

Ontario Institute
for Cancer Research

Ontario Institute for Cancer Research

Strategic Plan

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Executive Summary

The Ontario Institute for Cancer Research (OICR) is a new centre of excellence in cancer research that will move the province to the forefront of discovery and innovation. Ontario residents and the provincial economy will benefit from promising research results and breakthroughs.

OICR's efforts are expected to result in Ontario being recognized internationally as a leading jurisdiction for cancer research; the province becoming more competitive in attracting both public and private research funds; and more effective knowledge transfer and commercialization of research findings to maximize both health and economic benefits for the people of Ontario.

OICR's Strategic Plan describes priorities based on the strengths and opportunities in Ontario, where the likelihood of major breakthroughs and potential impact is highest. The key elements of the Strategy include:

1. OICR Innovation Projects

These are goal-oriented initiatives that will offer new insight and approaches for cancer prevention, detection or treatment, through the establishment and support of multi-institutional networks that will link basic and clinical researchers from multiple disciplines. Early projects will include:

- ❖ The Ontario Cancer Cohort designed to bring more effective prevention strategies to the population;
- ❖ The One Millimetre Cancer Challenge which aims to facilitate early diagnosis and cure for cancer through the development of sensitive biomarkers and imaging technologies that will detect millimetre size tumours;
- ❖ The Cancer Stem Cell Project to develop approaches that will target therapies that are unique to cancer stem cells, with the goal of preventing recurrence and lessening toxicity.

These projects will be integrated with four platforms that will develop state-of-the-art knowledge and technologies in the following disciplines:

1. Imaging and Interventions;
2. Bio-repositories and Pathology;
3. Genomics and High-Throughput Screening (HTS);
4. Informatics and Bio-computing.

Future projects in cancer genomics and selective therapies will characterize and use specific properties of tumours to selectively destroy cancer cells and minimize adverse reactions to cancer patients.

2. OICR Translational Programs

OICR will invest significantly in translational research programs that will move new discoveries to prevent, detect and treat cancer directly from the bench to practical applications in patients. OICR will ensure that novel diagnostic and therapeutic discoveries resulting from its innovation programs receive first-class support to advance towards the market, with Ontario enterprises being the primary receptors. The clinical trials community in Ontario will incorporate new technologies and innovative designs in a High Content Trials Program for clinical testing of new drugs and medical devices. OICR will also support a broad research program to evaluate and transfer new health care services that can benefit the public and cancer patients.

3. OICR Investigator Program

In order to meet the goal of strengthening Ontario's cancer research capacity by attracting outstanding PhD researchers and in particular clinician scientists to the province, OICR will establish an Investigator Awards Program, designed to provide stable recruitment and retention funding for fifty principal investigators (PIs) involved in OICR programs. Investigators will be selected based on scientific excellence, leadership qualities, collaborative experience, fit with OICR research programs and in the case of clinician scientists, the allocation of research time.

4. OICR Cancer Research Fund

OICR will continue a program of the Ontario Cancer Research Network (OCRN), a predecessor of OICR (2002-2005), that supports investigator-initiated translational cancer research projects based on excellence in translational cancer research, from validation of novel drug targets and development of new treatments and diagnostic tools, to their clinical validation and application.

5. Partnerships

OICR will develop strategic partnerships with organizations that can accelerate the discovery and translation of new cancer diagnostics and therapeutics. Initial partners include:

- ❖ Cancer Care Ontario (CCO): CCO is an umbrella organization that steers and coordinates Ontario's cancer services and prevention efforts. CCO and OICR have formed an essential alliance for translational research that will benefit the public and cancer patients;
- ❖ The Broad Institute of Harvard and MIT: The Broad Institute is a world leader in genomics, computational biology and chemical biology. OICR is developing a strategic alliance with the Broad Institute that would see collaboration in a number of areas where the Broad has developed unique research platforms.

6. Commercialization

- ❖ Create a culture that recognizes the value of translation and commercialization in bringing the benefits of discovery to the residents of Ontario with direct links between the commercialization team and the science programs;
- ❖ Be proactive in the management of intellectual property (IP) arising as a result of OICR investments to enable bundling for highest value;
- ❖ Promote the downstream development of inventions and ultimately the manufacturing of devices derived from these inventions in Ontario, i.e., the “Ontario First Policy”;
- ❖ Be proactive in engaging industry;
- ❖ Work with our partner institutions, MaRS and other key players involved in the commercialization of life science in Ontario so that OICR brings added-value to the effort and does not duplicate existing functions already in place.

Investments by the Government of Ontario will allow OICR to become a catalyst within the Ontario cancer research community, to build on and supplement the excellence of the existing research institutions and to achieve both health and economic benefits for the people of Ontario.

Section A: Introduction

A.1. Introduction

OICR was formally launched on December 2, 2005. The Hon. Dalton McGuinty, Premier and Minister of Research and Innovation, announced the establishment of the new Institute and a funding commitment that would increase to \$82 million per year with the understanding that the Institute would be supported at this level on an ongoing basis. The funding of the Institute, a significant research investment, is part of the Government of Ontario’s Science and Technology Strategy. Headquartered at MaRS to take advantage of the bio-medical life sciences portal, OICR will build the province’s leading edge research capacity, thereby enhancing international recognition of Ontario as a major jurisdiction for cancer research and as an attractive environment for investment by industry. OICR is expected to be a catalyst within the Ontario cancer research community, to build on and supplement the excellence of the existing research institutions and to achieve both health and economic benefits for the people of Ontario. The investment is timely in light of the significant increase in the number of people affected by cancer and the impact on individuals and their families and in terms of challenges to the health care system.

A.2. The Vision for OICR

The Ontario Institute for Cancer Research is a new centre of excellence in cancer research that will move the province to the forefront of discovery and innovation. Ontario residents and the provincial economy will benefit from promising discoveries and research breakthroughs.

OICR will distinguish itself by taking on significant challenges in cancer research with multi-disciplinary, multi-institutional teams. The success of those teams will lead to a reduction in the incidence, morbidity and mortality of cancer.

OICR will invest significantly in translational research that will move new discoveries in prevention, detection and treatment of cancer directly from the bench to practical applications in patients. OICR will ensure that novel diagnostic and therapeutic discoveries resulting from its innovative programs receive first-class support to advance towards the market, with Ontario enterprises being the primary receptors. OICR will also support a broad research program with CCO, the provincial agency that is the steward of cancer care delivery in Ontario, to evaluate and transfer new health care services that can benefit the public and cancer patients.

The Institute's efforts are expected to result in international recognition of Ontario as a leading jurisdiction in cancer research, the province becoming more competitive in attracting both public and private research investment and more effective knowledge transfer and commercialization of research findings.

A.3. Mandate

- ❖ To strengthen Ontario's cancer research capacity and to contribute to the development of the next generation of cancer researchers by attracting outstanding researchers to the province and ensuring that the very best of the established and newer/rising-star scientists remain in Ontario;
- ❖ To establish partnerships with Ontario research institutions including universities, academic hospitals, research institutes and other organizations;
- ❖ To establish national and international program collaborations;
- ❖ To develop strategic research program priorities with the potential for impact on the spectrum of prevention, early detection, diagnosis and treatment of cancer;
- ❖ To build innovative programs that will lead to the effective translation of research findings into health care interventions, products and services;
- ❖ To train the next generation of basic and clinical researchers;
- ❖ To attract private sector investment in research and to commercialize research findings to the economic benefit of Ontario.

A.4. Meeting the Cancer Challenge

A large number of patients are affected by a wide range of cancer types, including breast, prostate, lung and colorectal cancer. The Ontario Cancer Registry reports there were more than 57,000 new cases in 2004. Cancer incidence increases with age. It is more common among females at younger ages and among men at older ages, in part due to the age at which breast and prostate cancers occur.

The last two decades of research have completely changed the strategies for developing new interventions to impact cancer. With advances in genetics, cancer biology, computing,

imaging technology and nanotechnology, to name a few, knowledge guides the development of new approaches to combat cancer.

Great Challenges in Cancer Research

To develop and implement an ambitious *strategy to transform the cancer continuum and thereby reduce the burden of disease*, OICR first needs to recognize the enormous challenges that it faces. These challenges are summarized in four broad themes:

I. Cancer is a complex disease.

- ❖ Every tumour is different. Every cancer patient is different;
- ❖ *Transformation requires understanding specific changes in a patient and tailoring interventions based on the profile of the tumour and the patient.*

II. Cancer is diagnosed late in the disease process.

- ❖ Most tumours are identified when there are over 100 million (and often one billion) cancer cells – at stages where treatment interventions are less effective;
- ❖ *Transformation requires understanding and targeting interventions at early stages.*

III. Cancer is a disease that can affect any member of our society.

- ❖ Everyone is at risk of developing cancer from mutations resulting from errors that occur during normal growth of cells or from toxins in the environment;
- ❖ *Transformation requires population interventions capable of delivering a complex portfolio of services to each individual in that population.*

IV. Optimal cancer care requires new cancer care services, technologies and therapeutic interventions that are affordable by our health care system.

- ❖ *Transformation requires an understanding of costs and benefits.*

Translating knowledge into the health care setting

OICR's contribution to cancer research will aim to transform the approach to combating cancer in the population at all stages of the cancer continuum from prevention and early detection through treatment and supportive care and including health services research to evaluate the benefits of new approaches.

Section B: Overview of the OICR Strategic Plan

B.1. Consultations

In the summer and fall of 2006, Dr. Thomas Hudson, President and Scientific Director of OICR, and senior staff traveled to numerous research institutes affiliated with universities and major hospitals to visit academic leaders and scientists across Ontario. These tours were supplemented by meetings with organizations such as CCO and cancer foundations.

OICR's Scientific Advisory Board, chaired by Drs. Phillip Sharp of the Massachusetts Institute of Technology and Elizabeth Eisenhauer of Queen's University, also provided recommendations as to where OICR could have the greatest impact, recognizing that OICR has to establish priorities based on the strengths and opportunities in Ontario and where the likelihood of major breakthroughs and potential impacts is highest.

B.2. Organization of OICR Programs, Projects and Platforms

OICR developed an organizational model of programs having two major themes: 1) innovation and 2) translation.

Innovation programs

Innovation programs will be established that target different time-points in the clinical continuum, i.e., prevention, early diagnosis and therapeutics. Because many new avenues for cancer screening, detection and drug discovery rely on the identification of specific components of cancer cells (called cancer targets), OICR will also develop an innovation program called cancer targets.

To focus its resources efficiently, in a way that creates synergies among the OICR research teams, innovation programs are organized into projects and platforms.

- ❖ *OICR innovation projects:* These are goal-oriented initiatives that will offer new insight and approaches through the establishment and support of multi-institutional networks that will link basic and clinical researchers from multiple disciplines. OICR will support high-level interactions among research teams with complementary strengths to bring innovation more quickly to the clinical arena;
- ❖ *OICR innovation platforms:* These will be composed of principal investigators and staff scientists that offer and develop state-of-the-art knowledge and technologies in disciplines that will enable most, if not all, OICR initiatives.

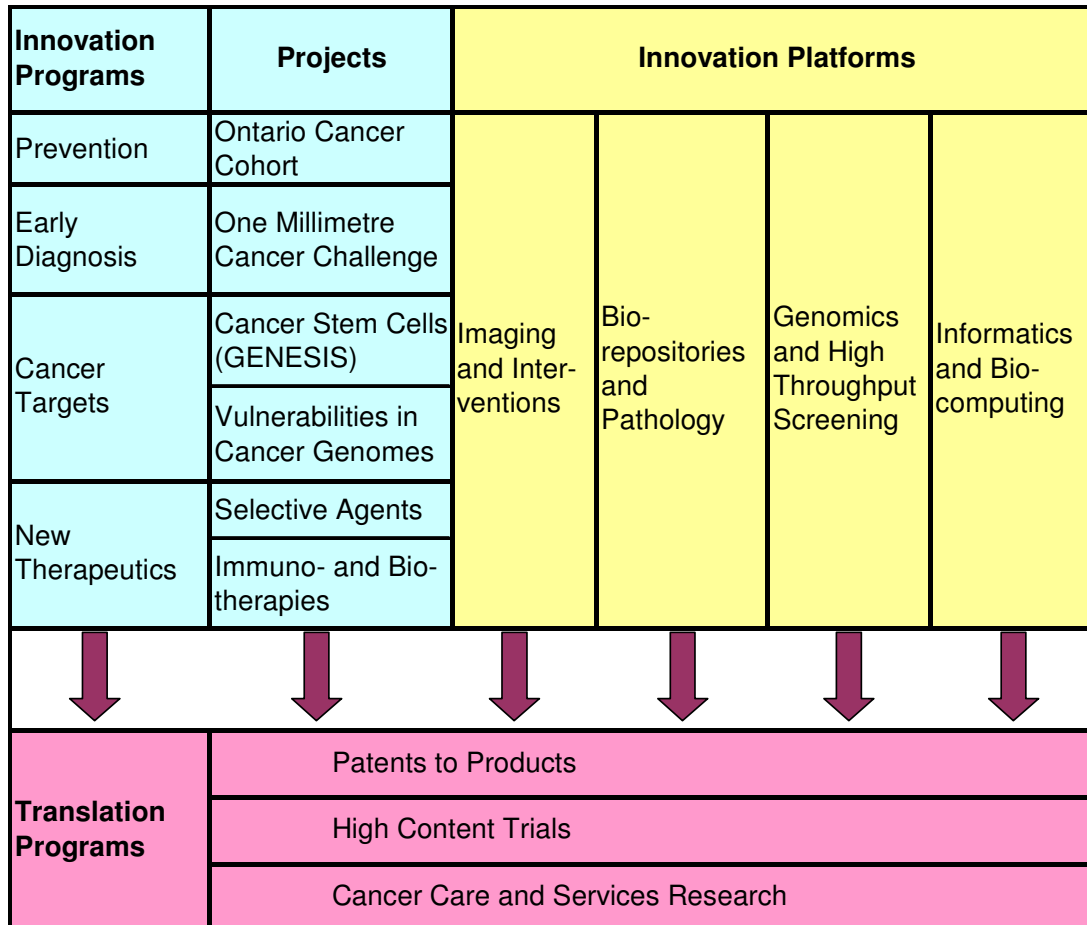
Translational programs

The OICR translation programs will allow the development and evaluation of new modalities and services as they progress towards the health care system, the population and cancer patients.

While OICR is not a basic research institute, its activities rely on the outstanding basic research community in Ontario and, in many cases, will involve basic science laboratories within the scope of the OICR programs to bring their discoveries toward the clinical arena or to provide needed expertise in understanding and solving new problems that emerge from the translational programs.

B.3. OICR Blueprint

Below is the OICR blueprint showing how programs, projects and platforms will fit together.



Section C: Innovation Projects

C.1. Ontario Cancer Cohort

OICR will support the creation of an Ontario Cancer Cohort, a prospective epidemiological study that will involve detailed questionnaires regarding lifestyle and behavioural factors, extensive biological specimens, tumours and environmental exposures/measures.

Objectives:

- ❖ Develop a better understanding of risk factors that initiate or accelerate cancer;
- ❖ Create more effective prevention strategies that will lead to a reduction of factors contributing to cancer incidence and mortality;

- ❖ Understand the natural history of biomarkers;
- ❖ Evaluate the clinical potential of new blood-based biologic markers of early disease and new imaging technologies for their use in early-detection screening programs.

Plan:

- ❖ A multidisciplinary study design team has been formed to plan the details of the cohort. The emphasis is on cancer, but the cohort design will be sufficiently flexible to enable collaborative investigations of other major chronic diseases;
- ❖ The leadership team and advisory committees will include leading scientists from many disciplines from Ontario, other provinces in Canada and many foreign countries;
- ❖ The Ontario Cancer Cohort will align with Canadian and international cancer cohorts e.g., the "Tomorrow Project" in Alberta, tumour registries and biobanks such as the UK Biobank, using harmonized tools developed by the Public Population Project in Genomics.

C.2. One Millimetre Cancer Challenge

Many cancers are diagnosed too late, which leads to poorer outcomes than when the tumour is small (and sometimes pre-malignant). Up to now, limitations in technology and understanding tend to limit effective screening programs to cancers on the skin or an accessible mucosa (colonic polyp, cervical lesions). A positive shift in outcomes would occur if effective programs could be developed to screen populations at risk and identify the presence of a tumour when it is still at the millimetre stage, and usually before metastases have spread, allowing application of a definitive treatment aimed at long term cancer-free survival. Enthusiasm is particularly high as a result of the intellectual and technical leadership of imaging groups in Ontario. OICR is calling its project the One Millimetre Cancer Challenge.

Objectives:

- ❖ Facilitate early diagnosis and cure of cancer by the development of sensitive biomarkers and imaging technologies that will detect millimetre-size tumours;
- ❖ Validate the predictive value of biomarker panels as screening tools (to be enabled by the Ontario Cancer Cohort);
- ❖ Identify and test molecular probes (tracers) and imaging devices that can detect one millimetre tumours;
- ❖ Develop devices for 3D-guidance of needle biopsies;
- ❖ Develop the ability to destroy millimetre-size tumours using minimally-invasive intervention tools at the tip of the needle;
- ❖ Enable the rapid translation of methods and devices to the clinical arena.

Plan:

- ❖ Support multiple teams across Ontario, with expertise in biomarkers, tracers, imaging devices, pathology, engineering, software development, clinical trials and health services research that will pool expertise in designing and implementing a comprehensive project;
- ❖ Integrate early with clinical trials teams for early validation;
- ❖ Establish expertise related to regulatory approvals.

C.3. Cancer Stem Cells: The GENESIS Project

There is evidence for several cancer types that a rare subset of cells, called cancer stem cells, are responsible for maintenance of the malignant tumour. The known properties of cancer stem cells make them resistant to many current forms of chemo- and radio-therapies providing an explanation of the high rate of relapse for many types of cancer as tumours can reappear months and years later from these surviving cancer stem cells. Therapies targeting and killing these critical cells are likely to prove much more effective in preventing cancer relapse.

Objectives:

- ❖ Define the clinical relevance of cancer stem cells regarding diagnostic, prognostic and therapeutic approaches;
- ❖ Identify the cancer-specific properties that give cancer stem cells their unique stem cell-like functionality and elucidate their importance in the continuum of cancer research from initiation, tumour growth and metastasis;
- ❖ Discover additional cancer stem cells for other types of cancer;
- ❖ Define specific markers of cancer stem cells;
- ❖ Develop approaches to target therapies that are unique to cancer stem cells, with the goal of preventing recurrence and lessening toxicity of treatment;
- ❖ Evaluate these strategies in cancer patients;
- ❖ Disseminate validated reagents related to cancer stem cell targets;
- ❖ Promote and attract a diversity of scientists (oncologists, surgeons, pathologists, radiologists, biologists, nurses and specialized technicians) to tackle the basic and clinical issues of cancer stem cells;
- ❖ Develop training initiatives to attract clinical fellows, clinician scientists and scientists with a PhD.

Plan:

- ❖ Dr. John Dick, pioneer and internationally recognized leader in cancer stem cell research, will oversee the development of the OICR project entitled GENESIS;
- ❖ Provide support to investigate key research questions including:
 - How can targeting cancer stem cells increase survival and bring new options for curing cancer?
 - What specific pathways and mechanisms are involved in self-renewing cancer stem cells?

- What distinguishes cancer stem cells from bulk tumours?
- ❖ Support the development of technologies to image, isolate, characterize and screen cancer stem cells;
- ❖ Establish resources including a repository of live cancer cells.

C.4. Vulnerabilities in Cancer Genomes

The systematic identification of genetic mutations and other genomic changes (i.e., translocations, amplifications, deletions, epigenetic modification) for entire cancers has not been possible to date. With the advent of new and relatively inexpensive sequencing technologies, comparative genomic hybridizations (CGH), and others methods, it is now possible to contemplate cataloguing genetic alterations that occur in different types of cancers, with the expectations that the imprecise classes of tumours used today in the clinic will be refined to more precise groups by being classified by molecular defects (and thus give new diagnostic tools). Furthermore, rational therapies will be developed for specific defects, providing new therapeutic opportunities.

Objectives:

- ❖ Develop and optimize rapid and relatively inexpensive methods for systematic evaluations of cancer genomes;
- ❖ Apply such methods to a large number of tumours;
- ❖ Develop classification tools that predict clinical features of tumours (i.e., pathology, prognosis, drug response), based on their genomic profile;
- ❖ Translate early findings into clinical markers for cancer risk determination or biomarkers for early detection or monitoring of disease;
- ❖ Design strategies for genomic fingerprinting of clinical samples.

Plan:

- ❖ Initiate the project subsequent to the evaluation of new sequencing technologies (see Genome and HTS platforms section below);
- ❖ Collaborate with other leading genome centres in launching an international cancer genome initiative;
- ❖ Collaborate and complement other OICR initiatives such as the Cancer Stem Cell Project and the One Millimetre Cancer Challenge.

C.5. Selective Agents

Recent genetic studies have revealed that tumours of the same pathological class, e.g., stage 2 colon cancer, usually contain significantly different mutations. A corollary to this finding is that each patient could likely need a different treatment, depending on the specific abnormalities of their tumour. Current treatments already reflect this trend – Herceptin™ for breast cancer patients with high levels of Her/neu, Gleevec™ for patients with Bcr/abl translocations, Iressa™

for lung cancer patients having EGFR mutations. In addition, the increasing sophistication of our understanding of genetic variations in the metabolism of drugs is leading to opportunities to modulate treatment to the most effective treatment and the most effective dose.

Objectives:

- ❖ Identify new compounds that can selectively destroy cancer cells, and minimize adverse reactions to cancer patients;
- ❖ Co-develop novel diagnostic tests to identify the best set of agents to treat each cancer patient.

Plan:

- ❖ Because development of new interventions is a rapidly evolving field, OICR has decided to build this program slowly to identify a niche where Ontario could excel in comparison with other jurisdictions;
- ❖ In developing its program, OICR will seek to focus on:
 - Biological processes that are based on genomic, metabolic or cellular characteristics specific to cancers;
 - Biological processes that are intensively studied by Ontario scientists, as the subsequent processes will likely require frequent validation and additional investigations by these teams;
 - Selective targets whose protein structures are known, or can be elucidated by the Structural Genomics Consortium (an international consortium based at the universities of Toronto and Oxford and the Karolinska Institute in Sweden);
 - Chemical screens that are structure-based;
 - Opportunities that show promise for rapid translation.

C.6. Immuno- and Bio-Therapies

Biotherapeutics for cancer treatment is an area in which Ontario has shown strength and leadership. Research clusters are developing innovative biotherapeutics development approaches targeting cancer. For example: 1) a national consortium of laboratory and clinical researchers has formed to develop and evaluate various oncolytic viruses – replication competent viruses that grow in and kill cancer cells while sparing cells of normal tissues; 2) another class of biotherapy using replication incompetent viruses is being developed as vaccines for cancer; 3) Ontario-based groups have revisited the scientific basis of T cell based adoptive immunotherapy, and are applying these to melanoma and breast cancer.

Objectives:

- ❖ Identify new biotherapeutic agents and immunotherapies that can selectively destroy cancer cells, and minimize adverse reactions to cancer patients;
- ❖ Facilitate the production of clinical grade products;
- ❖ Enable the clinical assessment of these therapeutics.

Plan:

- ❖ Further consulting and planning will occur before OICR can define its involvement in this area. A strategic investment by OICR at the interface between the discovery and clinical phases would increase the development of opportunities in Ontario.

Section D: Innovation Platforms

Four innovation platforms have been identified as pivotal to the OICR strategy.

D.1. Imaging and Interventions

The Imaging and Interventions Platform of OICR will integrate critical components of medical imaging centres of excellence in Ontario to accelerate the translation of discovery to clinical uses of techniques for early diagnosis of cancer (The One Millimetre Cancer Challenge), and support the development and uses of imaging techniques for cancer screening (as a part of the Ontario Cancer Cohort), cancer stem cell research (The GENESIS project) and clinical trials.

Objectives:

- ❖ Development of targeted imaging probes allowing specific morphological, functional or molecular characteristics of cancer, or combinations of these to be visualized;
- ❖ Build the capability in Ontario to accelerate translation of research findings and commercial development of new imaging probes of cancer.

Plan:

- ❖ Build upon key strengths in imaging research in Ontario and add critical resources in terms of recruitment and support of personnel, and provision of infrastructure to foster collaborative effort;
- ❖ Create a research and development pipeline platform for cancer imaging that will result in a more effective flow of innovative developments into the clinic and the marketplace;
- ❖ Put in place a multidisciplinary research approach to:
 - Develop molecular, cellular and morphological imaging probes (tracers);
 - Develop medical imaging instrumentation and software by building a closer links between those who design and test imaging systems, the cancer probe builders, the cancer biologists and clinical oncologists;
 - Validate the clinical potential of novel imaging probes;
 - Design, test and produce image-guided biopsy devices that integrate the information from functional and molecular imaging technology into real-time biopsy image guidance techniques.
- ❖ Participate in the design of other OICR innovation programs;
- ❖ Facilitate the integration of new imaging modalities that monitor tumour size, metabolism, or allow serial biopsies of non-responsive tumours, in the execution of high-content trials.

D.2. Bio-repositories and Pathology

Access to quality tumour and normal tissues, blood samples and their derivatives (DNA, RNA, proteins, metabolites, and chemicals) is central to OICR-sponsored cancer research, from discovery research, to disease classification and to the understanding of drug response.

Objectives:

- ❖ Store and distribute legally consented samples (tumours, tissues, bloods, other) that will be used by scientists in Ontario and elsewhere;
- ❖ Coordinate the tissue collection efforts of the Ontario Tumour Bank (OTB), the Ontario Cancer Biomarker Network and the Ontario Tumour Repository Network;
- ❖ Develop new classifications of human malignancies, possibly based on tumour stem cell characteristics and extensive use of biomarkers and genetic profiles;
- ❖ Develop new tissue-based analytic technologies;
- ❖ Accelerate the translation of new innovations into community.

Plan:

- ❖ The OTB will continue to provide a high-quality collection and state-of-the-art storage infrastructure;
- ❖ OICR will also develop a research program in molecular pathology and cytopathology. These activities will complement other programs of the OICR, such as stem cell isolation and the One Millimetre Cancer Challenge. Research pathologists will also oversee a team that performs quality reviews on OTB tissue samples and act as a technical and professional resource for OICR in-house programs such as imaging, tumour stem cell and others requiring tissue processing and interpretation;
- ❖ Integrate expertises, standard operating procedures (SOPs), and resources of the OTB, and link data to the Ontario Cancer Registry, with biospecimen collections that complement existing mechanisms developed by the clinical trials consortia.

D.3. Genomics and High-Throughput Screening

The Human Genome Project led to the development of a wide array of technologies to screen the genome, its products (genes, proteins, metabolites) and molecules that interact with these products (chemicals, RNAi, etc.). These tools have led to a rapid deployment of “omics” facilities that use robotics and informatics to generate high-throughput screens (HTS) of DNA, RNA, protein, tissue, chemicals, etc. Almost all biomedical research laboratories make use of these technologies and facilities to explore biological processes in more global ways.

Objectives:

- ❖ Use cancer genome sequencing and other high-throughput genomics techniques to identify genes critical in the development of cancer;
- ❖ Identify anomalies in the genomic profile of tumours to develop tests and strategies for novel (and rational) diagnostics and therapeutics based on the specific profile of a cancer;
- ❖ Establish and/or access facilities that can rapidly test the function of cancer-related genes, or screen agents that can perturb the activities of cancer cells.

Plan:

- ❖ Facilitate and support linkages to existing core facilities in Ontario that will provide state-of-the-art technologies and expertise required by OICR programs. Examples of such facilities include:
 - The Ontario Cancer Biomarker Network (OCBN), a not-for-profit corporation dedicated to supporting and accelerating programmatic biomarker research;
 - HTS chemical screening laboratories at McMaster University and the Samuel Lunenfeld Research Institute;
 - The Structural Genomics Consortium (SGC) at the University of Toronto which determines the three dimensional structures of proteins of medical relevance;
 - The Centre for Applied Genomics (TCAG), located in MaRS, which involves more than 50 scientists and other highly qualified staff at The Hospital for Sick Children (MaRS site). TCAG's technology platforms provide a number of leading-edge technologies and services to the genomics research community in the public and private sector;
 - OICR will evaluate other technology platforms in Ontario for quality, cost and capacity as new OICR project needs are identified.
- ❖ As a prerequisite to building a cancer genome sequencing group, OICR scientists will carefully evaluate and test the next generation of sequencing platforms;
- ❖ OICR will join an RNAi consortium with the Broad Institute of Harvard and MIT, a world leader in RNAi technology, and its applications to use RNAi to identify genes underlying a biological process through systematic loss-of-function genetic screens.

D.4. Informatics and Bio-computing

Computational and statistical research is intrinsic to all OICR programs. New methods will be needed to handle the large and complex datasets (clinical, genomics, imaging, pathology, chemical etc.) that will be generated. New challenges arise as these datasets are integrated and interpreted. Visualization tools need to be developed to provide global views of the data, not only for the computer scientist, but also for biologists, clinicians, and trainees.

Objectives:

- ❖ Develop algorithms, software and databases as an integral component of OICR programs;
- ❖ Develop with Ontario cancer centres and clinical trials network a pervasive computing environment that drives data collection and provides easy access to those contributing to the databases and those using it for their research;
- ❖ Disseminate datasets, resources and tools to the cancer research community and beyond. OICR will favour a strategy for open and free release of large-scale datasets that are generated for several of its projects, according to principles developed for the Human Genome Project.

Plan:

- ❖ Recruit and develop world-class teams (including a leader) in cancer informatics, with broad expertise spanning clinical informatics, bioinformatics, computational chemistry, imaging informatics, biostatistics and epidemiology and health services;
- ❖ Create an informatics development group to provide programming expertise required in building and customizing computational analysis tools and databases. One of the early thrusts of the informatics group development efforts in the first two years will be in integrating software packages for storage, handling and analysis of the data needed and generated by large-scale OICR studies.

Section E: Translation Programs

OICR will invest significantly in translational activities that will accelerate the advent of new strategies to prevent, detect and treat cancer. OICR will assure that novel diagnostic and therapeutic discoveries resulting from its innovation programs get the best support to advance towards the market, with Ontario enterprises – and residents - being the primary benefactors.

E.1. Patents to Products

Commercialization is key to bringing therapeutic and diagnostic advances to the clinical setting where they can benefit patients. Discoveries that will arise from OICR research have the potential to launch or enhance the products of a number of Ontario companies. OICR has initiated a survey of stakeholders in Ontario that include researchers, institutional leaders, technology transfer officers, government officials, corporate investors and industry. The emerging strategy for this OICR program is included in Section I of the OICR Strategic Plan.

E.2. High Content Cancer Trials

OICR's greatest challenge is to bridge the gap between discoveries and patients. The clinical trials infrastructure in Ontario is critical to addressing this challenge. OICR has set among its primary goals, the establishment of the very best *high content clinical trials* in the world that will

provide a platform for outstanding translational research and scientific discoveries that have an important impact on the cancer patient.

Ontario is fortunate to be home for the coordinating centres for three clinical trials groups that include networks of investigators that extend provincially, nationally and internationally:

- ❖ The National Cancer Institute of Canada's Clinical Trials Group located at Queen's University in Kingston;
- ❖ The Ontario Clinical Oncology Group (OCOG) at McMaster University in Hamilton;
- ❖ The Princess Margaret Hospital Phase II Consortium.

OICR's predecessor, OCRN, initiated a series of programs to enhance clinical trials infrastructure and processes in Ontario to increase recruitment of patients into trials. To achieve this goal, OCRN created programs to increase personnel support, improve efficiencies, and provide better information to patients and care givers. These programs, including the provincial research ethics board for multi-centre clinical trials, will continue within OICR.

Objectives:

- ❖ To continue to address priority questions in cancer by conducting the highest quality trials incorporating the best science;
- ❖ To maintain and enhance the existing leadership roles of the trials groups in Ontario by improving infrastructure for trials and recruitment of methodologists and biostatisticians;
- ❖ To increase recruitment of Ontario cancer patients to trials through research and by improving processes to facilitate recruitment;
- ❖ To conduct research on innovative trial designs;
- ❖ To increase the capacity to study novel targeted cancer therapies;
- ❖ To enhance the capacity for bench to bedside and bedside to bench research by the recruitment of molecular pathologists and clinical pharmacologists with pharmacogenomic expertise.

Plan:

- ❖ Implement the High Content Trials Program to capitalize as a launching point for OICR's major thrust in translational research;
- ❖ Create an advisory committee of clinical investigators to discuss the strategic planning of high content clinical trials and models for implementation;
- ❖ Facilitate the integration of expertise and resources developed by other OICR platforms and programs;
- ❖ Recruit methodologists and statisticians interested in applied biomedical research;
- ❖ Recruit molecular pathologists and clinical pharmacologists with pharmacogenomic expertise who bridge the gap between basic scientist and clinician scientist;
- ❖ Support oncologists in the clinical sites and young researchers with research training to ensure sufficient dedicated time for their research;
- ❖ Develop processes to deal with the increased complexity of the regulatory environment;
- ❖ Develop a closer collaboration between behavioural and social scientists and trialists to understand barriers to recruitment of cancer patients into trials;

- ❖ Actively market to pharmaceutical and biotech companies the ability of OICR to conduct high content clinical trials with the goal of attracting high value trials to Ontario and encourage some companies to place their research teams in Ontario.

E.3. Cancer Care and Services Research

OICR’s mandate to develop innovative health care interventions, products and services is complementary to CCO’s mission to improve the performance of the cancer system by driving quality, accountability and innovation in all cancer-related services. OICR and CCO are natural partners in developing rigorous health services research that is not only policy relevant, but policy actionable. Ontario has unparalleled research teams to support first-rate health services research, including 1) the Institute for Clinical Evaluative Sciences (ICES); 2) Programs in Evidence-Based Care (PEBC) and Supportive Cancer Care Research, housed at McMaster University; 3) the Cancer Care and Epidemiology group at Queen’s University. Working together, with additional resources, they need to create an ambitious Health Services Research Program (HSRP) to OICR, capitalizing on the provincial databases, such as the Ontario Cancer Registry, which has recorded all cancer diagnoses in Ontario residents since 1964, as well as screening activity, chemotherapy, radiation treatment and pathology databases, and death registration.

Objectives:

- ❖ Analyse the benefits, risks, and costs of new diagnostic and therapeutic interventions;
- ❖ Provide evidence-based assessments regarding the use of such interventions in the health care system;
- ❖ Improve our understanding of the barriers to dissemination of new services and products, following principles of fairness and equity;
- ❖ Evaluate new interventions that improve the quality of care provided to cancer patients, including high quality supportive and palliative care.

Plan:

- ❖ Establish a process to evaluate how OICR can best contribute to health services research;
- ❖ Recruit an internationally recognized leader for the program;
- ❖ Support a mix of junior, mid-career and senior researchers located in various existing centres of excellence in Ontario.

Section F: OICR Cancer Research Fund

OICR recognizes the importance of supporting investigator-driven research that is independent of the OICR large-scale programs. OICR established the Cancer Research Fund (CRF) in 2003. The CRF program supports investigator-initiated translational cancer research projects based on excellence in translational cancer research.

Funds are made available through biannual grant competitions, with selections based on recommendations generated by scientific peer review panels. To date, CRF has supported proposals in four major areas:

1. Pre-clinical validation of potential therapeutic targets, development of new agents, genetic/proteomic studies;
2. Clinical evaluation of new therapeutic agents/modalities;
3. Clinical trials companion studies;
4. Special Request for Proposals (RFPs) to address unique research needs.

Since an early gap in drug development involves the step from target validation to small molecule identification, one of the biannual competitions (co-sponsored by CCO) is dedicated to providing the Ontario academic community with the opportunity to access funds required to cover the costs necessary for assay development and running HTS designed to identify small molecules with activity against novel cancer therapeutic targets.

Section G: Partnerships

G.1. Cancer Care Ontario

Ontario has created a unique infrastructure for cancer care delivery in Ontario. CCO is an umbrella organization that steers and coordinates Ontario's cancer services and prevention efforts so that fewer people get cancer and patients receive the highest possible quality of care. As the provincial government's chief cancer advisor, CCO directs over \$550-million in annual public funding for cancer prevention, detection and care. The agency also operates screening and prevention programs; collects, monitors and reports information about cancer system performance; develops evidence-based standards and guidelines; and works with regional providers to plan and improve services for patients. CCO has a significant financial stake in public health and direct relationships with primary care providers, oncologists, surgeons, hospital administrators and health encounter data systems. CCO's research priorities in molecular epidemiology, imaging, experimental therapeutics and health services research align very well with the OICR strategic plan.

CCO and OICR form an essential alliance for all translational research at the level of the provincial population of cancer patients in addition to the healthy public. Opportunities for joint programs have been capitalized early in the design of the OICR strategy:

- ❖ Coordination for the design of the Ontario Cancer Cohort;
- ❖ Use of CCO databases and registries in the conduct health services and population research;
- ❖ Creation of an enhanced HSRP.

CCO and OICR are both necessary elements in these areas since they involve research that will influence and change the organization, finance and delivery of care. The partnership has policy

and operational implications that go beyond research, as they will describe the path for research translation into the health care system and facilitate provincial decisions.

G.2. Broad Institute of Harvard and MIT

As described above, OICR is developing a strategic alliance with the Broad Institute of Harvard University and MIT (Broad) that will see collaboration in a number of areas where the Broad has developed unique research platforms. The Broad is a world leader in genomics, computational biology and chemical biology.

Section H: Investigator Awards Program

To achieve its objectives, OICR will involve several hundred scientists in its programs. It is recognized that there are many established cancer researchers in Ontario already supported by institutions and/or funding agencies such as the Canada Research Chairs Program, Canadian Institutes of Health Research (CIHR), and Natural Sciences and Engineering Research Council of Canada (NSERC). However, the level or quantity of support that is available is not always sufficient, particularly for clinician-scientists who are critical for translational research. In order to meet the goal of strengthening Ontario's cancer research capacity by attracting outstanding PhD researchers and in particular clinician scientists to the province, OICR will establish an investigator awards program, designed to provide stable recruitment and retention funding for fifty principal investigators (PIs) involved in OICR programs. Recipients of these awards will be identified as OICR Investigators. Investigators participating in OICR research programs who are not recipients of Investigator Awards will be identified as OICR Associate Investigators. Both levels of investigators will participate in well-funded and focused research programs, projects and platforms. OICR will thus create an environment that will move Ontario to the forefront of discovery and innovation.

Description of the OICR Investigator Awards

OICR will offer investigator award packages that can be used for salary, benefits, office support, travel, stipends for trainees, other research-related expenses and a contribution for space. There is no overhead included in the investigator awards, consistent with other national and international salary awards programs. While the awards have been developed to reflect competitive compensation packages, the Host Institution and the Awardee may determine the allotment within each of these categories. The value of the packages will vary depending on whether the investigator is a beginning or senior investigator and a laboratory or clinical investigator. This flexibility reflects that each institution has different guidelines related to salary and other forms of compensation. In addition to the base package, OICR will provide additional funds for equipment.

OICR expects that Awardees will apply for additional research funds for other research projects that are outside the scope of the OICR programs. The level of non-OICR funds that are obtained through other agencies will define part of the success of the Awardee at the fourth year review.

Duration of the Awards

Awards are for five years. It is expected that the awards will be renewable, subject to the understanding of sustained OICR funding in the future. All Awardees will be subject to a rigorous (tenure-like) review of their science in the fourth year of an OICR award.

Selection Process

All potential appointments will be evaluated by an OICR Awards Committee composed of a common pool of individuals selected by OICR based on their excellent track record in recruitment. This is to assure that similar standards are met for all Awardees. Candidates will be rated according to the following criteria:

1. Scientific excellence;
2. Leadership qualities (particularly for senior PIs);
3. For clinician scientists: time allocation for research;
4. Collaborative team-building experience;
5. Fit with OICR research programs in terms of meaningful participation and contribution.

OICR will be diligent in coordinating its internal review with the recruitment processes occurring at the Host Institution.

Section I: Commercialization Strategy

OICR is committed to the value and importance of commercialization as part its mission. OICR undertook a multi-step approach to develop a preliminary OICR commercialization strategy, recommendations and action items.

Objectives:

- ❖ Create a culture that recognizes the value of translation and commercialization in bringing the benefits of discovery to citizens of Ontario;
- ❖ Be proactive in the management of intellectual property (IP) arising as a result of OICR investments to enable bundling for highest value;
- ❖ Be proactive in engaging industry, by nurturing market “Pull”, and becoming industry-facing in its approach to the commercialization of cancer;
- ❖ Promote the downstream development of inventions and ultimately the manufacturing of devices derived from these inventions in Ontario, i.e., the “Ontario First Policy”;

- ❖ Work with our partner institutions and other key players involved in the commercialization of life science in Ontario so that OICR brings added-value to the effort and does not duplicate existing functions already in place.

Plan:

- ❖ Recruit a commercialization leader and team to direct OICR's commercialization activities;
- ❖ Do more work over the next 12 months to determine the appropriate long term approach to undertake further research, establish relationship networks and identify opportunities for pilot projects;
- ❖ Form direct linkages with the science programs so that commercialization steps can be incorporated into the projects early, when appropriate, to increase the efficiency of the research and the likelihood of investment for commercialization;
- ❖ Establish an IP protection framework that is compatible with the Host Institutions of Principal Investigators and other possible inventors involved in OICR programs. The guiding principle regarding IP should be that "Ownership follows Inventorship";
- ❖ Will not seek an ownership position in relation to the proportion of IP developed at associate institutions, except for the MaRS-based OICR inventors will share licensing fees, royalties and other remuneration, similar to practices at other academic institutions in Ontario;
- ❖ Provide funding support, require the establishment of IP co-management frameworks with the institution(s) or the inventor(s) (depending on the institution's IP policy);
- ❖ Establish an "evaluation process" to identify promising commercialization projects relative to cancer interventions and diagnostics;
- ❖ Use its commercialization funds and leverage other seed funds, for Proof-of-Principal (PoP) experiments, to refine and develop standard operating procedures, carry out validation studies, file additional patents and identify potential receptors for the discoveries;
- ❖ Select one (or more) promising projects in Ontario to demonstrate the feasibility of a multi-institutional and managed approach to IP commercialization;
- ❖ Undertake the development of agreements with its institutional and private partners that will encourage the maximum participation of Ontario firms in the development, utilization and commercialization of inventions arising from the OICR research projects and that the products derived from these inventions be substantially manufactured in Ontario, an "Ontario First Policy";
- ❖ Promote linkages with other programs that can provide rapid and rigorous evaluations of OICR products.

Section J: Governance

OICR is a federally incorporated not for profit, non-share capital corporation.

The Board of Directors (see Appendix 1) is to consist of 14 members (currently 10) to be selected on individual merit and capacity to contribute to furthering OICR's agenda.

In keeping with the By-laws, the Board includes four members named by the following organizations (one from each): Cancer Care Ontario (CCO); University Health Network (UHN); the Council of Ontario Universities (COU); and the Council of Academic Hospitals of Ontario (CAHO).

The remaining members provide a balance of expertise, knowledge and experience, including: scientists/clinical scientists of international stature in cancer-related disciplines; financial, legal, and business experts familiar with the process of technology transfer and commercialization in the life sciences sector; individuals with knowledge of the voluntary sector; and individuals from the community.

The Scientific Advisory Board (see Appendix 2) has been established to advise the President/Scientific Director and the Board on strategic planning, research priorities, the directions for the Institute's scientific programs and the recruitment of Principal Investigators. The Board is co-chaired by Elizabeth Eisenhauer, MD and Phillip Sharp, PhD and includes basic, clinician and population health international experts. The appointment of an expert in health services research is yet to be made.

A Clinical Investigation Advisory Board has been established to advise the President/Scientific Director and the Board of Directors on strategies to augment the clinical translation potential of the Institute.

The President and Scientific Director is accountable to the Board for the effective delivery of the Institute's mandate.

Section K: Communications

OICR is a centre of excellence in cancer research. OICR's communications support its programs and objectives with a two-way flow of information that informs and educates the public and stakeholders while seeking feedback from them.

OICR is committed to open, timely and accurate communications, delivered in plain language, and welcomes inquiries, comments and opportunities for dialogue.

Objectives:

- ❖ Educate, inform and engage in dialogue with the general public to raise awareness and obtain feedback regarding OICR achievements along the entire spectrum of cancer research from fundamental discovery to development of early diagnostic methods, therapies and better methods of cancer prevention;
- ❖ Engage in dialogue with stakeholders in the cancer community, researchers, treatment providers and advocacy groups;
- ❖ Educate and inform youth about careers in science and cancer research to create the next generation of cancer researchers;
- ❖ Support OICR programs by creating awareness that will increase participation in clinical trials, use of the Ontario Cancer Research Ethics Board (OCREB) and use of the OTB.

Plan:

- ❖ Implement a multi-year program to communicate OICR achievements, create awareness in the general public, and encourage feedback regarding the success of OICR programs and OICR funded researchers, using media relations, placement of articles in trade publications and community newspapers, events, sponsorships and partnerships with relevant organizations;
- ❖ Engage in stakeholder relations in the cancer community to obtain feedback and support for OICR initiatives;
- ❖ Implement a multi-year, comprehensive youth outreach program with components promoting the study of science for elementary and secondary school students, encouraging university and college students to pursue careers in cancer research and supporting postdoctoral fellows in cancer research;
- ❖ Work with stakeholders to create awareness in the public of clinical trials as a treatment option, using display and print materials, presentations, community newspaper stories and advertising;
- ❖ Support OCREB to create greater awareness among hospitals, physicians, clinical trials personnel by producing materials as required;
- ❖ Support marketing initiatives of the OTB with production of display and marketing materials, participation at events and trade shows;
- ❖ Provide updates on OICR activities to ministry staff and caucus briefings;
- ❖ Support OICR employees with internal communications using the Intranet, Talking Points (newsletter) and staff recognition events.

Section L: Multi-Year Budget Summary

The approved OICR budget from the Ontario Ministry of Research and Innovation is \$346,926,189 over five years. OICR is presenting a balanced budget, which respects both the yearly and overall funding allocations.

1. Investigator Awards

The investigator awards amount to \$45.8 million over five years. They are based on award packages (salary, overhead and research) ranging from \$250,000 to \$350,000 to be offered to new and retained OICR PIs. The program will ramp up over five years, with the expectation that 20 investigators (40 per cent) will be located at MaRS and 30 PIs (or 60 per cent) will be located at associate institutions.

2. Innovation Projects, Platforms and Translation Programs

The largest single component of the OICR strategic plan budget is the amount allocated to research spending, close to \$126.7 million over five years. Research spending will be divided into Innovation Projects and Platforms and Translational Programs. It is expected that the OICR PIs will add significantly to these funds through other grants from both Canadian and international granting agencies.

3. Equipment and IT

The allocation for equipment and information technology (IT) infrastructure is based on two components: an equipment start-up package for recruited investigators and a budget amount for major equipment purchases. A yearly budget for major equipment purchases has been allocated. The total five year allocation is \$33.6 million.

4. Opportunity Fund

An “Opportunity Fund” of \$2 million/yr (except \$250,000 for Year 0) has been established for OICR’s participation in world-leading international research collaborations and other arising opportunities. The budget allocation is \$8.3 million.

5. MaRS Build-Out

There will be two distinct phases of “build-out” for the research and support areas within the MaRS complex. Build-out refers to the completion of interior spaces. The first phase of build-out is the completion of the fifth floor lab area in the MaRS South Tower. This is approximately a 10,000 square foot (sq. ft.) area. The second and more substantial phase of build-out will take place in the new MaRS “West Tower” and construction is to be scheduled to begin in 2007. Based on the PI projections and relating staffing and platform operations, the estimated area required will be approximately 80,000 sq. ft.

6. Commercialization Program

One of the key deliverables of the OICR mission is to foster an effective and novel approach to commercialization of cancer related research. The commercialization budget ramps up from \$400,000 in Year 0 to \$4 million in Year 4, a total of \$12.7 million.

It is anticipated that many of the functions will be shared with umbrella organizations involved in commercialization of IP in Ontario and with our associate institutions. There are three main components to the budget: 1) an early stage seed fund for commercial projects; 2) salary support for sector specific IP management professionals; and 3) an allocation for marketing studies and activities to increase the exposure of OICR related IP and inventions to the investment community. The largest component of the commercialization budget is to fund projects with commercial potential. It is intended to allocate up to \$250,000 per project/year for promising discoveries, starting with four projects in Year 2 and ramping up to eight ongoing projects in Year 4. Projects will be selected through a rigorous due diligence basis.

7. OICR Administration Centre

The research administration budget ranges from \$3.2 million in Year 0 to \$6.5 million in Year 4, for approximately \$28 million over five years. Approximately, 60 per cent of this amount is for salaries. Yearly salary expenses will be from \$3 to \$4.2 million/year. The number of full-time-equivalent (FTE) positions is 24 in Year 1, which ramps up to 34 by Year 4

7.1. Rental Expense

OICR will pay rent for use of laboratory space in the MaRS complex. The current rental charge (all inclusive) for the 5th Floor, South Tower is approximately \$600,000/year. Starting in Year 2, with full occupancy in Year 3, rental expenses will increase to \$4.1 million/year for both the South Tower (current) and new space (80,000 sq. ft.) in the new West Tower

8. OCRN Budget

9.1 Cancer Research Fund (CRF)

Each year the CRF will conduct two competitions, one in the spring to support HTS and one in the winter for grants to support translational programs (PoP, clinical trials, and companion studies to clinical trials).

The HTS program is jointly funded by OICR and CCO with each organization contributing \$500,000 per year. The formal agreement with CCO runs for another year, but it is anticipated that CCO will continue the program.

9.2 Clinical Trials Infrastructure Fund (CTIF)

To increase the capacity of Ontario groups to conduct clinical trials, OCRN signed contracts with 29 cancer centres, large community hospitals and paediatric hospitals to provide them with funds to hire additional people to conduct trials. The CTIF will put approximately \$13 million into infrastructure over the seven years of the contract lifetimes. The support

programs are nearing completion. In 2007/08, OICR will make payments of \$1 million to centres, but this will drop to \$155,000 in 2008/09 and to \$43,000 in 2009/10.

Each program also had to commit to conducting more industry sponsored trials in order to generate the revenue to sustain the OCRN-supported infrastructure. Furthermore, the centres agreed to share some of their new industry revenue with OCRN to support the clinical trials programs that contribute to the overall efficiency of clinical trials in Ontario. In 2006/07, it is expected that OICR will receive \$560,000. In following years it is expected that this income to increase as follows: 2007/08 - \$700,000; 2008/09 - \$900,000; 2009/10 - \$ 1 million.

9.3 OCRN Programs (OTB, OCREB and Clinical Trials Program)

In addition to the support for five centres that collect tumour samples, the OTB budget supports five staff, but plans to increase by one in the coming year to start a new program. The OTB budget also includes \$300,000 for the estimated share of a joint CCO project to link the OTB database with the CCO registry to provide automated data collection and outcome data.

The OCREB budget supports four staff and also includes upgrades in 2006/07 and 2007/08 to the software supporting online submission of proposals and for management of reports of serious adverse events.

The Clinical Trials Program includes the Clinical Trials Network which supports the development of training program, standard operating procedures and the clinical trials management software. Also included is the support for the CTIF program and the clinical trials database. In the 2006/07 budget, there is support for redevelopment of this database to make it more user-friendly and to improve the efficiency of managing the database.

Section M: Monitoring of Results

The Strategic Plan and the annual Operating Plan set out what is to be accomplished by the organization and as a matter of course, there will be monitoring and reporting of achievements against these Plans. Furthermore, the individual Research Programs/ Projects and Platforms will also have established milestones and deliverables against which progress will be monitored in addition to regular scientific evaluation. Finally OICR and all institutions receiving financial contributions to their research from OICR will provide the information necessary to report on the performance indicators set out in OICR's contract with the Government of Ontario.

Section N: Conclusion

This Plan identifies directions that were determined after consultation across Ontario. It should be understood that the research strategy and programs will evolve over time and OICR anticipates an ongoing consultation with the Ontario and international research communities.

The Strategic Plan outlines the direction, research priorities and programs, and the commercialization strategy for the building of the OICR over the next three years. The Plan is ambitious but necessarily so in order to achieve the objectives that have been set. The Plan reflects the commitment of OICR to exemplifying international standards of excellence; to engaging with the Ontario cancer research community in leading edge research; to attracting, developing and retaining top research talent; and to working effectively and creatively to enable the application of innovation and the attraction of public and private investment to Ontario. OICR has been given an exciting opportunity to have a real impact in terms of health and economic benefits to Ontarians. The Institute is committed to meeting this challenge.

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Appendix 1

Board of Directors

Chair

John Evans Chair, MaRS Discovery District

Members

Elizabeth Eisenhauer Director, Investigational New Drug Program, National
Cancer Institute of Canada Clinical Trials Group
Professor, Department of Oncology, Queen's University

Peter George President and Vice-Chancellor
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Raylene Godel Former Board Member
Cancer Care Ontario

Mark Levine Director, Clinical Trials Methodology Group
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Christopher Paige Vice-President, Research
University Health Network

Calvin Stiller Chair and CEO
Stilco Corporation

Terrence Sullivan President and CEO
Cancer Care Ontario

Ronald Worton CEO and Scientific Director
Ottawa Health Research Institute

Appendix 2

Scientific Advisory Board

Co-Chairs

Elizabeth Eisenhauer Director, Investigational New Drug Program, National Cancer Institute of Canada Clinical Trials Group, Professor, Department of Oncology, Queen's University

Phillip Sharp Institute Professor, Center for Cancer Research, Massachusetts Institute of Technology

Members

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Tak Mak Director, The Campbell Family Institute for Breast Cancer Research, Ontario Cancer Institute

Harold Moses Hortense B. Ingram Professor of Molecular Oncology
Professor of Cancer Biology, Medicine and Pathology
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