

Collaboration leads to better
research and improved outcomes
for cancer patients.



Message from the Minister of Research and Innovation

On behalf of the Government and the people of Ontario, I'm pleased to extend our gratitude to the Ontario Institute for Cancer Research (OICR) for another year of hard work and dedication to overcoming cancer.

More than 200 known types of cancer strike people everywhere—across age, gender, income and other lines. The Canadian Cancer Society estimates more than 187,000 new cases will be diagnosed across the country in 2013. That's like a new diagnosis every three minutes.

Our government is committed to the health and well-being of Ontarians. With the help of OICR, the province has become a leading jurisdiction for cancer research, enabling us to attract world-leading researchers to Ontario. These researchers are searching for new ways to prevent, detect, diagnose and treat cancer—improving the lives of people here and around the world.

One reason they are attracted to OICR is the tremendous leadership of President and Scientific Director Dr. Tom Hudson. I'm especially proud to congratulate Dr. Hudson on his recent appointment as an Officer of the Order of Canada.

World-class researchers are also drawn to OICR's approach to collaboration. Collaborations make conducting research more effective, meaning discoveries get made sooner. OICR has been instrumental in the creation of national and international collaborations—including the International Cancer Genome Consortium, and the recently launched Global Alliance to Enable Responsible Sharing of Genomic and Clinical Data.

Most important, OICR is making progress in moving discoveries out of the lab and into clinics where they can help patients. Along with improving the quality of life for patients and their families, commercializing new technologies is creating good jobs for Ontarians and helping build our innovation economy.

Once again, thank you to everyone at OICR for your exceptional work and commitment. Best wishes for continued achievement in the year ahead.

Sincerely,
Reza Moridi
Minister of Research and Innovation



Strategically focused research for the highest potential impact on cancer patients

The Ontario Institute for Cancer Research is an independent, not-for-profit translational cancer research institute funded by the Government of Ontario. The Institute's focus is on the translation of discoveries into products, services and improved clinical practice related to cancer prevention, early detection, diagnosis and treatment.

The Institute's clinical and translational research activities are strategically focused where they can have the highest potential impact on patients. They are built on Ontario's global strengths – medical imaging, clinical trials, cancer stem cells and bio-therapeutics. These strengths are complemented with world-leading programs in genomics, bioinformatics and high-throughput screening.

With a variety of business models, the Institute can help de-risk the commercialization of new technologies. The Intellectual Property Development and Commercialization Fund provides both capital and expertise to support pre-commercial development of technologies in areas such as therapeutics, medical technology and new technology platforms.



For more information:

Please visit our website at www.oicr.on.ca

Quick facts

- ➡ Research in small molecules, biologics, stem cells, imaging, genomics, informatics and bio-computing, pathology, high impact clinical trials and health outcomes;
- ➡ Annual budget of more than \$173 million with funding from government, collaborators and partners;
- ➡ Supports more than 1,600 researchers, clinician scientists, research staff and trainees across Ontario;
- ➡ Headquartered in downtown Toronto's Discovery District, with a global strategy and an Ontario focus;
- ➡ Toronto has Canada's largest concentration of scientific research and is among the top three in North America in terms of its bioscience cluster.

From the Chair of the Board of Directors and the President and Scientific Director

We are pleased to present the annual report for the Ontario Institute for Cancer Research (OICR) for the year 2012-2013.

The past year saw Ontario's international profile raised and the Institute is proud to have played a leadership role in furthering Ontario's reputation as a major hub for life science research in North America and for international collaborations. In addition to playing a pivotal role in the International Cancer Genome Consortium and the Cancer Stem Cell Consortium, OICR has been instrumental in the creation of the Global Alliance to Enable the Responsible Sharing of Clinical and Genomic Data which was formed this spring. The initiative will allow scientists to tackle larger, more complex research problems and help accelerate genomic medicine.

More than 90 institutions worldwide have joined the alliance, including 16 in Canada, and others are expected to join in the near future. The alliance will establish a common international framework to allow genomic data to be collected, managed and shared in an effective, responsible and interpretable manner. Sharing data will create new opportunities to define diagnostic categories, streamline clinical trials and match patients to therapies.

OICR made significant progress in the execution of its research strategy. A new research framework, introduced this year, places an emphasis on collaboration. You can read more about the framework and about the success of the Institute's programs in the pages that follow.

The Institute entered into a new collaboration with the pharmaceutical industry. Janssen Inc. has funded a project with OICR's High Impact Clinical Trials Program to find and test new biomarkers to identify patients with hormone-resistant prostate cancer at high risk for disease progression and biomarkers of response to therapy. These biomarkers could lead to more personalized treatments and fewer side effects for prostate cancer patients.

OICR was selected by the Canadian Partnership Against Cancer (CPAC) to develop the coordinating centre for the Canadian Cancer Clinical Trials Network (CCCTN). Dr. Janet Dancey, Director of OICR's High Impact Clinical Trials Program, will be the Scientific Director and lead the CCCTN coordinating centre. OICR is collaborating with the NCIC Clinical Trials Group and N2 (Network of Networks) on this project. The Network will improve the quality of cancer clinical trials in Canada and provide support in ethics, regulatory matters, biospecimen collection and analyses as well as knowledge transfer to personnel in treatment centres and hospitals.

This will make it possible to conduct more trials sponsored by academic institutions or cooperative clinical trials groups and increase patient enrollment. The benefit to patients will be earlier access to the most innovative therapies and the ability to play a more active role in setting research priorities for clinical cancer research.

In February 2013, an international panel of scientists reviewed the progress of OICR's Cancer Stem Cell, Drug Discovery, Genome Technologies, Informatics and Bio-computing, Innovation in Target Validation and Transformative Pathology programs. Funding has been renewed for these programs, which will receive \$51 million over the next two years. These funds include an investment in the IT infrastructure to support the next



Left:
Dr. Calvin Stiller
Chair of the Board of Directors

Right:
Dr. Tom Hudson
President and Scientific Director

generation of cancer research and care in Ontario and for new translational research initiatives to develop new tools to reduce the over-diagnosis of prostate cancer, the over-treatment of breast cancer and the high fatality rate of pancreatic cancer.

This past year we welcomed the appointment of Mr. Jeff Courtney as Chief Commercial Officer. Courtney has extensive experience in venture capital, business development and strategic planning. As part of his role, he will be leading the development of new programs designed to accelerate the commercialization of innovative cancer research in Ontario as well as expand and grow the Institute's collaborations with industry partners.

We welcome Ms. Leslee Thompson, President and CEO, Kingston General Hospital who joined the Board of Directors this year and we thank Mr. Michael Power, whose term has ended, for his wise counsel and valuable contribution.

We welcome Dr. James Allison, the David H. Koch Chair, Immunologic Studies, Memorial Sloan-Kettering Cancer Center, Investigator, Howard Hughes Medical Institute, Director, Ludwig Center for Cancer Immunotherapy, who has joined the Scientific Advisory Board.

We wish to acknowledge the support of the Government of Ontario through the Ministry of Research and Innovation. The Ministry is a champion of research and innovation and has ensured that the financial resources and moral support are available to enable us to achieve our vision of new cancer discoveries, products and services to ensure lasting health and economic benefits for the people of Ontario.

The achievement of our goals is due to the Institute's engaged and talented staff, whose commitment to excellence has made OICR an international model for a cancer research institute. We thank the staff for their continued dedication and hard work.

Congratulations to the following who were recognized with prestigious awards for their significant contributions to science.

Dr. Tom Hudson

President and Scientific Director
Ontario Institute for Cancer Research

Appointed Officer of the Order of Canada for his contributions to global breakthroughs in genome science and for his leadership in the field of cancer research.

Dr. Dave Williams

Member, Board of Directors
Ontario Institute for Cancer Research
President and CEO, Southlake Regional Health Centre

Appointed Officer of the Order of Canada for his contributions to space exploration and his leadership in enhancing astronaut health and welfare.

Dr. Geoff Fong

OICR Senior Investigator
Professor, Department of Psychology and School of Public Health and Health Systems
University of Waterloo

Presented with World No Tobacco Day Award by the World Health Organization for his significant contribution to the advancement of tobacco control.

Research Framework

Since its launch in 2005, the Ontario Institute for Cancer Research has recruited top scientists from around the world to serve as leaders for its research programs and developed a robust research infrastructure to improve the translation of the latest research discoveries in Ontario into new interventions associated with the prevention, screening and treatment of cancer patients.

On April 1, 2013, OICR adopted a new research framework to further enhance the Institute's translational research capabilities. It is designed to increase collaboration among programs and help to accelerate the flow of research discoveries for testing in the clinic. It will allow OICR to implement its translational research strategy and facilitate its goal of bringing more personalized medicine to cancer patients.

Translational Research Initiatives (TRIs) will involve OICR research groups who collaborate on common areas of research. Two TRIs have been identified so far: Improved Management of Early Cancer (IMEC, focused on prostate and breast cancers) and PanCuRx (pancreatic cancer).

"Recognizing that multiple programs were working on related, highly-challenging questions on pancreatic, breast and prostate cancers, we created the TRIs as a way to enhance collaboration," explains Dr. Robert Campos, Head of Research Operations.

"We hope to take advantage of the disease expertise and specialties in research methodology within the organization. Having a diverse range of expertise on research teams is essential as researchers strive to understand the increasingly complex nature of cancer pathogenesis and to impact the treatment of patients."

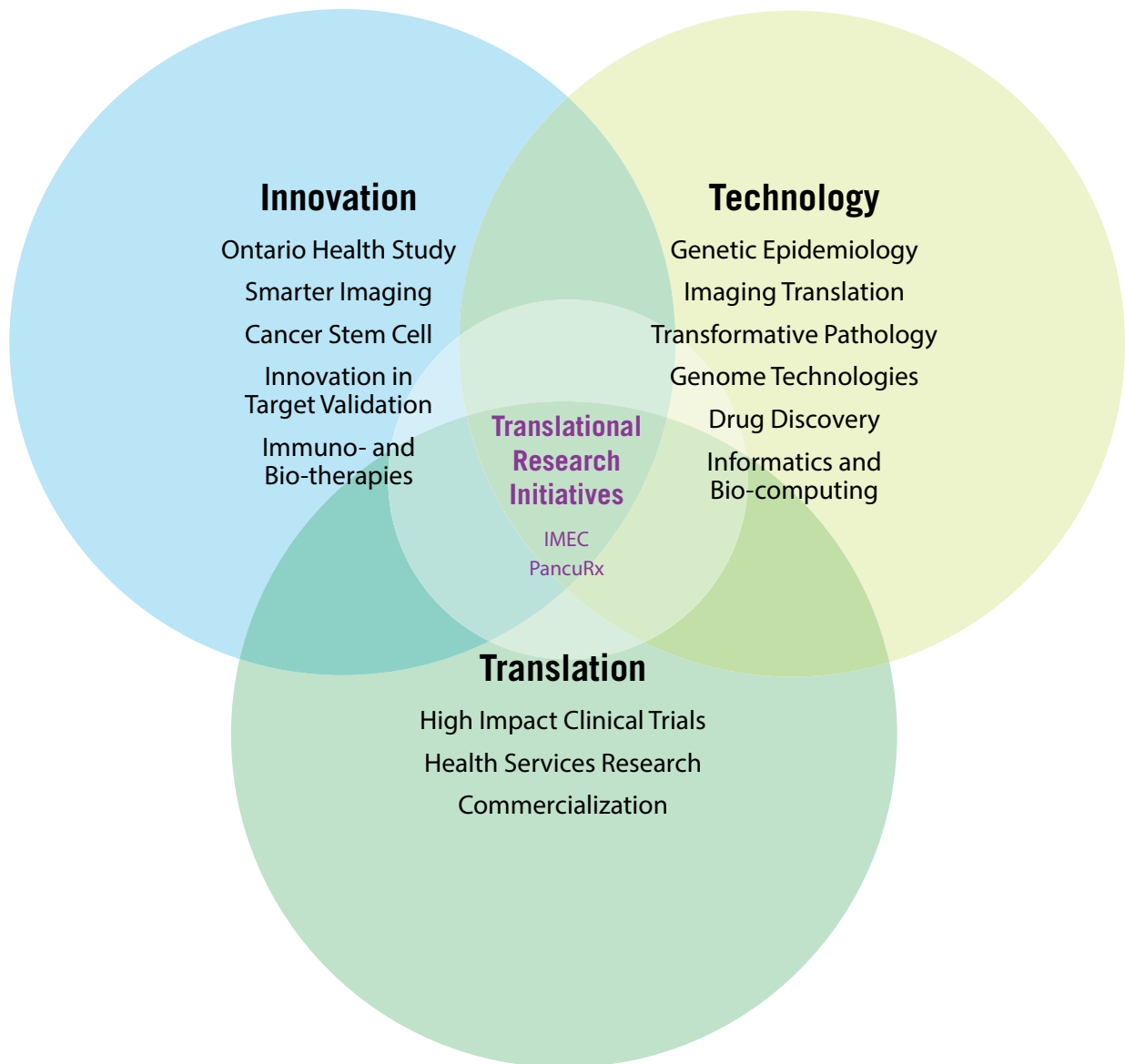
In addition to TRIs, the framework establishes well-defined projects that are smaller in scale and focus on other research areas. "We wanted to encourage research in areas outside of the TRIs and have these smaller projects potentially develop into TRIs of their own," says Campos. There are two types of these projects: Translational Research Projects (TRPs) and Catalyst Projects.

TRPs will primarily be run by one program with some collaboration with other OICR programs and external partners. Catalyst Projects are smaller than TRPs and generally represent "blue sky" research with a line of sight to translational research objectives.

"We are now able to better synchronize work streams through more frequent communication among groups working on the same cancer types using diverse, yet complementary methods," explains Campos. "By integrating our research efforts, we intend to deliver on our mission to bring impactful translational research solutions to patients, healthcare practitioners and the people of Ontario."

The choice of TRIs and the design of the research strategy in general have been centered on addressing OICR's translational research priorities:

- ➡ **Therapeutic discovery:** Find new ways to treat difficult cancers;
- ➡ **Clinical development:** Use personalized medicine to optimize patient treatment decisions;
- ➡ **Population health:** Improve cancer care through innovation in prevention, screening, diagnosis and treatment delivery.



OICR Leaders



Tom Hudson
President and
Scientific Director

Ontario Institute for
Cancer Research



Nicole Onetto
Deputy Director and
Chief Scientific Officer

Ontario Institute for
Cancer Research



Jeff Courtney
Chief Commercial Officer

Ontario Institute for
Cancer Research



Karen Belaire
Chief Operating Officer

Ontario Institute for
Cancer Research



Rima Al-awar
Program Director
Drug Discovery

Ontario Institute for
Cancer Research



John Bartlett
Program Director
Transformative Pathology

Ontario Institute for
Cancer Research



John Bell
Program Director
Immuno-and Bio-therapies

Ottawa Hospital
Research Institute



Janet Dancey
Program Director
High Impact Clinical Trials

Queen's University



John Dick
Program Director
Cancer Stem Cell

Princess Margaret
Cancer Centre



Craig Earle
Program Director
Health Services Research

Cancer Care Ontario
Sunnybrook Health
Sciences Centre



Aaron Fenster
Co-Program Director, Imaging
Translation; Co-Program
Director, Smarter Imaging

Robarts Research Institute
Western University



John McPherson
Program Director
Genome Technologies

Ontario Institute for
Cancer Research



Lyle J. Palmer
Executive Scientific Director,
Ontario Health Study; Program
Director, Genetic Epidemiology
and Biostatistics

Ontario Institute for
Cancer Research



Robert Rottapel
Program Director
Innovation in Target Validation

University Health Network
St. Michael's Hospital



Lincoln Stein
Program Director
Informatics and Bio-computing

Ontario Institute for
Cancer Research



Martin Yaffe
Co-Program Director, Imaging
Translation; Co-Program
Director, Smarter Imaging

Sunnybrook Health
Sciences Centre

The value of collaboration in translational research

Cancer is a worldwide disease, with 13 million new cases diagnosed each year. In Ontario, 72,300 people receive a diagnosis of cancer annually. There is a new trend in cancer research, which presents an opportunity for a worldwide assault on a challenging disease. Scientific research is now borderless – the borders across disciplines and between investigators' labs in research institutes, academia and the private sector are dissolving. Researchers are reaching out to colleagues across cities, countries and internationally. This new approach is proving to be very beneficial.

Collaboration enables scientists with a wide variety of leading-edge skills to apply those skills to a single issue, saving time, sharing risk, encouraging cost-effective use of research funds and facilitating a transfer of knowledge, skills and technical expertise. It also allows researchers to tackle projects that are very large in scope which require resources that exceed what is available in any one organization.

On the pages that follow, you can read about the Ontario Institute for Cancer Research's projects that are using collaboration to advance the Institute's translational research priorities.

Better imaging improves treatment of liver cancer

Advances in drugs and devices that help treat cancer are essential to providing better treatment options for patients, but many cannot be used and tested without the essential support of imaging software. This is just one reason why innovation in imaging technology is so important to improving patient care.

Dr. Aaron Fenster, Centre Director at the Centre for Imaging Technology Commercialization (CIMTEC) in London, Ontario, and Co-Director of OICR's Smarter Imaging and Imaging Translation Programs, is working on a number of imaging projects for the treatment of liver and prostate cancer using focal ablation. Focal ablation is an approach that uses small probes to deliver laser, radio-frequency, ultrasound or microwave energy to raise the temperature of a tumour until it is destroyed, leaving the surrounding healthy tissue unaffected.

The approach requires extremely accurate guidance to ensure the laser is hitting only tumour tissue and not surrounding healthy tissue. Perfecting imaging systems to improve guidance is the basis of Fenster's research. "We are currently advancing the numerous pieces of the ablation guidance technology with patents filed for each," says Fenster. "This includes a semi-automated system that outlines the tumour on a computer screen, a module to show the path of the ablation needle for guidance, a module to verify that the tumour is covered by the ablation zone, an approach to compensate for the movements of patients during the procedure, such as breathing and the device itself." Fenster's team has most recently developed a newer streamlined version of the device, one that is smaller, lighter and more efficient than the last, which is also patent pending.

Fenster believes that clinical trials for liver tumour ablation, which would test both imaging software and ablation technology, will begin before the end of 2013. "We already have ethics approval for a Phase I clinical trial, so we are currently waiting for all patents to be filed and approved, while continuing to test and improve the technology," says Fenster.

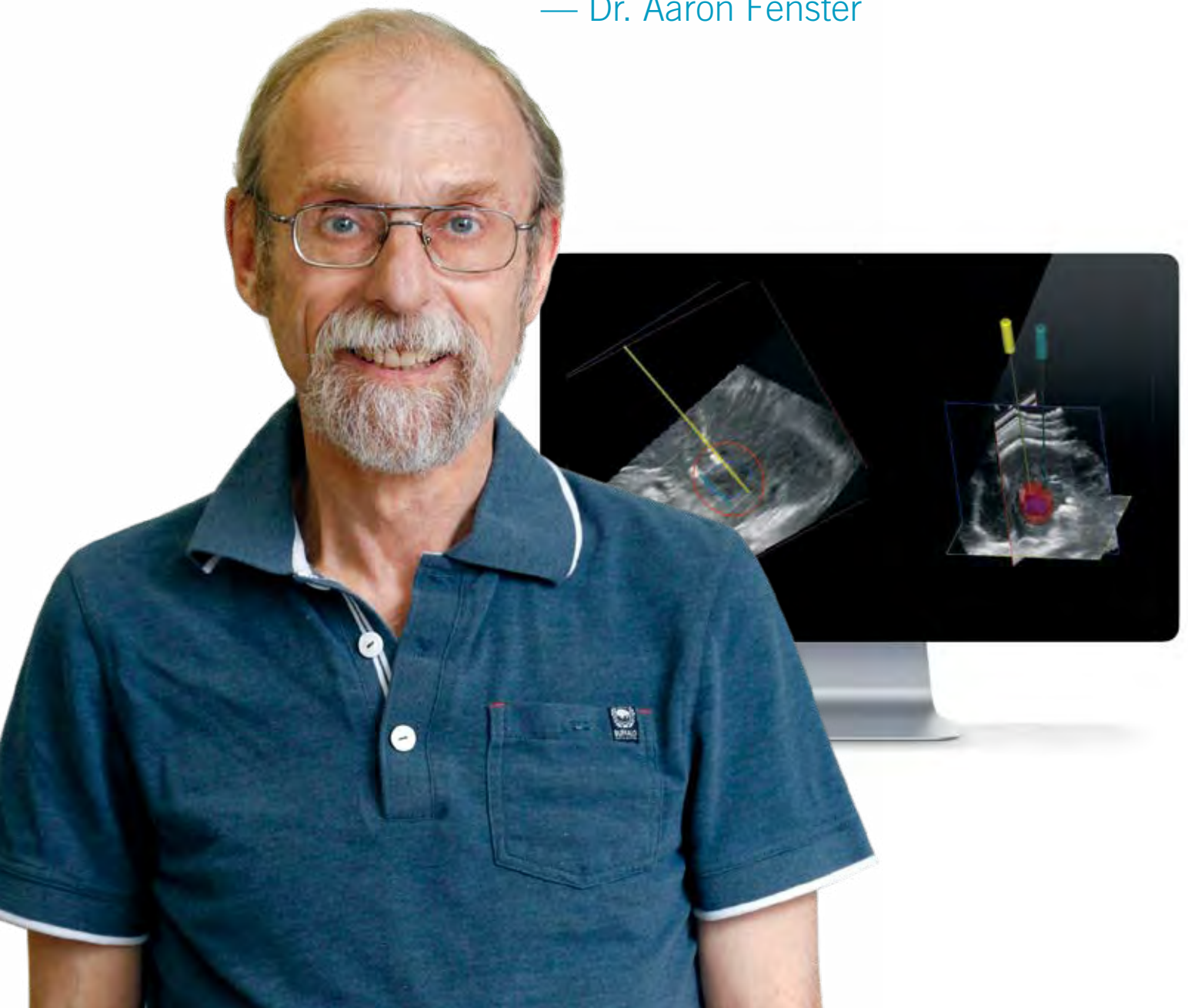
With the help of OICR funding, Fenster has formed critical collaborations across numerous disciplines, including physician groups who work in urology, radiology and pathology. "We develop technologies and software in the lab, but we have to translate them into clinical use. This has allowed us to develop partnerships with physicians in London and in Toronto at Princess Margaret Cancer Centre and Sunnybrook Health Sciences Centre."

"OICR takes a multi-disciplinary and multi-institutional approach to research. The research is transformative not only for this particular project, but for establishing collaborations," says Fenster. "It brought investigators across Ontario together by creating joint projects. It gave us the chance to work with people we never would have got to work with before."

Fenster believes that OICR has made it possible to integrate the imaging sector with a number of other groups within the Institute and Ontario's research community. The collaborative nature of the project will allow for these groups to have an input on the new technology and approach, making the process seamless and safe for patients throughout all stages of treatment. It will also lead to a more accurate and less invasive form of therapy for patients living with liver cancer.

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— Dr. Aaron Fenster



Personalized risk profiles for earlier treatment of esophageal cancer

Cancer of the esophagus is rare and very difficult to detect in its early stages and becomes more difficult to treat as it progresses. As a result, only 140 of the roughly 1,500 Canadians diagnosed with esophageal adenocarcinoma each year will survive beyond five years. Rates of esophageal cancer are rising rapidly and have increased by three to six times since the 1980s. There is a clear need to diagnose esophageal cancer earlier.

In response to the need for early diagnosis Dr. Lincoln Stein, Director of OICR's Informatics and Bio-computing Program, and a team of researchers at OICR are focusing on developing a better diagnostic tool to test for a major precursor to esophageal cancer called Barrett's Esophagus.

Barrett's Esophagus is a change in the lining of the esophagus caused by chronic heartburn, also known as acid-reflux disease. Those with this condition have a risk of developing esophageal cancer that is between 11 and 40 times higher than that of the general population. This is about the same magnitude of increase in the risk of lung cancer that comes with smoking.

Until recently the only way to diagnose Barrett's Esophagus was to use endoscopy, a procedure that requires sedation and carries the risk of complications. Endoscopy is also expensive, costing the healthcare system hundreds of dollars per procedure. "Forty-thousand Canadians with known Barrett's Esophagus undergo periodic endoscopic surveillance for cancer, but because of the rarity of this cancer even in those at elevated risk, only 80 cases will be caught and 70 deaths averted each year," said Stein.

Fortunately there is now a new, painless test in development for Barrett's Esophagus that could be administered at a family doctor's office. Patients swallow a sponge attached to a string in a gelatin capsule, which then dissolves in the stomach. The string is pulled back through the mouth, allowing the sponge to collect cell samples as it passes back through the esophagus.

The sample is then analyzed using cytology at a fraction of the cost. This tool can identify half of those with Barrett's Esophagus.

Stein and his team are seeking to improve this advancement even further by adding a genetic component to the sample analysis. "We know that patients with Barrett's Esophagus are at a greater risk of developing cancer of the esophagus, but what has been hard to do so far is determine the individual risk of each patient," explains Stein.

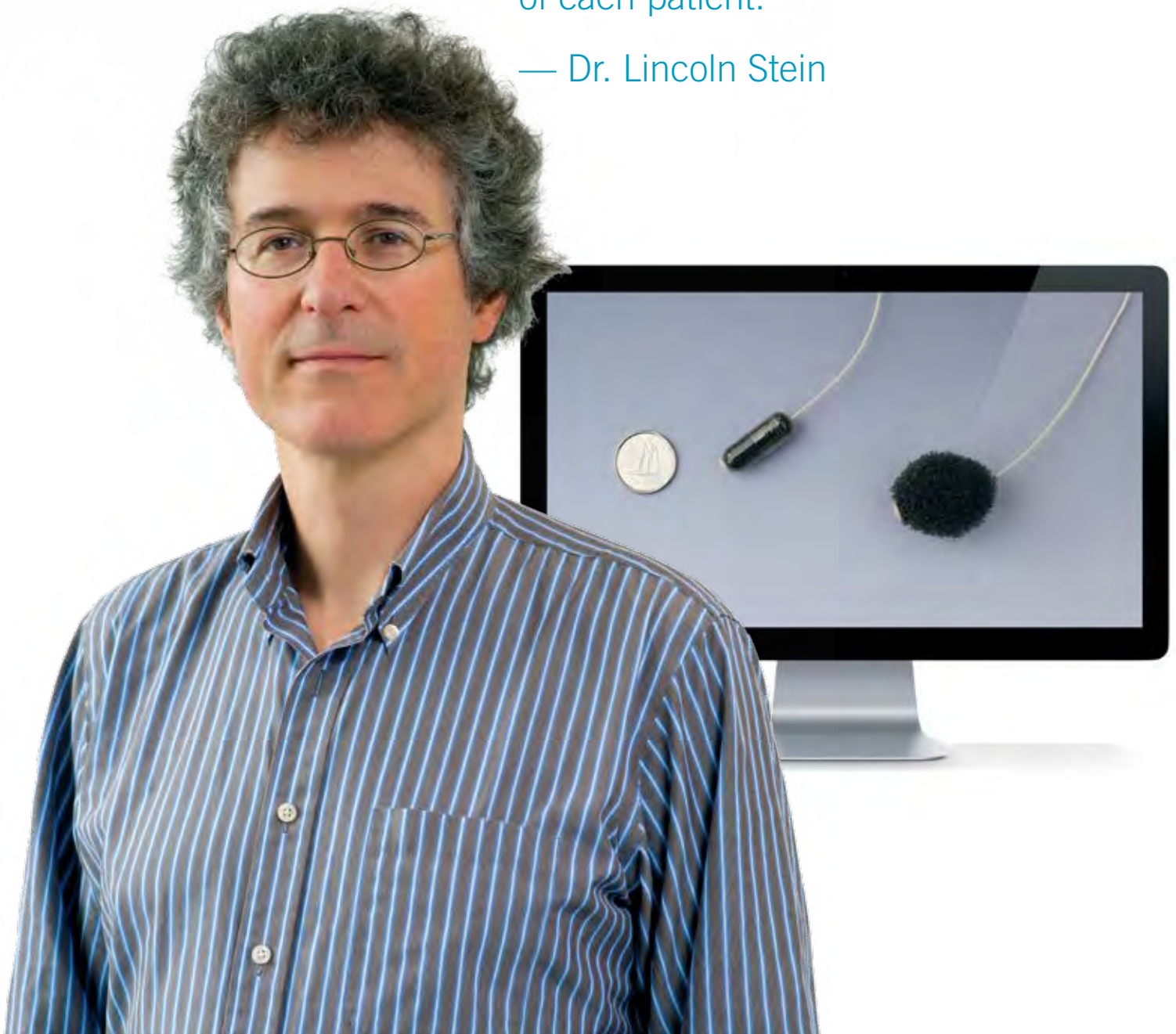
To stratify the risk patients face, Stein and his team are developing genetic signatures that will provide a personalized risk profile for each patient. "We want to be able to predict if a patient with Barrett's Esophagus will develop cancer in one year, five years, or never, for example," says Stein. "Adding the genetic component will increase the cost of the test, but this will be far outweighed by the benefits realized from treating these cancers earlier and more effectively."

More importantly, Stein says that adding this genetic component to the test could save many more lives. "If 325,000 patients were identified as having Barrett's Esophagus, we will be able to identify about 870 of them as progressing to cancer and potentially save many of those lives." Although an initial projection, this model estimates that the inclusion of the genetic component would save the Canadian healthcare system many millions of dollars each year.

Genome Canada is providing \$1.6 million in funding for the project and OICR has provided \$1.05 million. "It is great that other organizations have also recognized the impact that this research could have on patients and the healthcare system," says Stein. "Now that our funding is in place we are ready to move forward and work on bringing this technology to the clinic."

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— Dr. Lincoln Stein



HALTing leukemia

On February 1, 1961, Drs. James Till and Ernest McCulloch, who were conducting research at the Ontario Cancer Institute, now a part of the Princess Margaret Cancer Centre, published a study identifying cells that were able to renew indefinitely for a variety of uses. They had proved the existence of stem cells. Today, more than 50 years later, researchers know far more about stem cells than ever before, yet many aspects remain a mystery.

The current treatment for leukemia is chemotherapy, which can be successful in many cases and lead to remission in patients. However, leukemic stem cells (LSCs) remain unaffected, surviving and hiding in the body, and can cause the cancer to return at any time. Researchers have made it their goal to locate and eradicate LSCs, helping to ensure that patients' cancers don't come back after treatment.

With funding from the Cancer Stem Cell Consortium (CSCC), which includes the Canadian Institutes of Health Research, Genome Canada and OICR, research institutions and pharmaceutical companies have teamed up to test an innovative new method to target LSCs with monoclonal antibodies and small molecule inhibitors that can be developed into drugs. The objective of the HALT project is to test drugs that target LSC against samples from large groups of leukemia patients, evaluate response using state-of-the-art leukemia xenograft models and develop diagnostic biomarkers that can be brought to clinical trials within the next few years.

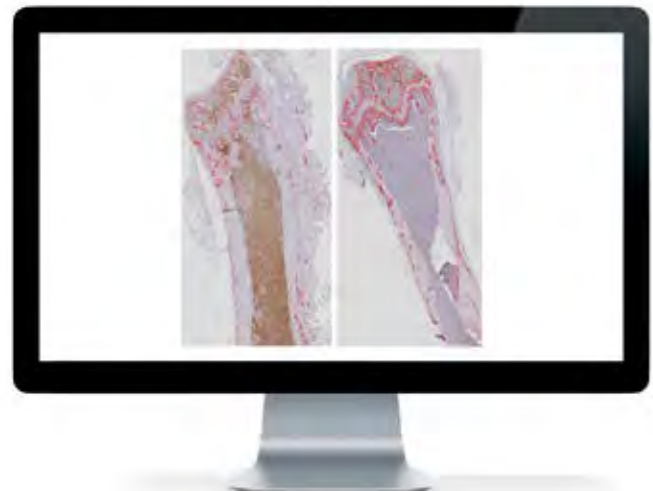
Dr. John Dick, Senior Scientist at the Princess Margaret Cancer Centre and Director of OICR's Cancer Stem Cell Program, and Dr. Dennis Carson of the University of California San Diego co-lead the HALT project. This international partnership, the first of its kind, is a partnership between CSCC and the California Institute for Regenerative Medicine.

The four-year HALT project began in March 2010 and has already made significant progress. "We have discovered three different drugs that successfully target the LSC," Dick says. "This would not have been possible without the help and integration of all of our partner organizations who make our fast-paced, milestone-driven research a model of academic and industry collaboration in drug discovery."

The partnerships within the pharmaceutical industry are what Dick believes is the reason why the research has

accelerated at such a fast pace. "We are working with a number of drug companies including Sanofi, Astra Zeneca and Roche in the pre-clinical development of small molecules and monoclonal antibodies that target specific inhibitors and receptors. The drugs we are testing are now in Phase I clinical trials for other indications but not in the context of LSC. With our efficacy data and biomarker results, our pharmaceutical partners are excited to bring these drugs to leukemia trials."

The identification and analysis of biomarkers has taken place at OICR and The Hospital for Sick Children in Toronto, the Genome Sciences Centre in Vancouver and by research teams at the Princess Margaret Cancer Centre, the BC Cancer Agency, University of California, San Diego and UCLA. Dick believes it would not have been a success without the seamless integration of all involved. "A project of this magnitude requires the cooperation and contributions of numerous partners," says Dick. "Collaboration has been by far the most important aspect."



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— Dr. John Dick



Tracking a cancer drug to better predict patients' response to therapy

It has been proven through DNA sequencing that every cancer has a different genetic makeup. This means that a specific treatment might not work for each patient, even patients with the same cancer. Researchers have begun developing personalized medicine and treatment plans in an effort to address this.

In breast cancer, for example, 25 per cent of patients have an increased amount of HER2 in their cancer, a protein that makes cancer cells grow faster. Trastuzumab (trade name Herceptin®) is a personalized medicine given to patients with HER2 positive breast cancer, which slows cell growth and prolongs life. However, clinicians still cannot easily predict which patients will respond to the costly drug before prescribing it.

With funding from OICR, Dr. Raymond Reilly, Professor and Associate Dean of Research at the University of Toronto's Leslie Dan Faculty of Pharmacy, and two graduate students under his guidance, found a new way of using imaging with radiolabeled pertuzumab (trade name Perjeta®) to detect the effects of Herceptin on breast cancer tumours. Radiolabeled drugs are visible using nuclear medicine imaging techniques, allowing doctors to track these drugs as they seek out and bind to tumours. "Pertuzumab similarly attaches to HER2, but to a different region than Herceptin," says Reilly. "We thought that if we could make pertuzumab into an imaging agent we could use it to see the effects of Herceptin on HER2 and the tumour." The study using an animal model proved it is possible to do so and a pharmaceutical-quality version of the radiolabeled pertuzumab was produced to test its safety and effectiveness in humans.

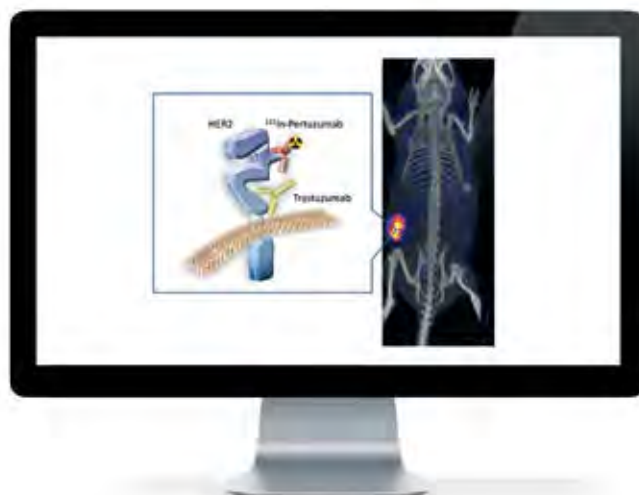
Reilly is now collaborating with Dr. Mark Levine, Professor and Chair of the Department of Oncology at McMaster University and Director of the Ontario Clinical Oncology Group (OCOG). Levine will lead a clinical trial of radiolabeled pertuzumab to test whether the imaging technology can predict whether Herceptin will work in patients. The three-year clinical trial will be coordinated by OCOG at McMaster University and both Levine and Reilly will be principal investigators.

OICR's Smarter Imaging Program funded the initial study and now the High Impact Clinical Trials Program will fund the upcoming clinical trial. "OICR has been involved at all three stages of research: discovery, translational bridge and clinical trial," says Reilly. "This illustrates how a basic discovery can be advanced to early clinical trials in cancer patients with OICR's support."

The opportunity to move the study into clinical trials has led to collaborations with multiple cancer centres in Ontario. "Although we're at an early planning stage, I suspect that we'll be able to interact much more with these clinical centres going forward," Reilly says. "It helps us appreciate the kinds of imaging tools that medical oncologists need to be most effective in treating patients."

The clinical trial will see a number of groups in Ontario's medical community come together to form a multi-disciplinary team. "The trial will require different types of expertise, bringing together oncologists, medical physicists, molecular pathologists, nuclear medicine physicians, biostatisticians and radiopharmacists," says Reilly.

Reilly and Levine will also be collaborating with pharmaceutical giant Roche. "The research made possible by OICR has attracted interest from pharmaceutical companies like Roche, who are excited by the innovation of the clinical trial," says Levine. "OICR has provided the unique opportunity for basic scientists, clinicians and industry partners to work together. This will help us to bring new imaging technologies to the clinic and accelerate future research."



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— Dr. Raymond Reilly



Left:
Dr. Raymond Reilly
Right:
Dr. Mark Levine

Nanoparticles locate and treat prostate tumours with added precision

Technologies such as PET and MRI scanners have become important tools for clinicians to diagnose and guide the treatment of cancer. A group of researchers, led by Dr. Gang Zheng, is working to make these imaging tools even more precise by developing nanoparticles called metalloporphysomes that can be used to both locate and treat tumours. Zheng and his team are currently focused on the use of these nanoparticles in prostate cancer, the most common cancer in Canadian men and a type of cancer where improved local treatment of early disease is urgently needed.

The metalloporphysomes are based upon the porphysome nanoparticle previously developed by Zheng. Porphysomes are completely organic and are multimodal, meaning that they can be used for many different purposes. Porphysomes also have the ability to absorb light, allowing them to be used in a therapy called focal laser ablation. This therapy uses heat from a laser beam to break down cancerous tissue. Localized treatment of prostate cancer with this method can be attractive to patients and clinicians because it is directed specifically against the tumour area and much less invasive than surgery. Zheng has added imaging capabilities to the porphysome nanoparticle by introducing the metals copper and manganese to its structure, which will allow the laser beam to be more accurately focused, meaning only tumour tissue is destroyed and the surrounding healthy tissue is spared.

“We use copper-64 as a PET imaging agent because it lets us accurately track the nanoparticles within the patient to detect tumour recurrence and see if a patient has an aggressive sub-type of cancer,” explains Zheng. Using a process called chelation, Zheng inserted copper-64 directly into the porphysome nanoparticle giving it an advantage over other radiolabels that can become detached. “What you see is what you get,” says Zheng. His research is the first to show that a functional nanoparticle can be directly radiolabelled to enable the quantitative *in vivo* tracking of its fate.

The manganese, on the other hand, increases the sensitivity of the MRI scan. “This allows us to see the edges of the tumour more clearly, which will allow for

better, more aggressive treatment with fewer side effects for the patient,” says Zheng. “When combined with the copper-64 it provides us with simultaneous functional and anatomical imaging of prostate cancer – something that hasn’t been done before.” This means that clinicians can not only see where the tumour lies in the prostate, but also how it is responding to treatment.

In animal models, the metalloporphysome has been used to detect prostate tumours as small as 2 mm and bone metastasis only 1.7 mm in size. Zheng thinks that porphysomes are ready to begin the process of moving from the lab to the clinic. “The strength of these nanoparticles lies in their simplicity, utility and that they are non-toxic,” he explains. “If we can provide patients and clinicians with an all-in-one imaging agent it will improve clinical decision-making and treatment, leading to better outcomes for patients with prostate cancer.”



If we can provide patients and clinicians with an all-in-one imaging agent it will improve clinical decision-making and treatment, leading to better outcomes for patients with prostate cancer.

— Dr. Gang Zheng



Creating highly skilled biostatisticians needed for today's cancer research

Technological advances in cancer research have resulted in the generation of increasingly large quantities of high-dimensional data. This has led to more demand for highly skilled biostatisticians with the interdisciplinary research experience needed to best apply quantitative methods to cancer research. However, the demand for biostatisticians with these skills is greater than the supply.

To address this need, OICR's High Impact Clinical Trials (HICT) Program and the University of Waterloo's (UW) biostatistics and statistics programs embarked on a collaborative effort in 2010 to increase the capacity and capability of biostatisticians working in cancer organizations across Ontario. The result is the Oncology Research and Methods Training Program (ORMTP) – an internship program that promotes collaborative, interdisciplinary training and research between the biostatistics and cancer research communities. Through these internships ORMTP allows biostatistics students to explore careers in cancer research.

The program aims to create a cohort of biostatisticians with the skills to work with the increasingly high volume and density of tumour and genetic biomarker data. Each May, ORMTP places five graduate students from UW's biostatistics and statistics programs in eight-month internships at cancer research centres throughout Ontario. The HICT Program provides ORMTP with funding and management support. To date the program has trained 13 interns (11 M.Sc. and two PhD students), with seven students employed following completion of the program.

"This program has become a significant draw for students in the biostatistics program at the University of Waterloo," says Dr. Richard Cook, Professor of Statistics and Canada Research Chair and Director of ORMTP. "Students compete fiercely for the exciting internship positions this unique program offers."

The internship provides a rare and valuable opportunity for students to work on teams made up of established biostatisticians and cancer researchers. "One of the aims of this internship program is to nurture collaborations between biostatisticians and cancer researchers to advance the understanding of disease

courses, risk factors and the effect on interventions in high priority cancers," says Cook. Other aims of the program are to increase the relevance and rigour of the training biostatistics graduate students receive so they can quickly work effectively in cancer research. This work includes the development of novel statistical methods for the analysis and design of observational and experimental cancer studies.

Students in the program gain pivotal first-hand experience applying statistical and computational skills learned in the classroom to real-life situations. "Real data are very different from data seen in academic settings," says Dr. Paul Boutros, Principal Investigator in OICR's Informatics and Bio-computing Program, who has mentored four students in the program. "There are problems that simply do not arise in the context of a classroom."

Many of the students who complete the program stay in the field of cancer research. Jenna Sykes completed an ORMTP internship in the department of biostatistics at the Princess Margaret Cancer Centre. She was then offered a full-time position there as a biostatistician – a position she still holds. "One of the benefits of the internship was being able to work directly with clinicians," says Sykes. "By learning to translate biostatistics jargon into more understandable terms, I developed confidence working with them and transitioned easily into my full-time role."

Cook is confident that the program's graduates are already making an impact and says that they "are especially valuable in cancer research centres because they possess both the highly technical and computational skills that are currently in such high demand. They also bring a broader set of skills than typically held by new graduates."

One of the aims of this internship program is to nurture collaborations between biostatisticians and cancer researchers to advance the understanding of disease courses, risk factors and the effect on interventions in high priority cancers.

— Dr. Richard Cook



Classifying colorectal cancer to predict prognosis and response to treatment

Two patients with the same stage of colorectal cancer could have very different prognoses and responses to treatment, and research suggests that this could be attributed to the presence of various so-called ‘subtypes’ of the cancer. In 2009, Pfizer Worldwide Research and Development initiated a partnership called POP-CURE (Princess Margaret Cancer Centre-OICR-Pfizer-CURE) with researchers at both OICR and the Princess Margaret Cancer Centre, to discover and validate new biomarkers and targets to address this problem.

These biomarkers could potentially be used to classify colorectal cancer by subtype at the molecular level and eventually equip physicians with valuable personalized medicine tools to predict a patient’s individual prognosis and response to treatment. The three-year collaboration ended in 2012 and has left a legacy of new data and materials that will drive ongoing research at the institutes involved.

“The program has mainly focused on building a resource in colorectal cancer that captures the known heterogeneity in the disease at the genetic level,” says Dr. Brad Wouters, a Senior Investigator in OICR’s Innovation in Target Validation Program, Senior Scientist at the Princess Margaret Cancer Centre and a Principal Investigator for POP-CURE. The program serves as a model for successful collaboration with industry. “A program of this size demonstrates to other researchers what can be done when you collaborate at a high level,” says Wouters. He explains that much of their success can be attributed to the fact that Princess Margaret Cancer Centre and OICR researchers were given input into the initial framework for building the program.

Scientists working within POP-CURE generated a large series of patient-derived xenograft models by transplanting a patient’s tumour into a mouse. If the tumour’s growth was successful, part of it was transplanted and grown in secondary mice and eventually stored in a biobank that allows future work with the model, including the clinical testing of new drugs. In addition, the genetic changes in each of the tumours were assessed using next-generation sequencing at OICR. Since the tissue came directly from the patient, the models are more reflective of what you would see in humans and this makes them unique compared to the traditionally used mouse tumour models. “We have demonstrated that these

models can be used as potential ways to test therapeutic and personalized medicine strategies before taking them into very expensive clinical trials with patients,” says Wouters. “The cancer research community as a whole benefits from this collaboration because not only did we learn more about colorectal cancer but what we’ve done here is get a lot closer to the clinic in terms of the type of preclinical experiments we can do.”

Many of the patients’ tumours underwent genomic characterization and a new portal called BioMart was created at OICR where genomic data could be retrieved and analyzed. A large number of patients’ samples were also selected to create a tissue microarray that enables testing of the value of newly identified targets and biomarkers. “We now have a set of models that reflect the genomic heterogeneity present in patients and the potential to use those models to test personalized medicine approaches in cancer and colorectal cancer in particular,” says Wouters.

Wouters explains that researchers at Princess Margaret Cancer Centre and OICR will continue to work together to move the program forward, and they are interested in participating in additional academic opportunities and collaboration with industry. “This is a huge opportunity for other industry collaborators,” says Wouters. “There is an opportunity for pharma companies to investigate therapeutic strategies in a very defined, genetically characterized manner and we also have the opportunity to move rapidly to validate discoveries and move them into the clinic with the tissue microarray we have generated.”

Ontario’s Ministry of Research and Innovation also supported the POP-CURE project through its Biopharmaceutical Investment Program.

A program of this size demonstrates to other researchers what can be done when you collaborate at a high level.

— Dr. Brad Wouters



Kinase inhibitor library

OICR's Drug Discovery Program started building a library in 2009 that is shared with research collaborators across the province – a library without journals, periodicals or even books. However, its contents could bring researchers closer to discovering new drugs that have therapeutic value for treating cancer.

This particular library is a collection of compounds called kinase inhibitors, which are stored in OICR's Drug Discovery laboratory. Kinases are proteins that are frequently overactivated in cancer. Kinase inhibitors are designed to prevent this over activation and therefore are useful in treating certain types of cancer. High-throughput screening of these inhibitors could help researchers find existing drugs that can be used to treat cancer or give them a starting point to generate a new drug.

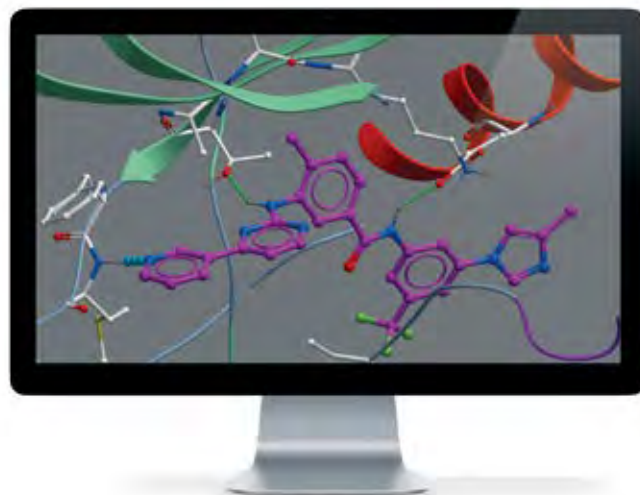
"There are various kinase inhibitors on the market that are used to treat specific cancers," says Dr. Michael Prakesch, Laboratory Manager of OICR's Drug Discovery Program, who leads the coordination and maintenance of the library. The goal of this library is to assemble a diverse group of inhibitors that can target and inhibit a wide variety of kinases involved in cancer. Another goal is to increase the number of inhibitors in the collection that are in clinical or pre-clinical phase.

Today, the library is a collection of more than 500 inhibitors with more than 100 kinases as their primary target. The library has been widely screened by 30 collaborators, who are mostly conducting cancer-related research at academic institutions across Ontario. "Our library is unique because of the breadth of kinases covered, the emphasis on clinical compounds and drug-like scaffolds, and the inclusion of redundant compounds with different chemotypes that inhibit certain kinases of interest," Prakesch explains.

Each compound in the collection was purchased from a panel of more than 25 different vendors or resynthesized in the Drug Discovery laboratory if not commercially available. "Most of the kinase inhibitors are in clinical trials and a few are approved drugs," says Prakesch. New compounds are added to the library only if they meet at least one of three specific criteria: They must be either new clinical compounds, have distinct chemotypes that inhibit a variety of known kinases or must target novel kinases not yet represented in the existing library. He explains that the library is an ongoing project that allows for many different research collaborations.

"There are great benefits to these types of collaborations with researchers," says Prakesch. "When compounds are given to collaborators for screening, they can subsequently share the data they obtained from their screens with OICR and we are then able to compile more information about these compounds and also determine which might not be interesting to pursue." In essence, the more screening that is completed with these compounds, the more that is known about them. "As a not-for-profit institute we are also helping researchers to move forward with the results of their research obtained after screening the library," he says.

The project is ongoing, with new and interesting compounds and data generated frequently. Looking forward, Prakesch hopes to build a complete database on everything published using the OICR kinase inhibitor library and organize the information in a format that would make data mining easier. "Such a database is basically not available and would be an extremely useful resource," he says. "We all need to collaborate and put our heads together if we are to advance cancer research."



When compounds are given to collaborators for screening, they can subsequently share the data they obtained from their screens with OICR.

— Dr. Michael Prakesch



Leadership in collaborative research

The dissemination of knowledge has been identified by the International Monetary Fund as one of the basic aspects of globalization and the globalization of scientific research means that scientists now work in a world without boundaries. The benefits of collaborative research include higher quality, greater scientific impact and efficiency. The issues in cancer research are global and the solutions increasingly come from large teams collaborating on a national and international basis.

The Ontario Institute for Cancer Research (OICR) has been instrumental in the creation of national and international collaborations on the conduct of clinical trials, cancer stem cells, the cancer genome and the responsible sharing of genomic and clinical data.

Through a competitive process, the Canadian Partnership Against Cancer selected OICR which is collaborating with the NCIC Clinical Trials Group and N2 (Network of Networks) to develop the coordinating centre for the Canadian Cancer Clinical Trials Network (CCCTN).

The centre will be led by Dr. Janet Dancey, Director of OICR's High Impact Clinical Trials Program, as the Scientific Director.

The CCCTN will improve the efficiency and quality of clinical trials by providing coordination and support for a network of clinical trial teams at cancer treatment centres and hospitals across Canada. The support will include ethics, regulatory, biospecimen collection and analyses, and knowledge transfer. The result will be an increase in the capacity of Canadian cancer centres to effectively



Left: Peter Goodhand, Acting Executive Director, global alliance and Executive Lead, International Partnerships, OICR
Right: Tom Hudson, President and Scientific Director, OICR

conduct cancer clinical trials sponsored by academic institutions or cooperative clinical trials groups that will address questions of greatest importance to Canadians and the Canadian healthcare system.

OICR, in collaboration with Genome Canada, the Canadian Institutes of Health Research, the Canada Foundation for Innovation and the Stem Cell Network, founded the Cancer Stem Cell Consortium (CSCC). The CSCC is focusing on identifying cancer stem cell biomarkers and molecular targets of therapeutic importance. This will lead to the discovery of new agents to target cancer stem cells (CSCs). CSCs are cells in a cancer tumour that display characteristics of stem cells. They are not affected by chemotherapy and start development of new tumours after treatment. The CSCC formed a partnership with the California Institute for Regenerative Medicine.

Two Ontario-led teams received funding in a competition held by the partnership.

1. Dr. John Dick, Senior Scientist at the Princess Margaret Cancer Centre and Director of OICR's Cancer Stem Cell Program, who proved the existence of cancer stem cells, received funds for a project to develop novel drugs to treat leukemia that target leukemic stem cells. He is collaborating with Dr. Dennis Carson of the University of California, San Diego.
2. Dr. Tak Mak, Director of both the Advanced Medical Discovery Institute and The Campbell Family Institute for Breast Cancer Research, and Senior Scientist at the Princess Margaret Cancer Centre, who discovered T-cell receptors, received funds to use a pipeline strategy to develop novel drugs targeting CSCs in solid tumour cancers. He is collaborating with Dr. Dennis Slamon of UCLA.

The International Cancer Genome Consortium (ICGC) was created to launch and coordinate a large number of research projects with the goal of unraveling the genomic changes present in many forms of cancer. The knowledge generated by the ICGC will lead to personalized cancer treatments. OICR hosts the Secretariat and Dr. Tom Hudson, OICR's President and Scientific Director, chairs both its Executive Committee and its International Scientific Steering Committee. The data produced by the ICGC project teams are housed on the ICGC website at www.icgc.org and the Data Coordination Centre is based

at OICR. Almost 8,000 cancer genomes are currently in the ICGC database and are made rapidly available to qualified investigators around the world. As of June 2013, there are commitments from funding organizations in Asia, Australia, Europe, North America and South America for 55 project teams in 15 jurisdictions to study more than 25,000 tumour genomes. OICR has two projects, one on pancreatic cancer and one being conducted on prostate cancer in partnership with Prostate Cancer Canada.

The decoding of the human genome and the rapid advances made in genomic technology, has resulted in the large-scale collection of data on genome sequencing and clinical outcomes. This information is extremely valuable in the creation of personalized medicine. Funders, disease/patient advocates and healthcare leaders from eight countries met to discuss the challenges and opportunities this presents and determined that what was needed was a common framework of international standards for the sharing of this data in an effective, responsible and interpretable manner. The Global Alliance to Enable Responsible Sharing of Genomic and Clinical Data was created which now has more than 90 participants worldwide.

Dr. Tom Hudson is a member of the transitional steering committee and Mr. Peter Goodhand, OICR's Executive Lead, International Partnerships, is the Acting Executive Director of the alliance.



Left: Jaypee Banlawi, Administrative Coordinator, ICGC Secretariat
Right: Jennifer Jennings, Senior Project Manager, ICGC Secretariat

The next generation:

Nardin Samuel

Pharmaceutical products have always been a major part of Nardin Samuel's life. Growing up in Toronto she spent most days working in her family's pharmacy, learning about drugs and how they can help treat everything from a common cold to a serious illness. But today, she has set her sights even higher. After spending a large part of 2012 working in the lab of Dr. Tom Hudson at OICR, she is now in the combined MD/PhD program at the University of Toronto, one of just a handful of students accepted in the prestigious program each year.

Samuel did not always have plans to be a researcher or a doctor. For most of her life she planned to be a pharmacist and continue to work in her family's pharmacy. But in high school, after finishing a semester early, her biology teacher recommended she apply for a research competition for Ontario high school biology students. Samuel was intrigued and, looking to keep busy during her free semester before university, enrolled. It was a life changing experience. "They funded us, but they didn't tell us what the research project would be – we had to come up with that on our own," she says. After a great deal of research, the team focused on cell regeneration in Parkinson's disease, and found a supervisor at CAMH who graciously let the team work in the lab. "I spent four months doing research in a real lab, and at the end of it we got results we didn't expect. I found that very interesting and I was intrigued by the results." She's been doing research projects ever since.

In Dr. Hudson's lab at OICR she investigated copy number analysis in pancreatic cancer. Members of the lab were looking at genomic DNA from pancreatic tumour samples and trying to identify recurrent mutations to see if there are potential candidate genes or mutations that could be targeted in the design of new drugs. Samuel worked on the functional validation of these targets in pancreatic cancer cell lines.

"I'm thankful that I had the opportunity to work at OICR and participate in this type of research because I'm not sure what field I would have been working in

otherwise," said Samuel. "I am glad that I met with the right people here and I started the type of research that I did, because I'm really happy every day and I love what I do."

Samuel sees her work at OICR as a starting point for the rest of her schooling, and ultimately, her career. "I am going to extend the knowledge that I gained during this time studying the role of genomics in cancer and extend it to a broad project that focuses on other tumour types, not just pancreatic cancer, and also tumour types that occur in patients who have a known susceptibility to the development of cancer," she says. "I'm especially interested in looking at certain mutations that we know will make individuals more susceptible than the general population to develop a particular form of cancer."

Samuel would like to continue to work in Toronto, but recognizes she may need to travel elsewhere to gain some experience. "I think it is important to diversify yourself, so I see myself potentially doing a fellowship or working abroad, whether that is in the U.S. or Asia, and ultimately hopefully coming back and starting a research program here. I've always been in Toronto. I am very fortunate to be here. It is great because there are so many people concentrated in one area with so much expertise and talent and it creates so much opportunity for collaboration. I can't imagine a better place to work."

I'm especially interested in looking at certain mutations that we know will make individuals more susceptible than the general population to develop a particular form of cancer.

— Nardin Samuel



The next generation:

Dr. Paul C. Park

It is estimated that 26,500 Canadian men will be diagnosed with prostate cancer this year. Yet the decision on how to treat an individual patient's prostate cancer is still not always an easy one. Some prostate cancers will evolve into an aggressive form and spread, while others will cause few or no medical issues. The problem for doctors and pathologists lies in determining which cases require radical treatment such as surgery and which can be safely monitored using a strategy called 'active surveillance'.

Dr. Paul C. Park is looking for a solution to this challenge. Park, who is based at Queen's University in Kingston, is the first Pathology Research Scholar of the Ontario Institute for Cancer Research's Transformative Pathology Program, a new initiative of the Institute that is generating novel molecular diagnostic approaches for cancer. Park is working to develop a molecular tool that will allow pathologists to determine the aggressiveness of prostate cancers that are ranked as a grade 7 on the Gleason scale – a standardized measure used by pathologists to grade the aggressiveness of a patient's prostate cancer.

As Park explains, it is when a patient has a Gleason score of 7 (10 is the highest possible score, with the worst prognosis) that the choice between treating or monitoring his prostate cancer is difficult. "These mid-grade cancers represent a grey area in clinical decision-making. Only about 30 per cent of these cancers will metastasize, but we currently don't have a reliable method of identifying these cases," says Park. This uncertainty can lead to over-treatment of prostate cancer, which can be expensive and reduces quality of life. With a better understanding of each tumour's aggressiveness, much of this over-treatment could be avoided.

Park is hoping to solve this problem by improving the understanding of a molecular process called epithelial-mesenchymal transition (EMT) that is a suspected precursor to the spread of prostate cancer. "If we know how EMT works on a molecular level in prostate cancer then we can use this knowledge as a basis for molecular profiling to determine which cases will be aggressive,"

says Park. "If we had this capability we would be able to treat only those cases that required intervention and closely monitor the rest, sparing patients the negative side effects of treatments and surgeries."

Park became familiar with this clinical challenge through his training and prior research activities. After completing his PhD in physiology at the University of Toronto, Park undertook postdoctoral training at the Princess Margaret Cancer Centre under Dr. Jeremy Squire, a leading researcher of prostate cancer. After this, Park pursued his medical degree, also at the University of Toronto, followed by training in anatomical pathology in Ottawa.

According to Park, becoming an OICR Pathology Research Scholar represented a "golden opportunity" to perform his research. "This is the best position of its kind in Canada and gives me the chance to work with OICR's researchers and partners to undertake research that is clinically meaningful," says Park.

Park is confident that the challenge of characterizing prostate cancer will be met and thinks that the Transformative Pathology Program at OICR is poised to play a central role. "This research group represents the ideal setting to bring all of the research together into a grander scale and context." Park hopes that findings can be put into clinical use sooner through better coordination and sharing of information throughout Canada's network of prostate cancer researchers.

This research group represents the ideal setting to bring all of the research together into a grander scale and context.

— Dr. Paul C. Park

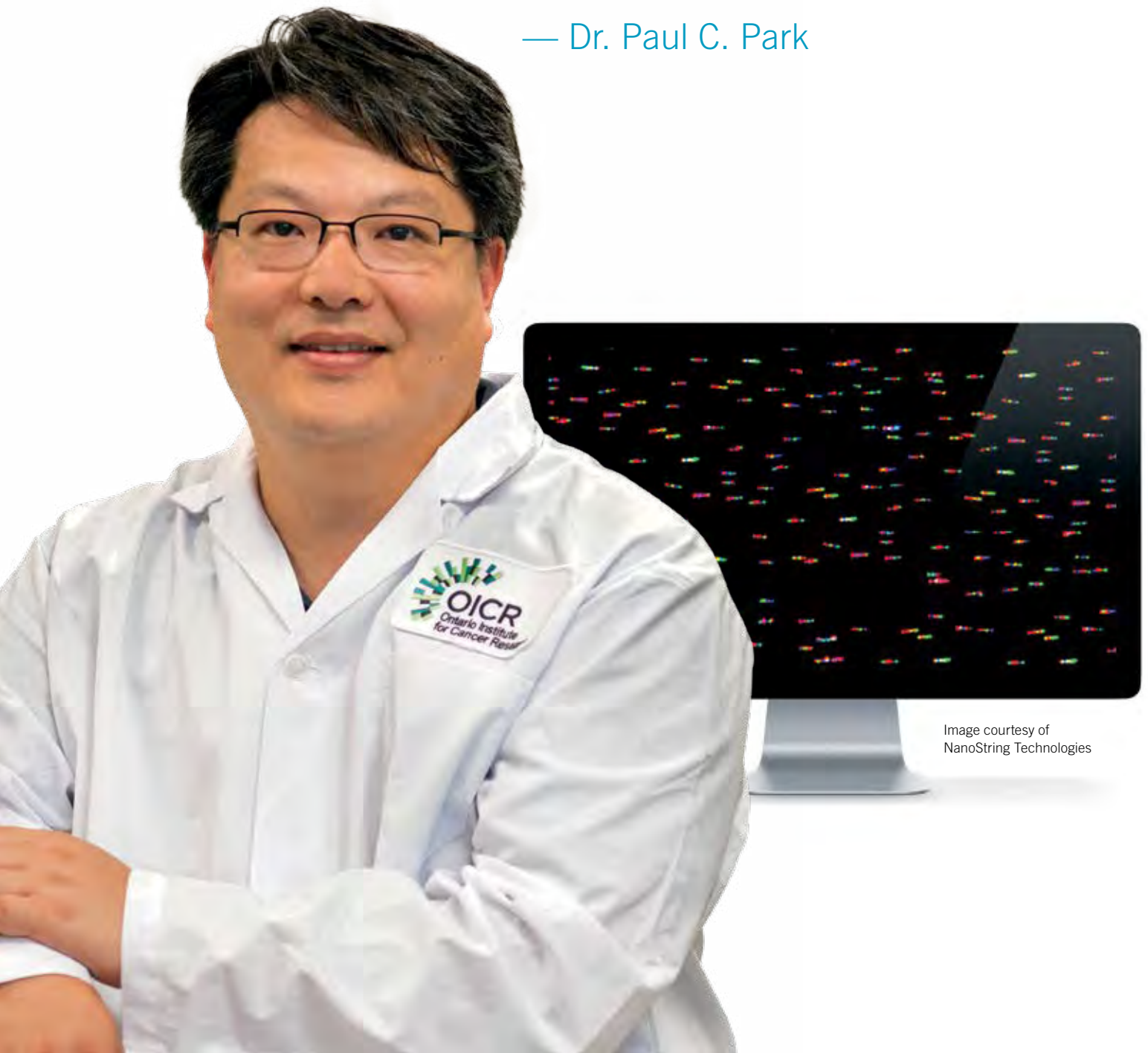


Image courtesy of
NanoString Technologies

The next generation:

Stuart Watt

For Stuart Watt, knowing how people understand the world and process information is the key to solving many problems across a variety of disciplines. Watt, a Senior Software Developer in OICR's Informatics and Bio-computing Program, is responsible for the coding of software for the Program's many projects.

Although his first degree was in computing, Watt has always enjoyed hands-on interdisciplinary research and has worked in both academia and industry. His interests in psychology led him to complete a PhD in Cognitive Science, before moving to Canada from the U.K. to work in industry. Motivated by the cancer diagnosis of his then partner, Watt began to think about the decision-making processes and the large-scale data involved in the medical and biotechnology fields. This prompted his move to OICR.

"It was clear that there was a strong cluster of high-powered biotechnology research happening in Ontario," says Watt. "I was at a point where I wanted to learn newer skills and work with large-scale data. I was interested in tackling some challenging issues, such as the problems concerning data management and how to assist decision-making in the field." Watt believes OICR allows him to tackle these issues and advance his research in the process.

His work at OICR began with the Genomics Pathway Strategy (GPS) feasibility study. "We wanted to find out how we could work bioinformatics into cancer clinical trials and how we could offer personalized medicine as a service," says Watt. "We studied whether we could build a service where we would, upon an initial meeting between patient and clinician, take a biopsy of their tumour, sequence it, find variants and once confirmed to a clinical standard, build a report that could guide treatment." The challenge was completing the process in a three-week target.

Watt was responsible for developing the software and application that would house the report. "We initially started with small-scale projects like building a custom private spreadsheet that could be easily shared," Watt says.

"We then built on this premise by integrating a knowledge base, adding search tools to look for relevant publications and bringing all components together to make a complete clinical decision support application that could generate a report."

The project is a partnership with the University Health Network, a collaboration that Watt has enjoyed. "A lot of the work I've done in the past has been interdisciplinary. I've worked with a wide range of people from numerous disciplines and am interested in how people from different fields think. I wish more people could do collaborative work. It's been wonderful to see the Princess Margaret Cancer Centre build on GPS, trialing programs to translate our work into future health care for their patients."

Watt is currently collaborating on a number of other projects including CaPSID, a web application that helps reveal and identify viruses and bacteria in sequencing data from tumour samples, and contributing protein visualization displays to the new International Cancer Genome Consortium Data Portal.



I was interested in tackling some challenging issues, such as the problems concerning data management and how to assist decision-making in the field.

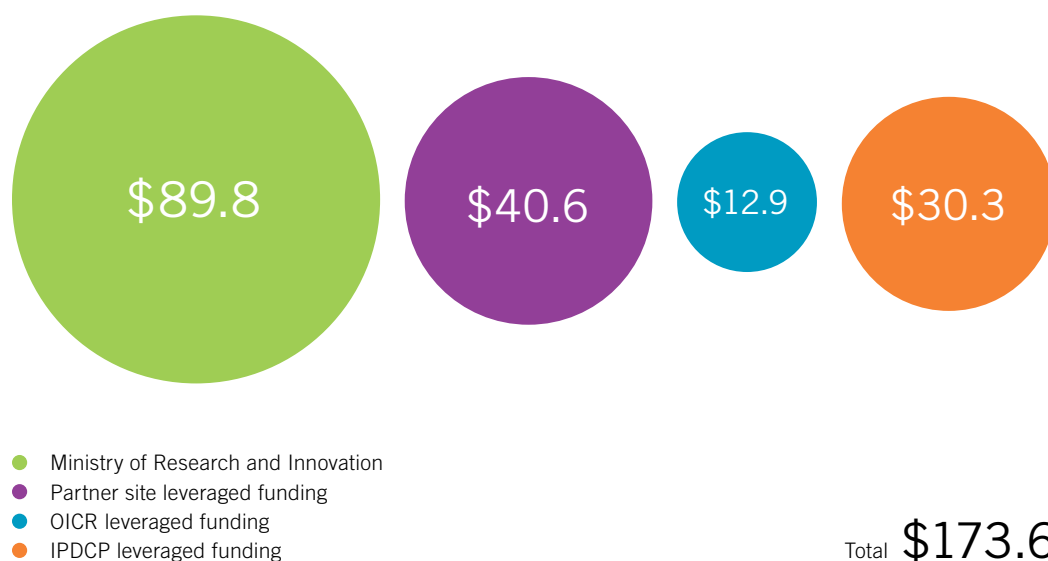
— Stuart Watt



Monitoring for Results

OICR's strategic programs and the projects supported by OICR result in scientific discoveries, commercial activity, communications and the creation of jobs for highly qualified personnel.

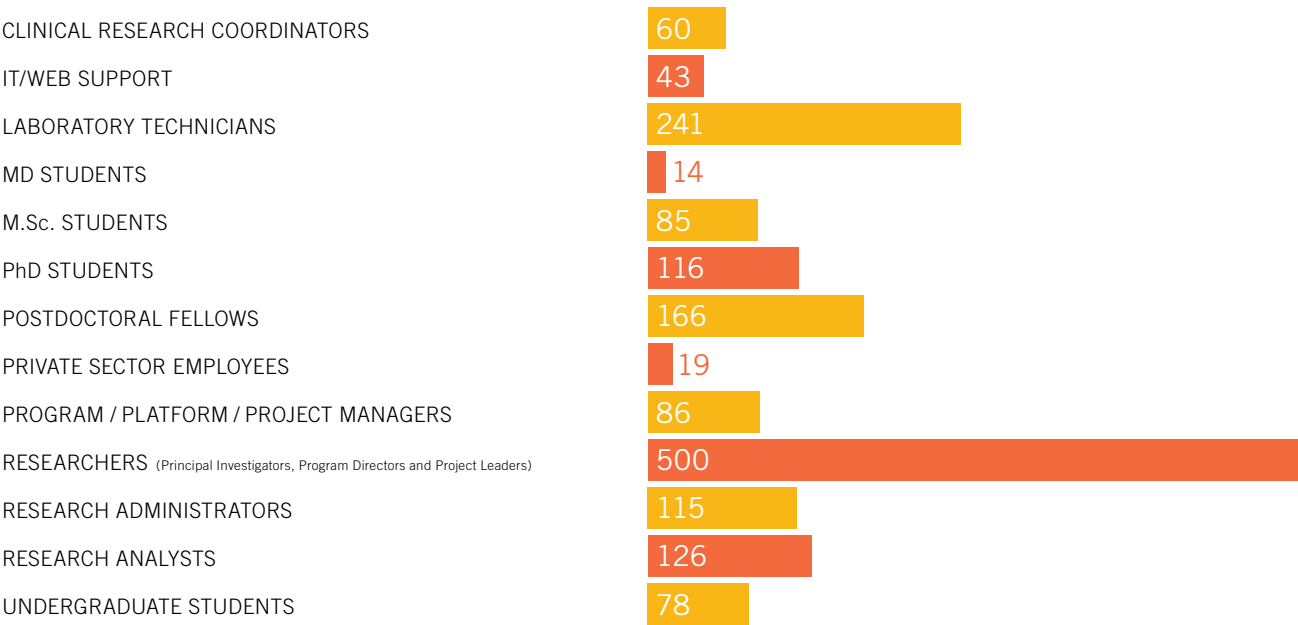
SOURCE OF OICR PROJECT FUNDS 2012-2013 IN MILLIONS OF DOLLARS



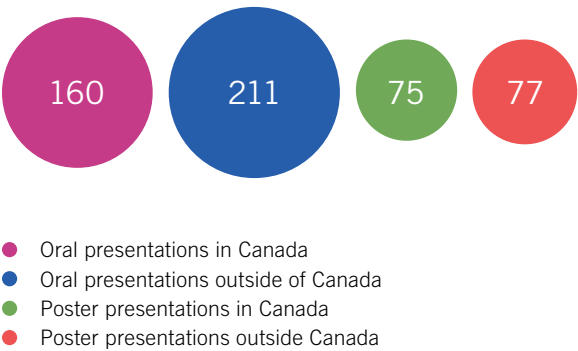
COMMERCIAL ACTIVITY

Commercial activity generated by funded projects	Cancer Research Fund	Cancer Research Program	Intellectual Property Development and Commercialization Program
DISCLOSURES (2012-2013)	0	13	2
PATENT APPLICATIONS (2012-2013)	8	18	3
PATENTS AWARDED (2012-2013)	0	0	2
LICENSES EXECUTED (2009-2013)	6	12	13
START-UP COMPANIES (2004-2013)	4	1	13

HIGHLY QUALIFIED PERSONNEL WORKING ON FUNDED PROJECTS 2012-2013



COMMUNICATIONS ARISING FROM FUNDED PROJECTS



PUBLICATIONS IN JOURNALS 2012-2013

Program	Journal impact factor range	Number in range
STRATEGIC PROGRAMS	0-10	349
	11-20	46
	21-30	8
	31-60	21
	NA**	107
GRANT SUPPORTED PROGRAMS	0-10	16
	11-20	1
	21-30	0
	31-60	0
	NA**	11

** NA = unrated journals

Financial Statements

Report of the Independent Auditor on the Summary Financial Statements

To the Members of the Ontario Institute for Cancer Research

The accompanying summary financial statements, which comprise the summary statements of financial position as at March 31, 2013, and 2012, and April 1, 2011 the summary statement of operations and changes in net assets and cash flows for the years ended March 31, 2013 and 2012, are derived from the audited financial statements of Ontario Institute for Cancer Research for the years ended March 31, 2013 and 2012. We expressed an unmodified audit opinion on those financial statements in our report dated June 24, 2013. Those financial statements, and the summary financial statements, do not reflect the effects of events that occurred subsequent to the date of our report on those financial statements.

The summary financial statements do not contain all the disclosures required by Canadian generally accepted accounting principles. Reading the summary financial statements, therefore, is not a substitute for reading the audited financial statements of Ontario Institute for Cancer Research.

Management's Responsibility for the Summary Financial Statements

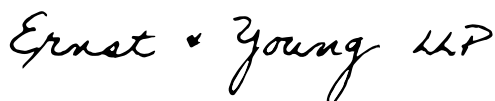
Management is responsible for the preparation of a summary of the audited financial statements in accordance with Canadian generally accepted accounting principles.

Auditor's Responsibility

Our responsibility is to express an opinion on the summary financial statements based on our procedures, which were conducted in accordance with Canadian Auditing Standard (CAS) 810, "Engagements to Report on Summary Financial Statements."

Opinion

In our opinion, the summary financial statements derived from the audited financial statements of Ontario Institute for Cancer Research for the years ended March 31, 2013 and 2012 are a fair summary of those financial statements, in accordance with Canadian generally accepted accounting principles.



Chartered Accountants
Licensed Public Accountants
June 24, 2013
Toronto, Canada

STATEMENTS OF FINANCIAL POSITION

Excerpt from the audited financial statements.

	March 31, 2013	March 31, 2012	April 1, 2011
ASSETS			
CURRENT			
Cash	\$ 24,472,226	\$ 13,012,946	\$ 16,466,759
Restricted cash and investments	4,850,219	4,275,000	4,275,000
Receivables	4,258,336	4,573,745	2,821,970
Supplies	834,500	729,745	359,906
Prepaid expenses	2,307,201	2,261,179	1,941,932
Current portion of deferred lease incentive	124,848	124,848	124,848
TOTAL CURRENT ASSETS	36,847,330	24,977,463	25,990,415
Long-term portion of prepaid expenses	706,968	770,855	1,268,223
Deferred lease incentive	197,678	322,526	447,374
Capital assets	24,399,183	26,062,459	27,289,697
Note receivable	446,602	484,496	478,667
	\$ 62,597,761	\$ 52,617,799	\$ 55,474,376
LIABILITIES, DEFERRED CONTRIBUTIONS AND NET ASSETS			
LIABILITIES			
CURRENT			
Accounts payable and accrued liabilities	\$ 9,231,656	\$ 10,700,101	\$ 11,345,169
Unearned rental revenue	–	4,255	127,691
Deferred gain	–	–	45,172
Term loan	460,000	500,000	500,000
TOTAL CURRENT LIABILITIES	9,691,656	11,204,356	12,018,032
TOTAL LIABILITIES	9,691,656	11,204,356	12,018,032
DEFERRED CONTRIBUTIONS	48,964,294	37,614,172	39,869,589
NET ASSETS	3,941,811	3,799,271	3,586,755
	\$ 62,597,761	\$ 52,617,799	\$ 55,474,376

STATEMENTS OF OPERATIONS AND CHANGES IN NET ASSETS

Excerpt from the audited financial statements.

Year ended March 31	Cancer Research Program	External Grants Programs	2013	2012
REVENUE				
Grant from Ministry of Research and Innovation	\$ 84,164,759	\$ –	\$ 84,164,759	\$ 86,444,628
Other grants	4,004,506	8,274,175	12,278,681	16,108,158
Rent	1,251,703	–	1,251,703	1,306,001
Gain on sale of leasehold improvements	–	–	–	45,172
Fees and workshop	224,468	–	224,468	316,300
Overhead recovery and other income	26,332	111,707	138,039	99,582
	\$ 89,671,768	\$ 8,385,882	\$ 98,057,650	\$ 104,319,841
EXPENSES				
Amortization	\$ 7,975,422	\$ 993,380	\$ 8,968,802	\$ 8,652,404
Audit fees	72,030	–	72,030	72,030
Contracted services	1,025,057	934,727	1,959,784	1,820,010
Grants, Personalized Medicine Research Fund	4,082,998	–	4,082,998	5,858,613
Grants, Tumour Bank Operations	682,617	–	682,617	712,672
Honoraria	275,793	5,144	280,937	209,976
Information system support	1,548,479	250,166	1,798,645	1,493,758
Insurance	130,703	–	130,703	94,810
Investigator and research support, external	30,906,391	1,137,293	32,043,684	36,450,343
Legal fees	474,317	188,957	663,274	421,084
Marketing and communications	249,038	31,534	280,572	329,849
Maintenance, office and general	2,559,228	112,162	2,671,390	3,159,388
Rent	5,584,500	–	5,584,500	5,289,889
Research operations, internal	7,014,776	1,914,023	8,928,799	12,717,384
Salaries, benefits and recruiting	25,801,444	2,697,948	28,499,392	25,716,543
Travel	816,830	112,389	929,219	955,608
Workshops and conferences	329,605	8,159	337,764	152,964
	\$ 89,529,228	\$ 8,385,882	\$ 97,915,110	\$ 104,107,325
Excess of revenue over expenses	142,540	–	142,540	212,516
Net assets, beginning of year	3,799,271	–	3,799,271	3,586,755
NET ASSETS, END OF YEAR	\$ 3,941,811	\$ –	\$ 3,941,811	\$ 3,799,271

STATEMENTS OF CASH FLOWS

Excerpt from the audited financial statements.

Year ended March 31	2013	2012
OPERATING ACTIVITIES		
Excess of revenue over expenses	\$ 142,540	\$ 212,516
Add (deduct) items not involving cash		
Amortization	8,968,802	8,652,404
Gain on sale of leasehold improvements	–	(45,172)
Decrease in unearned rental revenue	(4,255)	(123,436)
Repayment (accretion) of note receivable	37,894	(5,829)
Decrease in deferred lease incentive	124,848	124,848
	9,269,829	8,815,331
Net change in non-cash balances related to operations		
Receivables	315,409	(1,751,775)
Supplies	(104,754)	(369,839)
Prepaid expenses	17,862	178,121
Accounts payable and accrued liabilities	(1,468,445)	(645,068)
Deferred contributions	11,350,123	(2,255,417)
CASH PROVIDED BY OPERATING ACTIVITIES	\$ 19,380,024	\$ 3,971,353
INVESTING ACTIVITIES		
Purchase of capital assets	(7,943,592)	(8,156,851)
Proceeds on disposal of capital assets	638,067	731,685
Net change in restricted cash and investments	(575,219)	–
CASH USED IN INVESTING ACTIVITIES	\$ (7,880,744)	\$ (7,425,166)
FINANCING ACTIVITIES		
Repayment of term loan	(40,000)	–
CASH USED IN FINANCING ACTIVITIES	(40,000)	–
NET INCREASE (DECREASE) IN CASH DURING THE YEAR	11,459,280	(3,453,813)
Cash, beginning of year	13,012,946	16,466,759
CASH, END OF YEAR	\$ 24,472,226	\$ 13,012,946

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(2 tons of wood)



5 million BTU's
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not consumed



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greenhouse
gases prevented



5,539 gallons
wastewater
flow saved



371 lbs.
solid waste
not generated

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