



Ottawa Hospital
Research Institute
Institut de recherche
de l'Hôpital d'Ottawa

Ottawa Hospital Research Institute
Annual Report 2014-2015

Tender Loving Research





Research fuels world-class care

Message from the Chair of the Board and the CEO and Scientific Director

BillyBob McPherson is now cured of a deadly liver infection because Dr. Curtis Cooper and the Viral Hepatitis Research Program are committed to giving their patients every opportunity to try new therapies. Claude Corneau survived a devastating stroke because Drs. Cheemun Lum, Dariush Dowlatshahi and the Ottawa Stroke Program relentlessly pursue all avenues to improve patient care. Tina Ceroni completely recovered from a rare and debilitating auto-immune disease after Dr. Harold Atkins and the Stem Cell Transplant team applied their innovative research to a new condition.

These are just a few of the people who benefited from *Tender Loving Research* (TLR) at The Ottawa Hospital in 2014-15. TLR is the name of our new fundraising campaign, but it is also much more than that: it is an opportunity to tell our research success stories, both from the perspective of patients who have benefited from our work and from the perspective of researchers who are inspired to do more.

You can see this inspiration in our TLR video blogs, when Dr. Christian Vaillancourt talks about saving lives in the emergency department; when Dr. Bernard Thébaud remembers the new mother who inspired him to do more for sick babies like hers; and when Dr. Dylan Burger describes the kidney dialysis patients who motivate him to spend long hours in the lab. This is *Tender Loving Research*, and it is fuelling world-class and compassionate patient care at The Ottawa Hospital.

Importantly, our research is also fuelling safer and more efficient health care at The Ottawa Hospital and beyond. For example, an economic analysis recently conducted through the Council of Academic Hospitals of Ontario estimates that the Ottawa COPD Risk Scale, developed

by Dr. Ian Stiell, could save Ontario \$115 million over three years, in addition to improving patient care. Our researchers are world-leaders in developing and implementing these kinds of clinical decision rules, as evidenced by the fact that three of the top five rules for enhancing efficiency in U.S. emergency departments were developed at The Ottawa Hospital. Other examples of our efficiency- and safety-promoting research include Dr. Marc Rodger's clinical trial showing that blood thinners don't prevent pregnancy complications, and a clinical trial led by Drs. Dean Fergusson and Alan Tinmouth that prevented a costly and unnecessary reorganization of the blood supply system.

We are also world-leaders in basic molecular research that is transforming our understanding of health and disease and fuelling the development of next-generation biological therapies. For example, Drs. Marjorie Brand and David Allan recently unravelled how a gene called TAL1 controls vascular stem cells, a discovery which could open up new approaches to enhance stem cell therapy for diseases such as heart attack and stroke. And Dr. John Bell's basic laboratory research on cancer has led to the development of novel cancer-fighting viruses that are currently being tested in patients at The Ottawa Hospital, as well as a \$60M Canadian network to develop biotherapeutics for cancer. We're also leading world-first or Canadian-first clinical trials of stem cell therapies for heart attack, septic shock and multiple sclerosis.

Our success is also evident in our ability to attract external, peer-reviewed research funds. Indeed, The Ottawa Hospital currently ranks as the third hospital

in the country for funding from the highly-competitive Canadian Institutes of Health Research, up from eighth in 2001, and our researchers consistently have grant success rates that are well above the national average. This success is due to the hard work and dedication of our researchers, but it has also been supported by the development of new procedures to help with the grant-writing process. We've also enhanced our support for clinical trials, research commercialization and knowledge translation, all with a balanced budget and the lowest administrative costs of all hospital-based research institutes in Ontario. The research environment in Canada may be more challenging than ever before, but we are rising to the challenge and exceeding expectations.

In the coming year, we look forward to making more discoveries and developing additional approaches to prevent, diagnose and treat disease. We will also continue to work closely with The Ottawa Hospital and the University of Ottawa to ensure that we are closely aligned in support of research, patient care

and learning. And finally, we look forward to continuing to share our stories of *Tender Loving Research*. Your support, through The Ottawa Hospital Foundation, is crucial for our continued success.



Ian Mumford
Chair, Board
of Directors,
Ottawa Hospital
Research Institute



Dr. Duncan Stewart
Executive Vice-President,
Research, The Ottawa
Hospital

CEO and Scientific
Director, Ottawa Hospital
Research Institute

Professor of Medicine,
University of Ottawa



In the Spotlight

Research saves a stroke patient's life and changes stroke treatment around the world



Claude Corneau realized something was very wrong the moment he started dropping his mechanic's tools at work.

It was January 23, 2014, and although he didn't realize it at the time, a massive blood clot was blocking blood flow to his brain. Corneau, 70, was suffering a life-threatening stroke.

"I don't remember much after the ambulance came," said Corneau, a husband, father and grandfather from Calabogie, Ontario. "But I do remember waking up briefly and realizing that we were on the way to The Ottawa Hospital, and I was very happy about that."

The Ottawa Hospital provides world-class, compassionate care to approximately 1,200 stroke patients every year, but Corneau also received something extra special that day. He was the first person in Ottawa to be treated in a clinical trial that would save his life and eventually change how strokes are treated around the world.

"The standard of care initially was to try to dissolve these large blood clots with medication," explained Dr. Cheemun Lum, a neuroradiologist at The Ottawa Hospital and the University of Ottawa. "This trial was testing a new device which we insert through the leg artery. We manoeuvre it up into the brain and then we pluck out the clot and pull it out of the brain."

"This research has really brought my husband back to life. We're able to see our children and our grandchildren, and I'm not alone."

-Shirley Corneau

Dr. Lum co-lead The Ottawa Hospital's arm of this international trial, along with Dr. Dariush Dowlatshahi.

The results were recently published in the *New England Journal of Medicine*. They show that people who received the experimental clot-plucking procedure in addition to the standard clot-dissolving medication were 50 percent less likely to die than those who received the medication alone. They were also almost twice as likely to have a positive recovery.

Like many of the other participants in the study, Corneau was able to return home a couple of weeks after his stroke with no major disabilities. He was even able to return to work as a mechanic a few months later.

"This research has really brought my husband back to life," said Corneau's wife, Shirley. "We're able to see our children and our grandchildren, and I'm not alone."

In fact, Claude and Shirley Corneau celebrated their 50th wedding anniversary in the summer of 2014.

"The words 'game-changer' and 'breakthrough' have been used to describe this research," said Dr. Lum. "It really is the most significant advance in stroke therapy that I have witnessed in my career as a physician. It's very exciting for stroke patients and it is now becoming the standard of care around the world for patients with the biggest strokes and the largest clots."

"The words 'game-changer' and 'breakthrough' have been used to describe this research. It really is the most significant advance in stroke therapy that I have witnessed in my career as a physician."

-Dr. Cheemun Lum

This clinical trial is just one of more than 600 trials involving nearly 9,000 patient volunteers conducted at The Ottawa Hospital in 2014. Many of these trials tested innovative new treatments, while others examined different ways to prevent or diagnose disease, or deliver health care more efficiently.

"The Ottawa Hospital is a great place to do research because a lot of our research focuses on exactly what The Ottawa Hospital is about, which is excellent patient care," explained Dr. Dowlatshahi, a stroke neurologist at The Ottawa Hospital and the University of Ottawa, and scientific director of the Ottawa Stroke Program. "What we are trying to do is to treat the patients in front of us and treat their family but also learn from what we are doing so that we can improve care for all people at The Ottawa Hospital and around the world. This is Tender Loving Research."



Fast Facts

Our research. Our people. Our facilities.



Our Research

3rd

Rank among Canadian research hospitals for peer-reviewed funding from the Canadian Institutes of Health Research

800%

Growth in funds received from the Canadian Institutes of Health Research since 2000 compared to national average of 200%

5th

Rank in terms of total research revenues out of more than 600 Canadian hospitals (2014, RESEARCH Infosource)

1,143

Scientific papers published in 2014 from the Ottawa Hospital Research Institute

50

Active patent families under management

by our Technology Transfer Office

7

Spin-off companies creating jobs in areas such as regenerative medicine, oncolytic viruses, diagnostics, vaccines and vision improvement

935

Active external grants, contracts and salary awards at the Ottawa Hospital Research Institute

1,663

Active clinical research projects

This includes all research projects at The Ottawa Hospital in which patients, health-care workers, students or volunteers have agreed to participate. This can include being interviewed, taking a survey, allowing biological samples to be analyzed, or testing new procedures, devices or drugs.

625

Active clinical trials

Clinical trials are a subset of clinical research projects. They include biomedical or behavioral interventions that involve patients at The Ottawa Hospital and are designed to answer specific questions about vaccines, drugs, treatments, devices, or new ways of using known drugs, treatments, or devices.

155

New clinical trials

10:1

Ratio of external research funding leveraged to every \$1 donated

by the community through
The Ottawa Hospital Foundation

245

Agencies and companies

funding the Ottawa Hospital Research Institute

6,855

Patients

Enrolled in clinical trials at The Ottawa Hospital

9

New breast cancer drugs

approved and available thanks to clinical trials conducted at The Ottawa Hospital

\$115M

Potential savings from just one research project

Ottawa COPD Risk Scale estimated to save Ontario \$115M over three years

Our People

124

Scientists

Scientists at the Ottawa Hospital Research Institute have MDs, PhDs, or both, and spend the majority of their time conducting research. Each scientist leads a team of 5 to 45 people and is a professor at the University of Ottawa. Many are also active physicians at The Ottawa Hospital.

455

Investigators

Investigators at the Ottawa Hospital Research Institute are generally physicians, nurses, or other health-care professionals who are engaged in research while remaining active in clinical practice.

427

Trainees

Trainees at the Ottawa Hospital Research Institute conduct much of the hands-on research and come up with many of the innovative ideas for new studies. Trainees include graduate students, postdoctoral fellows, undergraduates and summer students. Most students are from the University of Ottawa.

721

Research and support staff

Support staff at the Ottawa Hospital Research Institute coordinate clinical trials, manage research programs and operate sophisticated laboratory equipment. They also take care of health and safety, commercialization, finance and other areas of administration

1,727

Scientists, investigators, trainees and staff

at the Ottawa Hospital Research Institute

Our Facilities

215,427

Square feet of dedicated basic and clinical research space at the Ottawa Hospital Research Institute

8

Core facilities

Including state-of-the-art facilities for studying cells, tissues, proteins and DNA, as well as unique laboratories for manufacturing clinical-grade virus- and cell-based therapeutics

63

Scientific research labs

at the Ottawa Hospital Research Institute

7,514

Pieces of research equipment

at the Ottawa Hospital Research Institute

3

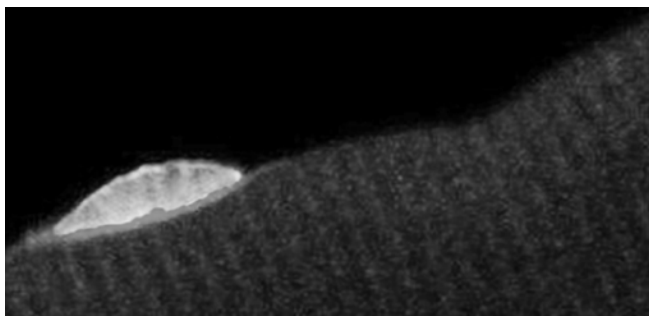
Campuses at which we conduct our research

including the Civic, General and Riverside Campuses



Top News

A look at some of the year's research highlights



Reversing aging in muscle stem cells

Dr. Michael Rudnicki discovers why muscle stem cells lose their capacity to repair damage as the body ages, bringing regenerative therapies for muscle diseases closer to reality. The study is published in *Nature Medicine*.



Blood thinners don't prevent pregnancy complications

Thousands of women around the world are now able to avoid unnecessary and potentially harmful blood thinner injections during pregnancy, thanks to the results of a major international clinical trial led by Dr. Marc Rodger and published in *The Lancet*.



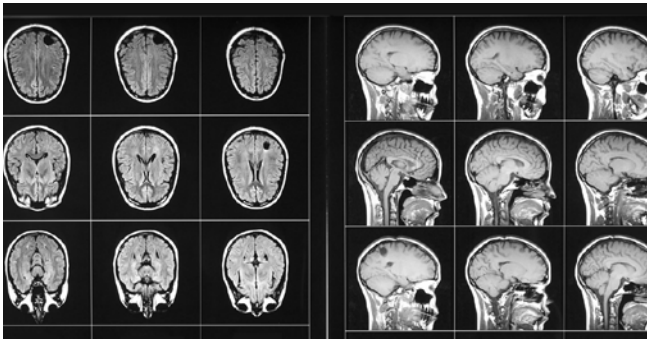
Viruses and drugs combine to form potent anti-cancer therapy

A study led by Dr. Jean-Simon Diallo and published in *Nature Communications* reveals that compounds that disrupt our cells' inner skeleton can greatly enhance oncolytic virus therapy for cancer.



Stem cell breakthrough for stiff person syndrome

Two women completely recover from stiff person syndrome, a debilitating auto-immune disease, after Dr. Harold Atkins and the Stem Cell Transplant team apply their innovative research to treat this rare condition. Their experience is described in *JAMA Neurology*.



Appetite-suppressing drug could also fight anxiety

A study led by Dr. Hsiao-Huei Chen and published in *Neuron* reveals a new biological pathway that regulates anxiety and obesity, and suggests that a drug currently in clinical trials to treat obesity might also provide a promising way to combat anxiety disorders.



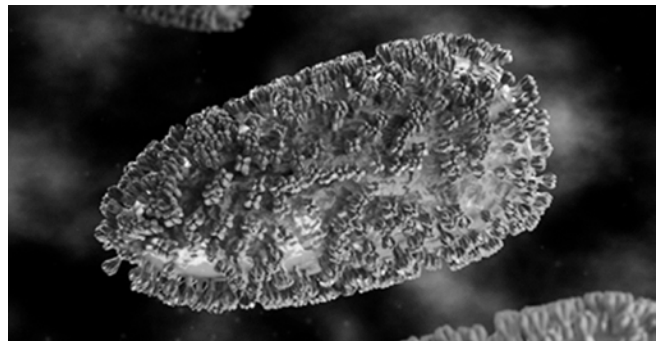
“Game-changing” new drug developed for hepatitis C

An international clinical trial published in the *New England Journal of Medicine* shows that new antiviral medications can cure close to 100% of people with Hepatitis C, a potentially-deadly liver disease. Dr. Curtis Cooper led the Ottawa site of the trial.



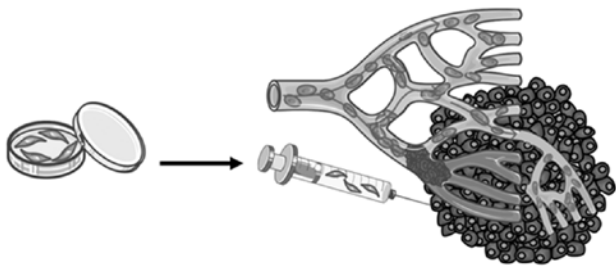
Old blood as good as fresh

A large international clinical trial finds that contrary to popular belief, blood stored for three weeks is just as good as fresh blood for transfusions in critically ill patients. The study was led by Drs. Dean Fergusson, Alan Tinmouth and others, and published in the *New England Journal of Medicine*.



Big boost for cancer biotherapeutic

Dr. John Bell launches BioCanRx, a \$60M national network dedicated to developing biotherapeutics that have shown promise in treating and even curing many cancers with minimal side effects.



Courtesy of Sylvain Fraineau

Enhancing stem cell therapy for vascular disease

Drs. Marjorie Brand and David Allan discover that it is possible to dramatically enhance the therapeutic potential of vascular stem cells by pre-treating them with epigenetic drugs that change gene activity prior to transplantation. Published in *Cell Stem Cell*, this research has the potential to improve stem cell therapy for heart disease, stroke, and other diseases that involve the blood vessels.



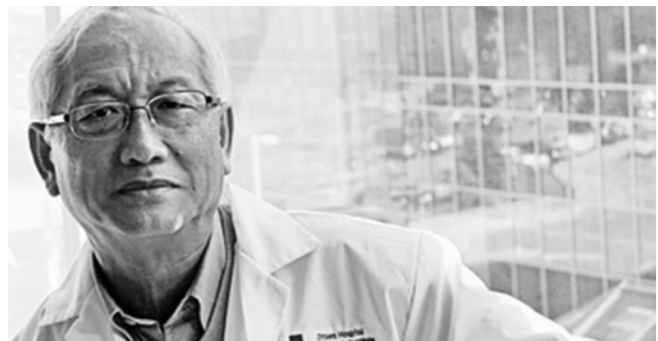
DNA test slashes wait times for tuberculosis diagnosis in Iqaluit

Dr. Gonzalo Alvarez finds that a DNA test for tuberculosis allows patients in Iqaluit to be diagnosed and treated in less than two days, compared to the previous process that could take a week to more than a month. The results are published in *CHEST Journal*.



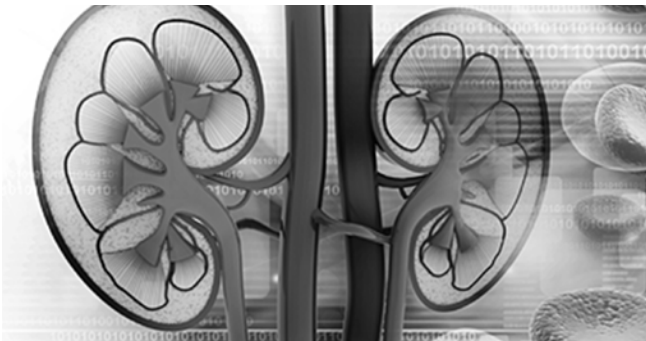
How do your habits impact your health and life expectancy?

Dr. Doug Manuel creates an online calculator to help Ontarians estimate their life expectancy and the amount of time they can expect to spend in hospital due to their habits and lifestyle choices.



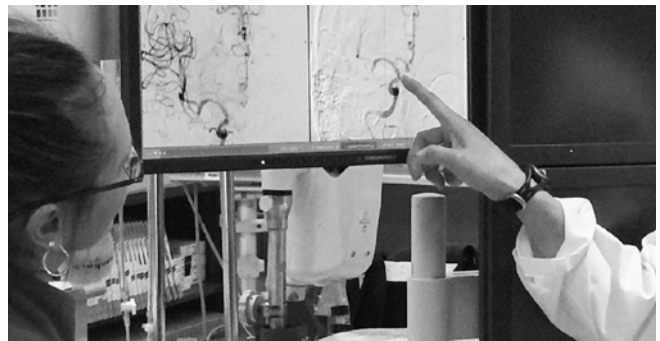
How to kill chemo-resistant ovarian cancer cells

Dr. Benjamin Tsang discovers a potential biomarker and new treatment approach for chemotherapy-resistant ovarian cancer, based on a protein called gelsolin. The study is published in *Proceedings of the National Academy of Sciences*.



Surprising study could save lives of kidney transplant patients

Drs. Greg Knoll and Dean Fergusson find that a drug that lowers the risk of cancer in kidney transplant patients actually increases the overall risk of death compared to other drugs. The clinical trial is published in the *British Medical Journal*.



New stroke treatment saves lives

People with severe strokes now have access to a life-saving clot-removal procedure, thanks to an international clinical trial published in the *New England Journal of Medicine*. The Ottawa site of the trial was led by Drs. Cheemun Lum and Dariush Dowlatshahi.



Collaboration and respect enhance patient safety climate

Dr. Ginette Rodger and her team find that the *Interprofessional Model of Patient Care*, implemented at The Ottawa Hospital in 2006, has contributed to a better patient safety climate by enhancing collaboration and respect. An analysis of the model, led by Dr. Milisa Manojlovich, is published in the *International Journal for Quality in Health Care*.



Using math to understand disease

Dr. Ted Perkins solves a 50-year-old math problem and uses the solution to help analyze how proteins fold—an important issue in many diseases. The study is published in *Nature Communications*.



Better reporting of research enhances impact

Dr. David Moher is a world leader in developing guidelines on how to report research to ensure that results have the greatest impact. His latest contribution, published in the *British Medical Journal*, addresses protocols for systematic reviews.



More exercise is better for breast cancer patients undergoing chemotherapy

Dr. Roanne Segal finds that exercise can help breast cancer patients cope with chemotherapy, and more exercise is better, especially for younger, fitter patients. The results are published in the *British Journal of Cancer*.



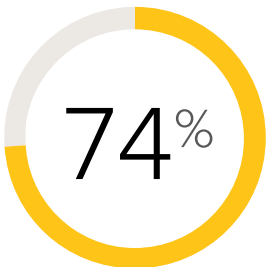
Financials

Our financial report and top 10 peer-reviewed funding sources

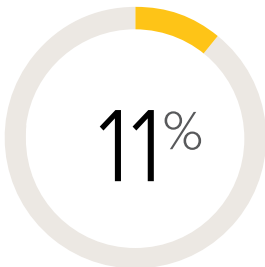


Financials

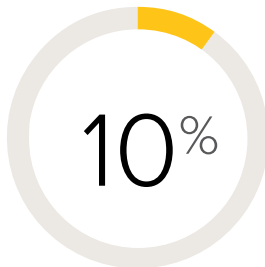
Revenue distribution 2014-2015*



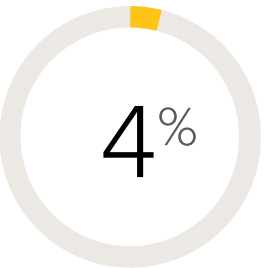
External grants, contracts and salary awards



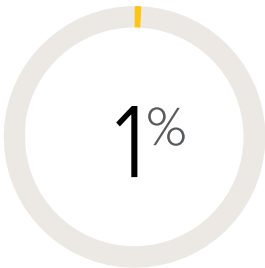
The Ottawa Hospital Foundation



Indirect costs and investment income



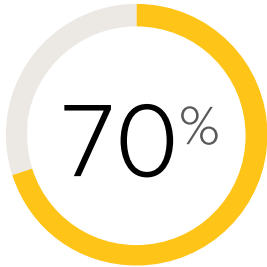
The Ottawa Hospital



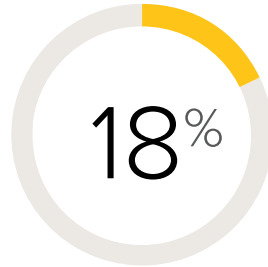
University of Ottawa

\$108.8M

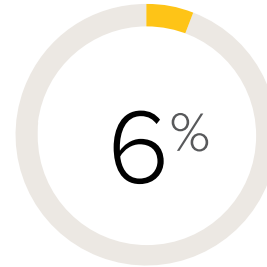
Expenditure distribution 2014-2015



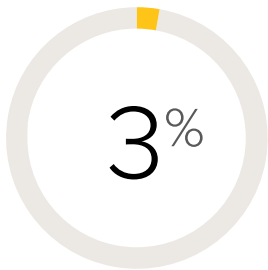
Research project expenses



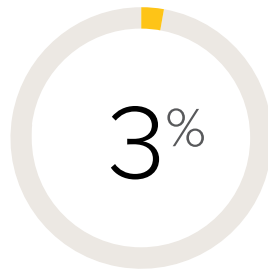
Scientific salaries



Other research expenses



Amortization of capital assets



Administrative expenses

\$107.4M

Top 10 sources of peer-reviews funding

SOURCES	FUNDING
Canadian Institutes of Health Research	\$19.0M
Ontario Research Fund	\$2.5M
Canada Foundation for Innovation	\$1.5M
Ontario Institute for Cancer Research	\$1.4M
Natural Sciences and Engineering Research Council of Canada	\$1.0M
Heart and Stroke Foundation	\$1.1M
Health Quality Ontario	\$0.9M
The Ottawa Hospital Academic Medical Organization	\$0.9M
Canadian Breast Cancer Foundation	\$0.8M
Canada Research Chairs Secretariat	\$0.8M