	Immunomodulators, RNAi and small molecules	Virulizin™ and pipeline	http://www.lorusthera.com/
PharmaGap Inc., Ottawa	Biotechnology/Biopharmaceutical drug development	Targeted PKC inhibitors	PhGalpha1	http://www.pharmagap.com/
Pharma Research (formerly Arius), Toronto	Cancer therapeutics	Discovery platform for therapeutic monoclonal antibodies	FunctionFIRST™	http://www.rochecanada.com/portal/eipf/ca/portal/roche
PreMD Inc., Toronto	Diagnostics	Cancer screening tests	ColorectAlert™ for early colorectal cancer detection, LungAlert™ for lung cancer detection, breast cancer detection	http://www.premdinc.com/
Profound Medical, Toronto	Medical devices	Temperature controlled thermal tumour ablation	Minimally invasive treatment of localized prostate cancer	http://www.profoundmedical.com/
Sentinelle Medical Inc., Toronto	Imaging hardware and software	Custom MR coils, patient stretchers and software	Vanguard System™ with variable coil geometry	http://www.sentinellemedical.com/
ToleroTech Inc., London	siRNA therapeutics	Immunomodulation using siRNA	siRNA based drugs	http://www.tolerotech.com/
Trillium Therapeutics Inc., Toronto	Protein therapeutics	Immunomodulatory monoclonal antibody	Anti-CD200 monoclonal antibody	http://www.trilliumtherapeutics.com/
VisualSonics Inc., Toronto	High-resolution imaging of experimental animals	High-resolution ultrasound	Vevo™ imaging platform for small-animal research	http://www.visualsonics.com/
Viventia Biotech, Inc., Mississauga	Biopharmaceutical Drug Discovery	Discovery platform for therapeutic monoclonal antibodies	Vicinium™ therapeutic protein, monoclonal antibodies and Armed Antibodies™	http://www.viventia.com/
YM Biosciences Inc., Mississauga	Clinical stage cancer drug development	Therapeutic monoclonal antibody	Nimotuzumab anti-EGFR antibody, tesmilifene chemosensitizer	http://www.ymbiosciences.com/

APPENDIX 7: MAJOR SERVICE PROVIDERS IN ONTARIO

ANALYTICAL CHEMISTRY/FINISHED PRODUCT/STABILITY TESTING

Activation Laboratories Ltd., Ancaster
Alphora Research, Mississauga
Dalton Chemical Laboratories Inc., Toronto
Keata Pharma Inc./PharmEng Technology Inc., Markham
Nucro-Technics, Scarborough

API MANUFACTURES

Alphora Research, Mississauga
Dalton Chemical Laboratories Inc., Toronto

BIOANALYTICAL

Allied Research International Inc., Mississauga
Custom Biologics, Mississauga
Hemostasis Reference Laboratory Henderson Research Centre, Hamilton
Pharma Medica Research Inc., Mississauga
SGS Canada Inc., Mississauga

CLINICAL TRIAL MANAGEMENT/MONITORING

Acclaim Pharma Research Inc., London
Allied Research International Inc., Mississauga
Allphase Clinical Research, Ottawa
Applied Health Research Centre, Toronto
Biovail Contract Research, Toronto
Clinimetrics, Mississauga
gap strategies, Toronto
Ozmosis Research Inc., Toronto
PG Clinical Trials, Toronto
Pharma Medica Research Inc., Mississauga
SGS Canada Inc., Mississauga
Stiris Research, London
Torealis Research Inc., Aurora
Ventana Clinical Research, Toronto

APPENDIX 7: MAJOR SERVICE PROVIDERS IN ONTARIO (CONTINUED)

CLINICAL TRIAL PACKAGING

Bellwyck Packaging Solutions, Mississauga
Chemi Pharmaceutical Inc., Mississauga
Keata Pharma Inc./PharmEng Technology Inc., Markham
Patheon Inc., Burlington Operations (Global Clinical Packaging), Burlington

DATA MANAGEMENT /STATISTICS

McDougall Scientific Ltd., Toronto
Pharma Medica Research Inc., Mississauga
SciAn Services Inc., Toronto
SGS Canada Inc., Mississauga

FORMULATION DEVELOPMENT

Dalton Chemical Laboratories Inc., Toronto
Keata Pharma Inc./PharmEng Technology Inc., Markham
Patheon Inc., Toronto Region Operations (TRO), Mississauga
Patheon Inc., Whitby Region Operations (WRO), Whitby
Therapure Biopharma Inc., Mississauga

REGULATORY

Allied Research International Inc., Mississauga
Ashuren Health Sciences, Mississauga
CanReg Inc., Dundas
Carexa incorporated, Oakville
Intrinsic Health Sciences Inc., Mississauga
SGS Canada Inc., Mississauga

SAFETY PHARMACOLOGY/TOXICOLOGY

Ashuren Health Sciences, Mississauga
Global Tox, Guelph
Intrinsic Health Sciences Inc., Mississauga
Nucro-Technics, Scarborough

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE

BLADDER

Grant, Denis M	University of Toronto
King, Will D	Queen's University
Lightfoot, Nancy	Laurentian University

BONE AND CONNECTIVE TISSUE

Alman, Benjamin A	The Hospital for Sick Children
Bell, Robert S	Toronto General Hospital
Ezzat, Shereen Z	Mount Sinai Hospital
Hamel, Paul A	University of Toronto
Khokha, Rama	Princess Margaret Hospital
Litchfield, David W	University of Western Ontario
O'Sullivan, Brian	Princess Margaret Hospital
Rudnicki, Michael A	Ottawa Health Research Institute
Squire, Jeremy A	Queen's University
Wunder, Jay S	Mount Sinai Hospital
Zacksenhaus, Eldad	Toronto General Hospital

BRAIN

Bauman, Glenn S	University of Western Ontario
Bouffet, Eric	The Hospital for Sick Children
Caudrelier, Jean-Michel	The Ottawa Hospital Cancer Centre – General Campus
Costello, Penelope	London Health Sciences Centre
Cusimano, Michael	St. Michael's Hospital
Dirks, Peter B	The Hospital for Sick Children
Guha, Abhijit	Toronto Western Hospital
Hawkins, Cynthia E	The Hospital for Sick Children
Huang, Annie	The Hospital for Sick Children
Irwin, Meredith S	The Hospital for Sick Children
Kaplan, David R	The Hospital for Sick Children
Krewski, Daniel R	University of Ottawa
Lee, Agnes YY	Hamilton Health Sciences – Henderson Site
Lee, Stephen	University of Ottawa

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Brain (continued)

Lorimer, Ian AJ	The Ottawa Hospital – General Campus
Mabbott, Donald J	The Hospital for Sick Children
Malkin, David D	The Hospital for Sick Children
Mason, Warren P	Princess Margaret Hospital
Meakin, Susan O	Robarts Research Institute
Ménard, Cynthia	Princess Margaret Hospital
Mirsattari, Seyed M	University of Western Ontario
Muller, Paul J	St. Michael's Hospital
Pignol, Jean-Philippe	Sunnybrook Health Sciences Centre
Ramsay, David	London Health Sciences Centre
Rozakis Adcock, Maria	University of Toronto
Rutka, James T	The Hospital for Sick Children
Rutt, Brian J	Robarts Research Institute
Stevens, Bonnie J	University of Toronto
Stojdl, David F	Children's Hospital of Eastern Ontario
Taylor, Michael D	The Hospital for Sick Children
Tozer, Richard G	Juravinski Cancer Centre – Hamilton Health Sciences
Watling, Christopher	London Health Sciences Centre
Whitton, Anthony (Tony) C	Cancer Care Ontario
Wong, C. Shun	Sunnybrook Health Sciences Centre
Wong, Eugene CM	University of Western Ontario

BREAST

Ackerman, Ida	Sunnybrook Health Sciences Centre
Allan, Alison L	London Health Sciences Centre
Allen, Christine J	University of Toronto
Andrews, David W	McMaster University
Andrulis, Irene L	Mount Sinai Hospital
Anthes, Margaret L	Thunder Bay Regional Health Science Centre
Archer, Michael C	University of Toronto
Aronson, Kristan J	Queen's University
Ashkar, Ali A	McMaster University
Basrur, Vas R	Grand River Regional Cancer Centre
Bhattacharya, Moshmi M	University of Western Ontario
Bondy, Susan J	University of Toronto
Bordeleau, Louise J	Mount Sinai Hospital
Bowen, Julie L	Cancer Program of the Sudbury Regional Hospital
Boyd, Norman F	Princess Margaret Hospital
Bramson, Jonathan L	McMaster Centre For Gene Therapeutics
Brophy, James T	University of Windsor
Brouwers, Melissa C	McMaster University
Catton, Pamela A	Princess Margaret Hospital

Breast (continued)

Chambers, Ann F	London Regional Cancer Program
Cheung, Angela M	Toronto General Hospital
Chiarelli, Anna M	Cancer Care Ontario
Chow, Benjamin JW	University of Ottawa Heart Institute
Clemons, Mark J	Princess Margaret Hospital
Côté, Jocelyn	University of Ottawa
Cotterchio, Michelle	Cancer Care Ontario
Coyle, Douglas A	University of Ottawa
Cunningham, Ian A	Robarts Research Institute
Czarnota, Gregory J	Sunnybrook Health Sciences Centre
Davey, Scott K	Queen's University
Dekaban, Gregory A	Robarts Research Institute
Dent, Susan F	The Ottawa Regional Cancer Centre
Dick, Frederick A	London Regional Cancer Program
Done, Susan J	Ontario Cancer Institute
Duivenvoorden, Wilhelmina (Helga)	Juravinski Cancer Centre – Hamilton Health Sciences
Egan, Sean E	The Hospital for Sick Children
Eisen, Andrea F	Sunnybrook Health Sciences Centre
Elliott, Bruce E	Queen's University
Ellis, Peter	Juravinski Cancer Centre – Hamilton Health Sciences
Emili, Andrew NJ	University of Toronto
Esplen, Mary Jane	Toronto General Research Institute
Fantus, I. George	Mount Sinai Hospital
Fenster, Aaron	Robarts Research Institute
Filmus, Jorge E	Sunnybrook Health Sciences Centre
Findlay, Brian P	Niagara Health System
Fitch, Margaret I	Sunnybrook Health Sciences Centre
Foley, S. Ronan	McMaster University
Foster, F. Stuart	Sunnybrook Health Sciences Centre
Foster, Warren G	McMaster University
Gagliese, Lucia	Toronto General Hospital
Gall, Terry Lynn	Université Saint-Paul (Ottawa)
Gariépy, Jean	Ontario Cancer Institute
Glendon, Gordon	Cancer Care Ontario
Goodwin, Pamela J	Mount Sinai Hospital
Gorey, Kevin M	University of Windsor
Gould, Judy	Women's College Research Institute
Graham, Charles H	Queen's University
Graham, Ian D	Canadian Institutes of Health Research
Gray, Ross	Sunnybrook Health Sciences Centre
Greenblatt, Jack F	University of Toronto
Greer, Peter A	Queen's University
Grimshaw, Jeremy M	Ottawa Health Research Institute

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Breast (continued)

Hakem, Razqallah	Princess Margaret Hospital
Hamel, Paul A	University of Toronto
Hassell, John A	McMaster University
Holloway, Claire MB	Sunnybrook Health Sciences Centre
Ingram, Carolyn A	McMaster University
Jacobs, J. Roger	McMaster University
Jia, Zongchao	Queen's University
Jiang, Rachel	Ryerson University
Johnston, Miles G	Sunnybrook Health Sciences Centre
Josephy, David	University of Guelph
Keith, Margaret M	University of Windsor
Kerbel, Robert S	Sunnybrook Health Sciences Centre
Kerr, Leslie R	Trent University
Khokha, Rama	Princess Margaret Hospital
Klamut, Henry J	Princess Margaret Hospital
Knight, Julia A	Mount Sinai Hospital
Koch, C. Anne	Princess Margaret Hospital
Kotra, Lakshmi P	University of Toronto
Lacefield, James C	Robarts Research Institute
Laird, Dale W	University of Western Ontario
Lala, Peeyush K	University of Western Ontario
Leatherdale, Scott T	Cancer Care Ontario
Leclair, Robert J	Laurentian University
Lee, Hoyun	Northwestern Ontario Regional Cancer Care
Lee, Jonathan M	University of Ottawa
Levine, Mark N	McMaster University
Liaw, Patricia CY	Henderson Research Centre – McMaster University
Lilge, Lothar	Princess Margaret Hospital
Lipscombe, Lorraine	Women's College Hospital
Liu, Fei-Fei	Princess Margaret Hospital
Lovrics, Peter J	St. Joseph's Healthcare Hamilton
Ma, David	University of Guelph
MacDonald, Ian C	University of Western Ontario
Maheu, Christine	University of Toronto
Mak, Tak W	Princess Margaret Hospital
Maroun, Jean A	The Ottawa Hospital Cancer Centre – General Campus
Martel, Anne L	Sunnybrook Health Sciences Centre
Martin, Lisa J	Princess Margaret Hospital
Matthews, Jason	University of Toronto
McPherson, J. Peter M	University of Toronto
Medin, Jeffrey A	Ontario Cancer Institute
Meng, Joanne	The Ottawa Hospital – General Division

Breast (continued)

Metcalfe, Kelly A	University of Toronto
Moorehead, Roger A	University of Guelph
Mossman, Karen L	McMaster University
Mueller, Christopher R	Queen's University
Narod, Steven A	Women's College Research Institute
Nicol, Christopher J	Queen's University
Nikolova, Natalia K	McMaster University
Nofech-Mozes, Sharon	Sunnybrook Health Sciences Centre
O'Malley, Frances P	Mount Sinai Hospital
Ozcelik, Hilmi	Mount Sinai Hospital
Paige, Christopher J	Princess Margaret Hospital
Paisley, Judy A	Ryerson University
Parissenti, Amadeo	Northwestern Ontario Regional Cancer Care
Paszat, Lawrence (Larry) F	Sunnybrook Health Sciences Centre
Pawson, Anthony J	Mount Sinai Hospital
Penn, Linda JZ	Princess Margaret Hospital
Perera, Francisco E	London Health Sciences Centre
Petrella, Teresa M	Sunnybrook Health Sciences Centre
Petronis, Arturas	Centre for Addiction and Mental Health
Pignol, Jean-Philippe	Sunnybrook Health Sciences Centre
Plewes, Donald B	Sunnybrook Health Sciences Centre
Porter, Lisa A	University of Windsor
Pratt, MA Christine	University of Ottawa
Puri, Mira C	Sunnybrook Health Sciences Centre
Quan, May Lynn	Sunnybrook Health Sciences Centre
Rakovitch, Eileen	Sunnybrook Health Sciences Centre
Raptis, Leda H	Queen's University
Reilly, Raymond M	University of Toronto
Richardson, Harriet	Queen's University
Roifman, Chaim	The Hospital for Sick Children
Rommens, Johanna M	The Hospital for Sick Children
Rossant, Janet	The Hospital for Sick Children
Rowlands, John A	Sunnybrook Health Sciences Centre
Sabourin, Luc A	University of Ottawa
Samani, Abbas	University of Western Ontario
Sangrar, Waheed	Queen's University
Schwartz, Lisa J	McMaster University
SenGupta, Sandip K	Kingston General Hospital
Seth, Arun K	Sunnybrook Health Sciences Centre
Shoichet, Molly S	University of Toronto
Sinding, Christina	McMaster University
Singh, Gurmit	Juravinski Cancer Centre – Hamilton Health Sciences
Spaner, David E	Sunnybrook Health Sciences Centre

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Breast (continued)

St George-Hyslop, Peter H	University of Toronto
Stambolic, Vuk	Ontario Cancer Institute
Tannock, Ian F	Princess Margaret Hospital
Th'Ng, John PH	Northwestern Ontario Regional Cancer
Thompson, Lilian U	University of Toronto
Torchia, Joseph	London Regional Cancer Program
Tranmer, Joan E	Kingston General Hospital
Trimble, William S	The Hospital for Sick Children
Tuck, Alan B	London Health Sciences Centre
Vandenberg, Theodore A	London Regional Cancer Program
Warner, Ellen	Sunnybrook Health Sciences Centre
Wells, Woodrow A	Princess Margaret Hospital
Whelan, Timothy J	Juravinski Cancer Centre – Hamilton Health Sciences
Whyne, Cari M	Sunnybrook Health Sciences Centre
Wiebe, John P	University of Western Ontario
Wiljer, David E	Princess Margaret Hospital
Willison, Donald J	St. Joseph's Healthcare Hamilton
Woodgett, James (Jim) R	Mount Sinai Hospital
Wright, Frances C	Sunnybrook Health Sciences Centre
Wright, James S	Carleton University
Yaffe, Martin J	Sunnybrook Health Sciences Centre
Yang, Burton B	Sunnybrook Health Sciences Centre
Yee, Albert JM	Sunnybrook Health Sciences Centre
Yeh, Wen-Chen	Ontario Cancer Institute
Zacksenhaus, Eldad	Toronto General Hospital

CERVIX

Biagi, James	Kingston Regional Cancer Centre
Bristow, Robert G	Princess Margaret Hospital
Fyles, Anthony W	Princess Margaret Hospital
Hedley, David W	Princess Margaret Hospital
Hill, P. Richard (Dick)	Princess Margaret Hospital
Kohandel, Mohammad	University of Waterloo
MacKay, Helen J	Princess Margaret Hospital
Milosevic, Michael P	Princess Margaret Hospital
Thomas, Gillian	Sunnybrook Health Sciences Centre
Watt-Watson, Judith H	University of Toronto
Winqvist, Eric W	London Regional Cancer Program
Yeung, Ivan WT	Princess Margaret Hospital

COLORECTAL

Archer, Michael C	University of Toronto
Attisano, Liliana	University of Toronto
Bapat, Bharati	Mount Sinai Hospital
Basak, Ajoy	The Ottawa Hospital – Civic Campus
Baxter, Nancy N	St. Michael's Hospital
Bird, Ranjana P	University of Windsor
Bondy, Susan J	University of Toronto
Coomber, Brenda L	University of Guelph
Cotterchio, Michelle	Cancer Care Ontario
de Metz, Catherine E	Kingston Regional Cancer Centre
Dennis, James W	Mount Sinai Hospital
Dimitroulakos, Jim	The Ottawa Regional Cancer Centre
Drucker, Daniel J	Mount Sinai Hospital
Egan, Sean E	The Hospital for Sick Children
Findlay, Brian P	Niagara Health System
Flintoff, Wayne F	University of Western Ontario
Gallinger, Steven	Mount Sinai Hospital
Gorey, Kevin M	University of Windsor
Greer, Peter A	Queen's University
Gryfe, Robert N	Mount Sinai Hospital
Hassell, John A	McMaster University
Hudson, Thomas J	Ontario Institute for Cancer Research
Kendal, Wayne S	The Ottawa Regional Cancer Centre
Kim, John J	Princess Margaret Hospital
Kim, Young-In J	St. Michael's Hospital
Kirby, Gordon M	University of Guelph
Krylov, Sergey N	York University
Kustra, Rafal	University of Toronto
Law, Calvin HL	Sunnybrook Health Sciences Centre
Little, Julian	University of Ottawa
Lobe, Corrinne G	Sunnybrook Health Sciences Centre
Macleod, R. John	Queen's University
McCart, J. Andrea	Toronto General Research Institute
McKay, Bruce C	The Ottawa Hospital – General Campus
McLaughlin, John R	Cancer Care Ontario
Ng, Cheng E	Ottawa Health Research Institute
O'Brien, Peter J	University of Toronto
Prapavessis, Harry	University of Western Ontario
Rabeneck, Linda	Sunnybrook Health Sciences Centre
Ritvo, Paul G	Cancer Care Ontario
Salit, Irving E	Toronto General Hospital
Sicheri, Frank	Mount Sinai Hospital
Simunovic, Marko I	Juravinski Cancer Centre – Hamilton Health Sciences

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Colorectal (continued)

Smith, Andrew J	Sunnybrook Health Sciences Centre
Tannock, Ian F	Princess Margaret Hospital
Tinmouth, Jill M	Sunnybrook Health Sciences Centre
Tsao, Ming-Sound	Princess Margaret Hospital
Wilson, Brian C	Princess Margaret Hospital
Zanke, Brent W	Ontario Institute for Cancer Research – Ontario Tumour Bank

ESOPHAGUS

Biagi, James	Kingston Regional Cancer Centre
Gopaul, Darindra	Grand River Regional Cancer Centre – Grand River Hospital
Liu, Geoffrey	University of Toronto
Narod, Steven A	Women's College Research Institute
Tinmouth, Jill M	Sunnybrook Health Sciences Centre
Vitkin, I. Alex	Princess Margaret Hospital
Wilson, Brian C	Princess Margaret Hospital
Wong, K.S. Rebecca	Princess Margaret Hospital

GALL BLADDER

Moayyedi, Paul	McMaster University
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HODGKIN'S DISEASE

Baetz, Tara	Kingston Regional Cancer Centre
Bence-Bruckler, Isabelle	The Ottawa Hospital – General Division
Buckstein, Rena J	Sunnybrook Health Sciences Centre
Crump, R. Michael	Princess Margaret Hospital
Hodgson, David C	Princess Margaret Hospital
Mak, Tak W	Princess Margaret Hospital

KIDNEY

Angers, Stephane	University of Toronto
Foster, F. Stuart	Sunnybrook Health Sciences Centre
Jewett, Michael AS	Princess Margaret Hospital
Lee, Stephen	University of Ottawa
Ohh, Michael	University of Toronto
Quaggin, Susan E	Mount Sinai Hospital
Rozakis Adcock, Maria	University of Toronto

LARYNX

Martin, Ruth E	University of Western Ontario
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LEUKEMIA

Anderson, Michele K	Sunnybrook Health Sciences Centre
Barber, Dwayne L	Princess Margaret Hospital

Leukemia (continued)

Barr, Ronald D	McMaster University
Bazett-Jones, David P	The Hospital for Sick Children
Benchimol, Samuel	York University
Ben-David, Yaacov	Sunnybrook Health Sciences Centre
Berger, Stuart A	University of Toronto
Bhatia, Mickie	McMaster Stem Cell & Cancer Research Institute
Brand, Marjorie C	University of Ottawa
Crump, R. Michael	Princess Margaret Hospital
Devins, Gerald M	Toronto General Hospital
Dick, John E	University of Toronto
Donaldson, Logan WF	York University
Downie, Andrea LS	London Health Sciences Centre
Fish, Eleanor N	Toronto General Hospital
Fradin, Cécile	McMaster University
Gauldie, Jack	McMaster University
Guger, Sharon L	The Hospital for Sick Children
Guidos, Cynthia J	The Hospital for Sick Children
Hakem, Razqallah	Princess Margaret Hospital
Hedley, David W	Princess Margaret Hospital
Hitzler, Johann (Hans) K	The Hospital for Sick Children
Hough, Margaret R	Sunnybrook Health Sciences Centre
Ikura, Mitsuhiro	University of Toronto
Kamel-Reid, Suzanne	Princess Margaret Hospital
Kerbel, Robert S	Sunnybrook Health Sciences Centre
Kirkland, James B	University of Guelph
Kolios, Michael C	Ryerson University
Kotra, Lakshmi P	University of Toronto
Krewski, Daniel R	University of Ottawa
LeBrun, David P	Queen's University
Liu, Fei-Fei	Princess Margaret Hospital
Lobe, Corrinne G	Sunnybrook Health Sciences Centre
Madrenas, Joaquin	Robarts Research Institute
McCart, J. Andrea	Toronto General Research Institute
McGlade, C. Jane	The Hospital for Sick Children
McPherson, J. Peter M	University of Toronto
Meckling, Kelly A	University of Guelph
Minden, Mark D	Princess Margaret Hospital
Montour-Proulx, Isabelle	Children's Hospital of Eastern Ontario
Moran, Michael F	University of Toronto
Pace-Asciak, Cecil	The Hospital for Sick Children Research Institute
Paige, Christopher J	Princess Margaret Hospital
Penn, Linda JZ	Princess Margaret Hospital
Puri, Mira C	Sunnybrook Health Sciences Centre

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Leukemia (continued)

Rast, Jonathan P	Sunnybrook Health Sciences Centre
Reilly, Raymond M	University of Toronto
Rodin, Gary M	Princess Margaret Hospital
Rottapel, Robert K	University of Toronto
Schimmer, Aaron D	Princess Margaret Hospital
Schlichter, Lyanne C	Toronto Western Hospital
Schuh, Andre C	Princess Margaret Hospital
Spaner, David E	Sunnybrook Health Sciences Centre
Stanford, William (Bill) L	University of Toronto
Sung, Lillian	The Hospital for Sick Children
Trifaro, José-Maria	University of Ottawa
Wang, Chen	Mount Sinai Hospital
Watts, Tania H	University of Toronto
Wells, Richard (Dick) A	Princess Margaret Hospital
Winn, Louise M	Queen's University
Zhang, Li	University of Toronto
Zhu, Xu-Dong	McMaster University
Zimmermann, Camilla CU	Princess Margaret Hospital

LIVER

Biagi, James	Kingston Regional Cancer Centre
Brock, Kristy K	Princess Margaret Hospital
Cripps, Christine	The Ottawa Regional Cancer Centre
Dawson, Laura A	Princess Margaret Hospital
Filmus, Jorge E	Sunnybrook Health Sciences Centre
Foster, F. Stuart	Sunnybrook Health Sciences Centre
Hudson, John W	University of Windsor
Khokha, Rama	Princess Margaret Hospital
Knox, Jennifer J	Princess Margaret Hospital
Lee, Ting-Yim	Robarts Research Institute
Major, Pierre	Juravinski Cancer Centre – Hamilton Health Sciences
McGilvray, Ian	Toronto General Hospital
Swallow, Carol J	Mount Sinai Hospital
Yeh, Wen-Chen	Ontario Cancer Institute

LUNG

Anthes, Margaret L	Thunder Bay Regional Health Science Centre
Bader, Pearl	[Tobacco] Consultants in Behaviour Change
Briollais, Laurent	Mount Sinai Hospital
Brock, Kristy K	Princess Margaret Hospital
Brouwers, Melissa C	McMaster University
Caldwell, Curtis B	Sunnybrook Health Sciences Centre

Lung (continued)

Cheung, Patrick CF		Sunnybrook Health Sciences Centre
Cohen, Joanna E	[Tobacco]	University of Toronto
Coyle, Douglas A		University of Ottawa
Culotti, Joseph G		Mount Sinai Hospital
Darling, Gail E		Toronto General Hospital
D'Avernas, Josie	[Tobacco]	Schlegel – University of Waterloo Research Institute for Aging
de Metz, Catherine E		Kingston Regional Cancer Centre
Dewhirst, Timothy L	[Tobacco]	University of Guelph
Di Guglielmo, Gianni (John)		University of Western Ontario
Dimitroulakos, Jim		The Ottawa Regional Cancer Centre
Elliott, Bruce E		Queen's University
Evans, William (Bill) K		Juravinski Cancer Centre – Hamilton Health Sciences
Faulkner, Guy	[Tobacco]	University of Toronto
Feld, Ronald		Princess Margaret Hospital
Ferrence, Roberta G	[Tobacco]	Ontario Tobacco Research Unit
Finkelstein, Murray M	[Tobacco]	Mount Sinai Hospital
Fish, Eleanor N		Toronto General Hospital
Fong, Geoffrey T	[Tobacco]	University of Waterloo
Forkert, Poh-Gek		Queen's University
Goffin, John		Juravinski Cancer Centre – Hamilton Health Sciences
Graham, Ian D		Canadian Institutes of Health Research
Grimshaw, Jeremy M		Ottawa Health Research Institute
Hammond, David G	[Tobacco]	University of Waterloo, Centre for Behavioural Research & Program Evaluation
Hardy, Sheila	[Tobacco]	Laurentian University
Hill, P. Richard (Dick)		Princess Margaret Hospital
Hudson, John W		University of Windsor
Isaac-Mann, Sonia T	[Tobacco]	Assembly of First Nations (Ottawa)
Jadad, R. Alejandro (Alex)		Toronto General Hospital
Johnston, Michael R		Toronto General Hospital
Kirby, Gordon M	[Tobacco]	University of Guelph
Knott, Verner J	[Tobacco]	Royal Ottawa Hospital
Koll, Wayne		Lakeridge Health Oshawa
Koval, John J	[Tobacco]	University of Western Ontario
Laurie, Scott A		The Ottawa Hospital – General Division
Laviolette, Steven R	[Tobacco]	University of Western Ontario
Le Foll, Bernard	[Tobacco]	Centre for Addiction and Mental Health
Levine, Mark N		McMaster University
Lewis, John D		London Health Sciences Centre
Lobe, Corrinne G		Sunnybrook Health Sciences Centre
Lorimer, Ian AJ		The Ottawa Hospital – General Campus
Mackillop, William (Bill) J		Queen's University

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Lung (continued)

Manske, Stephen (Steve) R	[Tobacco]	University of Waterloo, Centre for Behavioural Research & Program Evaluation
Maroun, Jean A		The Ottawa Hospital Cancer Centre – General Campus
Marrett, Loraine D		Cancer Care Ontario
Massey, Thomas E	[Tobacco]	Queen's University
Maziak, Donna E		The Ottawa Hospital – General Campus
McDonald, Paul W	[Tobacco]	University of Waterloo
Moorehead, Roger A		University of Guelph
Rodin, Gary M		Princess Margaret Hospital
Rodrigues, George B		London Health Sciences Centre
Schwartz, Robert	[Tobacco]	University of Toronto
Selby, Peter L	[Tobacco]	Centre for Addiction and Mental Health
Skinner, Harvey A	[Tobacco]	York University
Sproule, Beth A	[Tobacco]	Centre for Addiction and Mental Health
St George-Hyslop, Peter H		University of Toronto
Sur, Ranjan		Juravinski Cancer Centre – Hamilton Health Sciences
Tsao, Ming-Sound		Princess Margaret Hospital
Tyndale, Rachel F	[Tobacco]	University of Toronto
Ung, Yee C		Sunnybrook Health Sciences Centre
Vettese, Lisa C	[Tobacco]	Ryerson University
Willison, Donald J		St. Joseph's Healthcare Hamilton
Wong, Eugene CM		University of Western Ontario
Wu, Xiao Yu		University of Toronto
Zhang, Li		University of Toronto

MULTIPLE MYELOMA

Chang, Hong		Princess Margaret Hospital
Chen, Christine I		Princess Margaret Hospital
Hakem, Razqallah		Princess Margaret Hospital
Imrie, Kevin R		Sunnybrook Health Sciences Centre
Kovacs, Michael J		London Health Sciences Centre
Levine, Mark N		McMaster University
Liaw, Patricia CY		Henderson Research Centre – McMaster University
Lichty, Brian D		McMaster University
Marcellus, Deborah (Deb) C		Juravinski Cancer Centre – Hamilton Health Sciences
Matthews, John H		Queen's University
Moran, Michael F		University of Toronto
Schimmer, Aaron D		Princess Margaret Hospital
Trudel, Suzanne M		Princess Margaret Hospital
Wilson, Jonathan J		Humber River Regional Hospital

NON-HODGKIN'S LYMPHOMA

Anderson, Michele K	Sunnybrook Health Sciences Centre
Barber, Dwayne L	Princess Margaret Hospital
Ben-David, Yaacov	Sunnybrook Health Sciences Centre
Bhatia, Mickie	McMaster Stem Cell & Cancer Research Institute
Buckstein, Rena J	Sunnybrook Health Sciences Centre
Devins, Gerald M	Toronto General Hospital
Feilotter, Harriet E	Queen's University
Frappier, Lori D	University of Toronto
Gupta, Radhey S	McMaster University
Hakem, Razqallah	Princess Margaret Hospital
Hough, Margaret R	Sunnybrook Health Sciences Centre
Imrie, Kevin R	Sunnybrook Health Sciences Centre
Kerbel, Robert S	Sunnybrook Health Sciences Centre
Korneluk, Robert G	Children's Hospital of Eastern Ontario Research Institute
Kuruvilla, John	Princess Margaret Hospital
Madrenas, Joaquin	Robarts Research Institute
Mak, Tak W	Princess Margaret Hospital
Medin, Jeffrey A	Ontario Cancer Institute
Ohashi, Pamela S	Princess Margaret Hospital
Paige, Christopher J	Princess Margaret Hospital
Rottapel, Robert K	University of Toronto
Siminovitch, Katherine A	Samuel Lunenfeld Research Institute
Stanford, William (Bill) L	University of Toronto
Wang, Chen	Mount Sinai Hospital
Zhang, Li	University of Toronto
Zúñiga-Pflücker, Juan-Carlos	Sunnybrook Health Sciences Centre

ORAL

Bressmann, Tim	University of Toronto
Frappier, Lori D	University of Toronto
Groome, Patti A	Cancer Research Institute – Queen's University
Hall, Stephen (Steve) F	Cancer Research Institute – Queen's University
Kamel-Reid, Suzanne	Princess Margaret Hospital
Laurie, Scott A	The Ottawa Hospital – General Division
Martin [1], Ruth E	University of Western Ontario
Siu, Lillian L	Princess Margaret Hospital
Winqvist, Eric W	London Regional Cancer Program

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

OVARY	
Allen, Christine J	University of Toronto
Andrulis, Irene L	Mount Sinai Hospital
Briollais, Laurent	Mount Sinai Hospital
Brown, Theodore J	Toronto General Hospital
Diamandis, Eleftherios P	Mount Sinai Hospital
Elit, Lorraine (Laurie) M	Juravinski Cancer Centre – Hamilton Health Sciences
Elit, Lorraine (Laurie) M	Juravinski Cancer Centre – Hamilton Health Sciences
Ethier, Jean-Francois	The Ottawa Regional Cancer Centre
Foster, Warren G	McMaster University
Kerbel, Robert S	Sunnybrook Health Sciences Centre
Khokha, Rama	Princess Margaret Hospital
Lee, Jonathan M	University of Ottawa
Liu, Johne (Xingquan)	Ottawa Health Research Institute
McCart, J. Andrea	Toronto General Research Institute
Narod, Steven A	Women's College Research Institute
Peng, Chun	York University
Petrik, Jim	University of Guelph
Piquette-Miller, Micheline R	University of Toronto
Shaw, Patricia A	University of Toronto
Shepherd, Trevor G	London Health Sciences Centre
Singh, Gurmit	Juravinski Cancer Centre – Hamilton Health Sciences
Squire, Jeremy A	Queen's University
Torchia, Joseph	London Regional Cancer Program
Tsang, Benjamin K	The Ottawa Hospital – Civic Campus
Vandenkerkhof, Elizabeth G	Kingston General Hospital
Vanderhyden, Barbara C	Ottawa Health Research Institute
Weberpals, Johanne	The Ottawa Hospital – General Campus
PANCREAS	
Berry, Scott	Sunnybrook Health Sciences Centre
Blondal, John A	St. Joseph's Health Centre – Toronto
Bristow, Robert G	Princess Margaret Hospital
Gallinger, Steven	Mount Sinai Hospital
Hedley, David W	Princess Margaret Hospital
Jonker, Derek	The Ottawa Hospital – General Division
Kerr, Ian	London Health Sciences Centre
Korneluk, Robert G	Children's Hospital of Eastern Ontario Research Institute
Lofters, Wycliffe S	Kingston Regional Cancer Centre
Moore, Malcolm J	Princess Margaret Hospital
Rodin, Gary M	Princess Margaret Hospital
Simunovic, Marko I	Juravinski Cancer Centre – Hamilton Health Sciences
Tsao, Ming-Sound	Princess Margaret Hospital

PROSTATE

Alibhai, Shabbir MH	Toronto General Hospital
Andrews, David W	McMaster University
Bayley, Andrew	Princess Margaret Hospital
Bella, Anthony J	Ottawa Health Research Institute
Bristow, Robert G	Princess Margaret Hospital
Bronskill, Michael J	Sunnybrook Health Sciences Centre
Catton, Charles N	Princess Margaret Hospital
Chin, Joseph L	London Health Sciences Centre
Chow, Edward LW	Sunnybrook Health Sciences Centre
Czarnota, Gregory J	Sunnybrook Health Sciences Centre
Duivenvoorden, Wilhelmina (Helga)	Juravinski Cancer Centre – Hamilton Health Sciences
Emmenegger, Urban	Sunnybrook Health Sciences Centre
Feldman-Stewart, Deborah (Deb)	Cancer Research Institute at Queen's University
Fenster, Aaron	Robarts Research Institute
Fleshner, Neil E	Princess Margaret Hospital
Foster, F. Stuart	Sunnybrook Health Sciences Centre
Fyles, Anthony W	Princess Margaret Hospital
Graham, Charles H	Queen's University
Haider, Masoom A	Princess Margaret Hospital
Holden, Lori	Sunnybrook Health Sciences Centre
Hotte, Sébastien J	Juravinski Cancer Centre – Hamilton Health Sciences
Jongstra, Jan	Toronto Western Hospital
Kelley, Shana O	University of Toronto
Khokha, Rama	Princess Margaret Hospital
Kirsh, Victoria A	Cancer Care Ontario
Klotz, Laurence H	Sunnybrook Health Sciences Centre
Krahn, Murray D	Toronto General Hospital
Levine, Mark N	McMaster University
Lewis, John D	London Health Sciences Centre
Lim, Tee	Odette Cancer Centre – Sunnybrook Health Sciences Centre
Lockwood, Gina	Canadian Partnership Against Cancer
Lukka, Himanshu R	Juravinski Cancer Centre – Hamilton Health Sciences
Lye, Stephen J	Mount Sinai Hospital
Mahmud, Aamer	Kingston Regional Cancer Centre
Matthew, Andrew G	Princess Margaret Hospital
McKay, Bruce C	The Ottawa Hospital – General Campus
Medin, Jeffrey A	Ontario Cancer Institute
Ménard, Cynthia	Princess Margaret Hospital
Milosevic, Michael P	Princess Margaret Hospital
Moore, Malcolm J	Princess Margaret Hospital
Mossman, Karen L	McMaster University
Ozcelik, Hilmi	Mount Sinai Hospital
Patel, Rajnikant (Rajni) V	University of Western Ontario

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Prostate (continued)

Pawson, Anthony J	Mount Sinai Hospital
Plewes, Donald B	Sunnybrook Health Sciences Centre
Rodrigues, George B	London Health Sciences Centre
Rosewall, Tara	Princess Margaret Hospital
Schimmer, Aaron D	Princess Margaret Hospital
Segal, Roanne J	The Ottawa Hospital Cancer Centre – General Campus
Siemens, D. Robert	Kingston General Hospital
Singh, Gurmit	Juravinski Cancer Centre – Hamilton Health Sciences
Squire, Jeremy A	Queen's University
Szumacher, Ewa	Sunnybrook Health Sciences Centre
Tang, Damu	St. Joseph's Healthcare Hamilton
Tannock, Ian F	Princess Margaret Hospital
Th'Ng, John PH	Northwestern Ontario Regional Cancer
Tsakiridis, Theos	Juravinski Cancer Centre – Hamilton Health Sciences
Van Dyk, Jacob (Jake)	London Health Sciences Centre
Venkateswaran, Vasundara	Sunnybrook Health Sciences Centre
Vieth, Reinhold	Mount Sinai Hospital
Vitkin, I. Alex	Princess Margaret Hospital
Warde, Pdraig R	Princess Margaret Hospital
Wilson, Brian C	Princess Margaret Hospital
Winqvist, Eric W	London Regional Cancer Program
Wong, Eugene CM	University of Western Ontario
Wood, Geoffrey A	University of Guelph
Xuan, Jim W	London Health Sciences Centre
Zheng, Gang	Ontario Cancer Institute
Zielenska, Maria	University of Toronto
Zlotta, Alexandre	Mount Sinai Hospital

SKIN (MELANOMA)

Bramson, Jonathan L	McMaster Centre for Gene Therapeutics
Coomber, Brenda L	University of Guelph
Dagnino, Lina	University of Western Ontario
D'Souza, Sudhir JA	University of Western Ontario
Gariépy, Jean	Ontario Cancer Institute
Hamel, Paul A	University of Toronto
Hogg, David	University of Toronto
Hui, Chi-Chung	The Hospital for Sick Children
Khokha, Rama	Princess Margaret Hospital
Ling, Hong	University of Western Ontario
Lohnes, David L	University of Ottawa
Marrett, Loraine D	Cancer Care Ontario
McKay, Bruce C	The Ottawa Hospital – General Campus

Skin (Melanoma) (continued)

Petrella, Teresa M	Sunnybrook Health Sciences Centre
Rainbow, Andrew J	McMaster University
Rotin, Daniela	The Hospital for Sick Children
Spaner, David E	Sunnybrook Health Sciences Centre
Tozer, Richard G	Juravinski Cancer Centre – Hamilton Health Sciences
Wan, Yonghong	McMaster University
Zhu, Xu-Dong	McMaster University

STOMACH

Creuzenet, Carole	University of Western Ontario
Jones, Nicola L	The Hospital for Sick Children
Kreiger, Nancy	Cancer Care Ontario

THYROID

Choy, Wing-Yiu	University of Western Ontario
Hall, Stephen (Steve) F	Cancer Research Institute – Queen's University
Mulligan, Lois M	Queen's University

UTERUS

Biagi, James	Kingston Regional Cancer Centre
Elit, Lorraine (Laurie) M	Juravinski Cancer Centre – Hamilton Health Sciences
Khokha, Rama	Princess Margaret Hospital
Lukka, Himanshu R	Juravinski Cancer Centre – Hamilton Health Sciences
Oza, Amit M	Princess Margaret Hospital
Siu, K. W. Michael	York University
Sugimoto, Akira	London Health Sciences Centre
Watt-Watson, Judith H	University of Toronto

OTHER SITES

Asa, Sylvia L	[Pituitary gland]	Toronto General Hospital
Barber, Dwayne L	[Myelodysplastic syndromes]	Princess Margaret Hospital
Bedard, André P	[Multiple endocrine neoplasia type 1 (MEN1)]	McMaster University
Bhatia, Mickie	[Malignant neoplasms of lymphoid, hematopoietic and related tissue, unspecified]	McMaster Stem Cell & Cancer Research Institute
Bremner, Rod	[Retina]	Toronto Western Hospital
Chan, Helen SL	[Adrenal gland, Retina]	The Hospital for Sick Children
Chen, Christine I	[Waldenstrom's macroglobulinaemia]	Princess Margaret Hospital
Crump, R. Michael	[Myelodysplastic syndromes]	Princess Margaret Hospital
Dagnino, Lina	[Skin, other]	University of Western Ontario
Dick, Frederick A	[Retina]	London Regional Cancer Program

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Other sites (continued)

Dror, Yigal	[Malignant neoplasms of lymphoid, hematopoietic and related tissue, unspecified]	The Hospital for Sick Children
Frappier, Lori D	[Kaposi's sarcoma, unspecified]	University of Toronto
Gallie, Brenda L	[Retina]	Princess Margaret Hospital
Greer, Peter A	[Gastrointestinal tract, NOS]	Queen's University
Hakem, Razqallah	[Adrenal gland]	Princess Margaret Hospital
Kaplan, David R	[Adrenal gland]	The Hospital for Sick Children
Koropatnick, D. James	[Mesothelioma]	London Regional Cancer Program
Lala, Peeyush K	[Placenta]	University of Western Ontario
Li, Shun-Cheng (Shawn)	[X-linked lymphoproliferative disease]	University of Western Ontario
Liston, Peter M	[Adrenal gland]	Children's Hospital of Eastern Ontario Research Institute
Lohnes, David L	[Skin, other]	University of Ottawa
Martin, Alberto	[Gastrointestinal tract, NOS]	University of Toronto
McBurney, Michael W	[Pituitary gland]	The Ottawa Hospital – General Campus
Meakin, Susan O	[Adrenal gland]	Robarts Research Institute
Minden, Mark D	[Myelodysplastic syndromes]	Princess Margaret Hospital
Moayyedi, Paul	[Gastrointestinal tract, NOS]	McMaster University
Mulligan, Lois M	[Adrenal gland]	Queen's University
Piquette-Miller, Micheline R	[Gastrointestinal tract, NOS]	University of Toronto
Rodin, Gary M	[Gastrointestinal tract, NOS]	Princess Margaret Hospital
Schimmer, Bernard P	[Adrenal gland]	University of Toronto
Schuh, Andre C	[Myelodysplastic syndromes]	Princess Margaret Hospital
Shaw, Patricia A	[Fallopian tube]	University of Toronto
Sicheri, Frank	[Gastrointestinal tract, NOS]	Mount Sinai Hospital
Stanford, William (Bill) L	[Chronic myeloproliferative disease]	University of Toronto
Tailor, Chetankumar S	[Constitutional aplastic anaemia]	The Hospital for Sick Children
Vitkin, I. Alex	[Gastrointestinal tract, NOS]	Princess Margaret Hospital
Wang, Chen	[Chronic myeloproliferative disease]	Mount Sinai Hospital
Watts, Tania H	[Malignant neoplasms of lymphoid, hematopoietic and related tissue, unspecified]	University of Toronto
Weksberg, Rosanna	[Beckwith-Wiedemann]	The Hospital for Sick Children
Wong, C. Shun	[Central nervous system, unspecified]	Sunnybrook Health Sciences Centre
Yeger, Herman	[Adrenal gland]	The Hospital for Sick Children
Zúñiga-Pflücker, Juan-Carlos	[Thymus]	Sunnybrook Health Sciences Centre

NON-SPECIFIC/ALL SITES

Addison, Christina L	[Treatment]	The Ottawa Hospital – General Campus
Allard, Pierre	[Cancer control, survivorship/ outcomes]	Elisabeth Bruyère Research Institute
Allen, Christine J	[Early detection]	University of Toronto
Amsden, Brian G	[Treatment]	Queen's University

Non-specific/All sites (continued)

Andrews, Brenda J	[Biology]	University of Toronto
Andrews, David W	[Biology]	McMaster University
Aronson, Kristan J	[Etiology]	Queen's University
Arrowsmith, Cheryl H	[Biology]	University of Toronto
Ashkar, Ali A	[Biology]	McMaster University
Attisano, Liliana	[Biology]	University of Toronto
Auzanneau, France-Isabelle	[Treatment]	University of Guelph
Baetz, Kristin K	[Biology]	University of Ottawa
Bag, Jnanankur	[Biology]	University of Guelph
Baker, Mark D	[Biology]	University of Guelph
Barzda, Virginijus	[Early detection]	University of Toronto
Bauman, Glenn S	[Treatment]	University of Western Ontario
Bedard, André P	[Biology]	McMaster University
Bell, John C	[Treatment]	Ottawa Health Research Institute
Benchimol, Samuel	[Biology]	York University
Bezjak, Andrea	[Cancer control/survivorship/outcomes]	Princess Margaret Hospital
Blencowe, Benjamin J	[Biology]	University of Toronto
Bognar, Andrew L	[Biology; Treatment]	University of Toronto
Boone, Charles M	[Biology; Treatment]	University of Toronto
Brade, Anthony	[Treatment]	Princess Margaret Hospital
Brandl, Christopher J	[Biology]	University of Western Ontario
Bremner, Rod	[Biology]	Toronto Western Hospital
Brill, Julie A	[Biology]	The Hospital for Sick Children
Bristow, Robert G	[Biology]	Princess Margaret Hospital
Brouwers, Melissa C	[Cancer control/survivorship/outcomes]	McMaster University
Brown, Grant W	[Biology]	University of Toronto
Brown, Patrick	[Cancer control/survivorship/outcomes]	University of Toronto
Brundage, Michael D	[Treatment, cancer control/survivorship/outcomes]	Cancer Research Institute at Queen's University
Burns, Peter N	[Early detection]	Sunnybrook Health Sciences Centre
Campbell, H. Sharon	[Cancer control/survivorship/outcomes]	Centre for Behavioural Research & Program Evaluation – University of Waterloo
Campos, Ana R	[Biology]	McMaster University
Carlyle, James R	[Biology]	Sunnybrook Research Institute
Chakrabarty, Avijit (Avi)	[Early detection]	Ontario Cancer Institute
Chambers, Ann F	[Biology]	London Regional Cancer Program
Chan, Bosco MC	[Biology]	Robarts Research Institute
Chan, Warren CW	[Early detection, treatment]	University of Toronto
Cheung, Peter	[Biology]	Princess Margaret Hospital
Chin-Sang, Ian D	[Biology]	Queen's University
Chow, Edward LW	[Cancer control/survivorship/outcomes]	Sunnybrook Health Sciences Centre
Choy, Wing-Yiu	[Biology]	University of Western Ontario
Ciruna, Brian G	[Biology]	The Hospital for Sick Children
Clarke, David M	[Treatment]	University of Toronto

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Non-specific/All sites (continued)

Cole, Susan PC	[Treatment]	Cancer Research Institute – Queen’s University
Cook, Richard J	[Etiology, treatment, cancer control/ survivorship/outcomes]	University of Waterloo
Coomber, Brenda L	[Biology, treatment]	University of Guelph
Copeland, John WR	[Biology]	University of Ottawa
Coppolino, Marc G	[Biology]	University of Guelph
Coyte, Peter C	[Cancer control/survivorship/outcomes]	University of Toronto
Craig, Andrew WB	[Biology]	Queen’s University
Cross, Peter	[Cancer control/survivorship/outcomes]	The Ottawa Hospital – General Division
Culotti, Joseph G	[Biology]	Mount Sinai Hospital
Cunningham, Ian A	[Early detection]	Robarts Research Institute
Daniel, Juliet M	[Biology]	McMaster University
Davey, Megan J	[Biology]	University of Western Ontario
Davey, Scott K	[Biology]	Queen’s University
Davidson, Alan R	[Biology]	University of Toronto
Davison, Daniel E	[Treatment]	University of Waterloo
de Metz, Catherine E	[Cancer control/survivorship/outcomes]	Kingston Regional Cancer Centre
Deeley, Roger G	[Treatment]	Queen’s University
Dennis, James W	[Biology]	Mount Sinai Hospital
Derry, William B	[Biology]	The Hospital for Sick Children
Devins, Gerald M	[Cancer control/survivorship/outcomes]	Toronto General Hospital
Diamandis, Eleftherios P	[Biology, early detection, treatment]	Mount Sinai Hospital
Dick, Frederick A	[Biology]	London Regional Cancer Program
Dixon, Peter F	[Cancer control/survivorship/outcomes]	Lakeridge Health Corporation Research Institute
Dobrow, Mark	[Cancer control/survivorship/outcomes]	Cancer Care Ontario
Dumont, Daniel J	[Biology]	Sunnybrook Health Sciences Centre
Duncker, Bernard P	[Biology, model systems]	University of Waterloo
Durocher, Daniel	[Biology, treatment]	Mount Sinai Hospital
Egan, Sean E	[Biology]	The Hospital for Sick Children
Emili, Andrew NJ	[Biology]	University of Toronto
Fang, Qiyin	[Biology, treatment]	McMaster University
Feldman-Stewart, Deborah (Deb)	[Cancer control/survivorship/outcomes]	Cancer Research Institute – Queen’s University
Ferguson, Stephen SG	[Early detection]	Robarts Research Institute
Fish, Eleanor N	[Biology]	Toronto General Hospital
Ford, Nancy L	[Biology]	Ryerson University
Forman-Kay, Julie D	[Biology]	The Hospital for Sick Children
Foster, F. Stuart	[Early detection, treatment]	Sunnybrook Health Sciences Centre
Foster, Paula J	[Biology]	Robarts Research Institute
Frappier, Lori D	[Biology, etiology]	University of Toronto
Friesen, James D	[Biology]	University of Toronto
Gagliese, Lucia	[Cancer control/survivorship/outcomes]	Toronto General Hospital
Gee, Stephen	[Etiology]	University of Ottawa

Non-specific/All sites (continued)

Giaever, Guri N	[Biology, treatment]	University of Toronto
Gingras, Anne-Claude	[Treatment]	Mount Sinai Hospital
Gloor, Gregory B	[Biology, treatment]	University of Western Ontario
Goldman, S. Pedro	[Treatment]	Ryerson University
Gould, Judy	[Cancer control/survivorship/outcomes]	Women's College Research Institute
Gray, Douglas A	[Biology]	The Ottawa Regional Cancer Centre
Greenblatt, Jack F	[Biology]	University of Toronto
Greer, Peter A	[Biology, treatment]	Queen's University
Groome, Patti A	[Cancer control/survivorship/outcomes]	Cancer Research Institute – Queen's University
Guerriere, Denise N	[Cancer control/survivorship/outcomes]	University of Toronto
Haché, Robert JG	[Biology]	University of Ottawa
Haeryfar, S.M. Mansour	[Treatment]	University of Western Ontario
Hakem, Razqallah	[Biology]	Princess Margaret Hospital
Hanna, Steven E	[Cancer control/survivorship/outcomes]	McMaster University
Harper, Patricia A	[Biology, etiology]	The Hospital for Sick Children
Harris, Tony JC	[Biology]	University of Toronto
Hirmiz, Khalid J	[Cancer control/survivorship/outcomes]	Windsor Regional Cancer Centre
Hoffman-Goetz, Laurie	[Etiology, cancer control/survivorship/outcomes]	University of Waterloo
Holcik, Martin	[Biology]	Children's Hospital of Eastern Ontario
Houry, Walid A	[Biology]	University of Toronto
Hughes, Timothy R	[Biology]	University of Toronto
Hui, Chi-Chung	[Biology]	The Hospital for Sick Children
Ikura, Mitsuhiko	[Biology]	University of Toronto
Ingalls, Brian P	[Biology, model systems]	University of Waterloo
Irwin, Meredith S	[Biology, treatment]	The Hospital for Sick Children
Iscove, Norman N	[Biology]	University of Toronto
Islam, Mohammad	[Treatment]	Princess Margaret Hospital
Jacobs, J. Roger	[Biology]	McMaster University
Jaffray, David A	[Early detection, treatment]	Princess Margaret Hospital
Jia, Zongchao	[Biology]	Queen's University
Johnson-Masotti, Ana P	[Cancer control/survivorship/outcomes]	Queen's University
Jones, Jennifer M	[Cancer control/survivorship/outcomes]	Toronto General Hospital
Junop, Murray S	[Biology]	McMaster University
Kaern, Mads	[Biology]	University of Ottawa
Kapus, Andras	[Biology]	St. Michael's Hospital
Kashyap, Sonya	[Cancer control/survivorship/outcomes]	The Ottawa Hospital – Civic Parkdale Clinic
Keeler, Werden	[Early detection, treatment]	Lakehead University
Kerbel, Robert S	[Treatment]	Sunnybrook Health Sciences Centre
Kerr, Andrew T	[Treatment]	Kingston Regional Cancer Centre
King, Will D	[Etiology]	Queen's University
Klassen, Anne F	[Cancer control/survivorship/outcomes]	McMaster University
Koch, C. Anne	[Biology]	Princess Margaret Hospital

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Non-specific/All sites (continued)

Kohandel, Mohammad	[Treatment, model systems]	University of Waterloo
Kolios, Michael C	[Early detection, treatment]	Ryerson University
Korneluk, Robert G	[Treatment]	Children's Hospital of Eastern Ontario Research Institute
Koropatnick, D. James	[Biology, treatment]	London Regional Cancer Program
Krause, Henry M	[Biology]	University of Toronto
Krewski, Daniel R	[Etiology]	University of Ottawa
Krylov, Sergey N	[Early detection]	York University
Krzyzanowska, Monika K	[Treatment]	Princess Margaret Hospital
Lacefield, James C	[Early detection, treatment]	Robarts Research Institute
Lavoie, Brigitte D	[Biology]	University of Toronto
Lee, Hoyun	[Biology]	Northwestern Ontario Regional Cancer
Lee, Jonathan M	[Biology]	University of Ottawa
Lemieux-Charles, Louise	[Cancer control/survivorship/outcomes]	University of Toronto
Lewis, John D	[Biology, early detection]	London Health Sciences Centre
Li, Shun-Cheng (Shawn)	[Biology, treatment]	University of Western Ontario
Lichty, Brian D	[Treatment]	McMaster University
Lilge, Lothar	[Treatment]	Princess Margaret Hospital
Ling, Hong	[Biology, etiology]	University of Western Ontario
Lipshitz, Howard D	[Biology]	University of Toronto
Liston, Peter M	[Biology, treatment]	Children's Hospital of Eastern Ontario Research Institute
Litchfield, David W	[Biology, treatment]	University of Western Ontario
Liu, Johne (Xingquan)	[Biology]	Ottawa Health Research Institute
Lu, Qing-Bin	[Treatment]	University of Waterloo
Luke, Robert A	[Cancer control/survivorship/outcomes]	University of Toronto
Mackillop, William (Bill) J	[Treatment, cancer control/survivorship/outcomes]	Queen's University
Madrenas, Joaquin	[Biology]	Robarts Research Institute
Mak, Tak W	[Biology, treatment]	Princess Margaret Hospital
Malkin, David D	[Biology, etiology]	The Hospital for Sick Children
Manuel, Douglas G	[Cancer control/survivorship/outcomes]	Institute for Clinical Evaluative Sciences
Marrett, Loraine D	[Etiology]	Cancer Care Ontario
McBurney, Michael W	[Biology]	The Ottawa Hospital – General Campus
McCart, J. Andrea	[Treatment]	Toronto General Research Institute
McConkey, Brendan	[Biology, model systems]	University of Waterloo
McGlade, C. Jane	[Biology]	The Hospital for Sick Children
McKay, Bruce C	[Biology]	The Ottawa Hospital – General Campus
McMillan, William G	[Cancer control/survivorship/outcomes]	Juravinski Cancer Centre – Hamilton Health Sciences
McNulty, James	[Treatment]	McMaster University
McPherson, J. Peter M	[Biology]	University of Toronto
Meyn, M. Stephen	[Biology]	The Hospital for Sick Children
Miller, R.J. Dwayne	[Treatment]	University of Toronto
Miller, Richard G	[Treatment]	Ontario Cancer Institute

Non-specific/All sites (continued)

Montaut, Sabine	[Prevention]	Laurentian University
Mosser, Richard	[Biology]	University of Guelph
Mossman, Karen L	[Treatment]	McMaster University
Mulligan, Lois M	[Biology]	Queen's University
Mustard, Cameron A	[Etiology, cancer control/survivorship/outcomes]	Institute for Work and Health
Mymryk, Joseph S	[Biology]	London Regional Cancer Program
Nagy, Andras	[Biology, treatment]	Mount Sinai Hospital
Nakatsu, Kanji	[Treatment]	Queen's University
Ng, Cheng E	[Treatment]	Ottawa Health Research Institute
Nislow, Corey E	[Biology, treatment]	University of Toronto
O'Brien, Peter F	[Cancer control/survivorship/outcomes]	Sunnybrook Health Sciences Centre
Ohashi, Pamela S	[Biology, treatment]	Princess Margaret Hospital
Ohh, Michael	[Biology]	University of Toronto
Okada, Hitoshi	[Biology]	Ontario Cancer Institute
Okey, Allan B	[Etiology]	University of Toronto
Orchard, Jeffery	[Treatment]	University of Waterloo
Ottensmeyer, F. Peter	[Etiology, treatment]	Princess Margaret Hospital
Oza, Amit M	[Treatment]	Princess Margaret Hospital
Paige, Christopher J	[Biology]	Princess Margaret Hospital
Pandey, Siyaram	[Biology]	University of Windsor
Pang, Geordi	[Treatment]	Sunnybrook Health Sciences Centre
Panjwani, Dilip	[Cancer control/survivorship/outcomes]	Grand River Regional Cancer Centre – Grand River Hospital
Parkinson, John	[Biology]	The Hospital for Sick Children
Parry, Diane C	[Cancer control/survivorship/outcomes]	University of Waterloo
Pawson, Anthony J	[Biology]	Mount Sinai Hospital
Penn, Linda JZ	[Biology]	Princess Margaret Hospital
Petitjean, Anne M	[Treatment]	Queen's University
Petkovich, P. Martin	[Biology, treatment]	Queen's University
Plewes, Donald B	[Early detection]	Sunnybrook Health Sciences Centre
Rainbow, Andrew J	[Biology]	McMaster University
Raptis, Leda H	[Biology]	Queen's University
Raught, Brian J	[Biology]	University of Toronto
Reed, Bruce H	[Biology]	University of Waterloo
Riddick, David S	[Etiology]	University of Toronto
Rogers, David WO	[Treatment]	Carleton University
Rose, David R	[Biology, treatment]	University of Toronto
Rossant, Janet	[Biology]	The Hospital for Sick Children
Rotin, Daniela	[Biology]	The Hospital for Sick Children
Rowlands, John A	[Early detection, treatment]	Sunnybrook Health Sciences Centre
Roy, Peter J	[Biology]	University of Toronto
Rubinstein, John L	[Biology]	The Hospital for Sick Children
Sabourin, Luc A	[Biology]	University of Ottawa

APPENDIX 8: ONCOLOGY RESEARCHERS IN ONTARIO GROUPED BY DISEASE SITE (CONTINUED)

Non-specific/All sites (continued)

Sadowski, Paul D	[Biology]	University of Toronto
Salomons, Gregory J	[Treatment]	Kingston Regional Cancer Centre
Sandig, Martin	[Biology]	University of Western Ontario
Scheid, Michael P	[Biology]	York University
Schreiner, L. John	[Treatment, cancer control/survivorship/outcomes]	Kingston Regional Cancer Centre
Schuh, Andre C	[Biology]	Princess Margaret Hospital
Sharom, Frances J	[Treatment]	University of Guelph
Shaw, Gary S	[Biology]	University of Western Ontario
Sicheri, Frank	[Biology, etiology]	Mount Sinai Hospital
Sinding, Christina	[Cancer control/survivorship/outcomes]	McMaster University
Singh, Gurmit	[Biology, treatment]	Juravinski Cancer Centre – Hamilton Health Sciences
Siu, Chi-Hung	[Biology]	University of Toronto
Smibert, Craig A	[Biology]	University of Toronto
Stagljjar, Igor	[Biology]	University of Toronto
Stambolic, Vuk	[Biology]	Ontario Cancer Institute
Stevens, Bonnie J	[Cancer control/survivorship/outcomes]	University of Toronto
Stewart, Moira A	[Cancer control/survivorship/outcomes]	University of Western Ontario
Sullivan, Terrence	[Cancer control/survivorship/outcomes]	Cancer Care Ontario
Sung, Lillian	[Cancer control/survivorship/outcomes]	The Hospital for Sick Children
Tang, Damu	[Biology]	St. Joseph's Healthcare – Hamilton
Tannock, Ian F	[Treatment]	Princess Margaret Hospital
Tepass, Ulrich J	[Biology]	University of Toronto
Thind, Amardeep	[Cancer control/survivorship/outcomes]	University of Western Ontario
Th'Ng, John PH	[Biology]	Northwestern Ontario Regional Cancer
Tini, Marc	[Biology]	University of Western Ontario
Trimble, William S	[Biology]	The Hospital for Sick Children
Truong, Kien K	[Biology]	University of Toronto
Turley, Eva A	[Biology]	London Regional Cancer Program
Valliant, John F	[Early detection]	McMaster University
Vaziri, Homayoun	[Biology]	Ontario Cancer Institute
Walker, Hugh D	[Cancer control/survivorship/outcomes]	Queen's University
Wells, George A	[Cancer control/survivorship/outcomes]	University of Ottawa Heart Institute
Wells, Peter G	[Etiology]	University of Toronto
Whyne, Cari M	[Biology, early detection]	Sunnybrook Health Sciences Centre
Wilde, Andrew R	[Biology]	University of Toronto
Wildeman, Alan G	[Biology]	University of Windsor
Williams, Allison M	[Cancer control/survivorship/outcomes]	McMaster University
Williams, David B	[Biology]	University of Toronto
Wilson, Brian C	[Treatment]	Princess Margaret Hospital
Winklbauer, Rudolf	[Biology]	University of Toronto
Wodak, Shoshana	[Biology]	The Hospital for Sick Children

Non-specific/All sites (continued)

Wong, C. Shun	[Treatment, cancer control/survivorship/outcomes]	Sunnybrook Health Sciences Centre
Woodgett, James (Jim) R	[Biology, early detection]	Mount Sinai Hospital
Wrana, Jeffrey L	[Biology]	Mount Sinai Hospital
Wright, James (Jim) G	[Treatment, cancer control/survivorship/outcomes]	Juravinski Cancer Centre – Hamilton Health Sciences
Yang, Xiaolong	[Biology]	Queen's University
Yee, Albert JM	[Biology, early detection]	Sunnybrook Health Sciences Centre
Yeh, Wen-Chen	[Biology]	Ontario Cancer Institute
Yeung, Ivan WT	[Treatment]	Princess Margaret Hospital
Young, Paul G	[Biology]	Queen's University
Zhang, Zhaolei	[Biology]	University of Toronto
Zhu, Xu-Dong	[Biology]	McMaster University
Zielinski, Jan M	[Etiology]	The Hospital for Sick Children
Zimmermann, Camilla CU	[Cancer control/survivorship/outcomes]	Princess Margaret Hospital
Zúñiga-Pflücker, Juan-Carlos	[Biology]	Sunnybrook Health Sciences Centre

Source: custom analyses from the Canadian Cancer Research Alliance database provided for calendar year 2007

