



Ottawa Hospital  
**Research Institute**

**Institut de recherche**  
de l'Hôpital d'Ottawa

# Research Bringing You Tomorrow's Health Care Today

Ottawa Hospital Research Institute 2013–2014 Annual Report



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## Making a difference: A brief message from the Chair and CEO

At the Ottawa Hospital Research Institute, our research team is inspired by the opportunity to improve health care and profoundly motivated to make progress in the fight against devastating illnesses.

This passion fuels our success at the Ottawa Hospital Research Institute and is a major reason why we are now solidly positioned among Canada's top tier of health research institutions. We are making important basic scientific discoveries, working to translate those advances into better patient care, and conducting research that is changing how medicine is practised here in Ottawa and around the world.

This year, for example, we opened the world's first clinical trial for a therapy using gene-enhanced stem cells to help the heart repair itself after a major heart attack. We made great strides in cancer research by finding novel ways to prevent and destroy cancers, whether by using special cancer-fighting viruses or taking personalized medicine tailored to the molecular signature of the patient's tumour. We even gave Canadians a free and simple way to manage their immunizations with a smartphone app.

Our researchers gained national and international recognition for their work. Dr. Michael Rudnicki was appointed as an Officer of the Order of Canada for his scientific discoveries and leadership in stem cell research. Dr. Ronald Worton, our institute's founding Chief Executive Officer, was named to The Canadian Medical Hall of Fame. Dr. David Moher made a list of the 400 most influential biomedical researchers in the world (out of 15 million). In addition, clinical decision rules from Drs. Ian Stiell and Phil Wells made up three items of a Top 5 list, published by the influential JAMA Internal Medicine that recommended procedures for use by all U.S. emergency physicians.



**Ian Mumford**  
Chair, Board of Directors



**Dr. Duncan Stewart**  
CEO and Scientific Director  
Vice-President, Research, The Ottawa Hospital  
Professor of Medicine, University of Ottawa

This year, The Ottawa Hospital also broke into the Top 5 list of Canada's research hospitals, ranking 4th in overall research revenues by RESEARCH Infosource. Among that group of the Top 5, we ranked first in terms of research intensity, which is the number of dollars per researcher.

### Passion fuels our success... and is a major reason why we are now solidly among Canada's top tier of health research institutions.

And when it comes to highly competitive peer-reviewed funding, The Ottawa Hospital ranks third in grants from the Canadian Institutes of Health Research (CIHR). In fact, since 2000, our CIHR funding has grown 800%, a rate that is nearly four times the national average. Significantly, this year CIHR also recognized the leadership of our researchers, awarding The Ottawa Hospital two of three Emerging Network grants to head up nationwide teams conducting collaborative research that will advance our knowledge of and care in respiratory and vascular diseases.

It is exciting to see the momentum we have gained in recent years. By working closely with our key partners to provide critical support and leading-edge research facilities, we continue to foster scientific excellence in a unique and truly collaborative environment that encourages our scientists and clinicians to join forces in their determination to improve health care for Canadians and bring you tomorrow's health care today.





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## In the Spotlight

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### Fixing a broken heart:

Making your stem cells young again



On November 14, 2013, after seeing his wife off to work, Langis LeBel had an ominous feeling that the symptoms he had been experiencing — malaise, indigestion, jaw pain, sore left shoulder and chest pain — should no longer be ignored.

The retired OPP sergeant had seen heart attacks when he was on the job and said to himself, “Get with the program, buddy!”

**LeBel’s heart had suffered major injury. Such extensive damage leads to ongoing and progressive health complications resulting from a weakened and enlarged heart.**

It turned out that the 60-year-old had a blocked artery that ran down the front of his heart, often called a “widow maker.” Once he was rushed to hospital, doctors whisked him into the catheterization laboratory, opened up the artery with a balloon and put in a metal stent. Before he knew it, he was recovering in the intensive care unit.

**“To rejuvenate these cells, we are inserting a small piece of genetic code that makes them more active and more effective in repairing the heart.”**

—Dr. Duncan Stewart



LeBel was shocked when his attending physician told him that he was actually very lucky to be alive and that eight of 10 people with such a serious heart attack are not so fortunate.

**“I feel strongly that [participating in a clinical trial] is something you need to do, otherwise we don’t advance.”**

—Langis LeBel

Although still beating, LeBel’s heart had suffered major injury. Such extensive damage leads to ongoing and progressive health complications resulting from a weakened and enlarged heart. This can lead to heart failure and, too often, premature and untimely death. Current heart-attack therapy is focused on opening up the blocked artery as soon as possible in an attempt to salvage heart muscle at risk. Once the damage has occurred, doctors can only wait to see how the heart heals and how the body copes with the heart’s reduced ability to pump blood.

**“If this trial is successful it could open the door to therapies based on genetically enhanced stem cells that can restore function and reverse damage in other critical organs, not just the heart.”**

—Dr. Duncan Stewart

“It does change your life because there are so many things you can’t do anymore,” said LeBel.

Dr. Duncan Stewart and his team want to change this. They are conducting a world-first clinical trial that uses a revolutionary stem-cell therapy. The idea is to improve the heart’s ability to heal itself using a person’s own genetically enhanced stem cells.

“Using someone’s own stem cells means that we avoid the problem of their body rejecting them,” said Dr. Stewart, CEO and scientific director of the Ottawa Hospital Research Institute, vice-president of Research at The Ottawa Hospital, and professor of medicine at the University of Ottawa.

“However, the patient’s own stem cells have reduced healing potential since they have been exposed to the same diseases and conditions that led to the heart attack in the first place. To rejuvenate these cells, we are inserting a small piece of genetic code that makes

them more active and more effective in repairing the heart,” added Dr. Stewart.

It’s the first time gene-enhanced stem cells have been used to treat cardiovascular disease. To run this clinical trial, the Ottawa Hospital Research Institute built a clinical cell manufacturing facility that is unique in Canada. It was designed specifically to handle complex procedures, such as inserting the gene into stem cells and then preparing them for use in patients.

Time is also of the essence in this experimental therapy. The cells must be given back to the patient before the injured heart tissue scars and hardens, which takes about one month. As a result, the 100 participants in this trial will be treated between five and 30 days after their attack.

The trial’s volunteers are randomly assigned to receive one of three treatments: a placebo, their own cells, or their own gene-enhanced cells. LeBel was still in the hospital when he was asked to participate in the trial. He jumped at the chance, even though he knew he only had a two in three chance of receiving stem cells.

For LeBel, those odds were definitely worth it.

However, he signed on to participate in the clinical trial for something more. “I feel strongly that it is something you need to do, otherwise we don’t advance,” said LeBel.

By participating in Dr. Stewart’s research, he could be helping to usher in a new era of regenerative medicine.

“If this trial is successful,” said Dr. Stewart, “it could open the door to therapies based on genetically enhanced stem cells that can restore function and reverse damage in other critical organs, not just the heart. It could give us ways to treat significant and devastating diseases for which we currently have no options, such as kidney failure, stroke and lung diseases.”

Recognizing the potential of this critical research, The Ottawa Hospital Foundation has committed to raising \$15 million for regenerative medicine to give our researchers the support and tools they need to bring promising results to patients as quickly as possible.

Dr. Stewart’s trial is scheduled to finish enrolling patients by 2015.

# Precise and personal cancer care:

Our genes hold the key



**“We’re now able to tell more and more of our patients, ‘I don’t think chemotherapy is going to help you. We’ve got a much less toxic treatment option to give you.’”**

—Dr. Mark Clemons

Cancers have long been named for the part of the body where they originate, which is why Paula Helmer was shocked to find that the tumours removed from the bone in her neck were actually breast cancer

“I didn’t have any lumps in my breasts, but the doctors told me it was breast cancer that had spread to my bones,” said Helmer.

**4 in 10 women with recurring breast cancer have tumours with a different molecular profile than the original tumour.**

What followed her unusual diagnosis was a personalized approach to cancer care that highlights how much the field has changed in this age of genetically informed medicine.

Dr. Mark Clemons, Helmer’s medical oncologist at The Ottawa Hospital Cancer Centre, is among a new generation of cancer specialists who are moving from

prescribing drugs based on the tissue of origin, to the molecular basis of each patient’s cancer. By identifying the genetic flaws inside a tumour cell, Dr. Clemons is able to tailor therapies to a patient’s individual type of cancer, providing a more effective treatment. In fact, his research in this area is improving care for cancer patients worldwide.

**“I’m enjoying my life and I count my blessings every day.”**

—Paula Helmer

With surgery and radiation therapy behind her, Helmer did not move on to the usual courses of chemotherapy. While chemotherapy may work for some patients, it often causes harmful side effects such as nausea, hair loss and organ damage.

**“I have received excellent care at the hospital and [participating in clinical trials] is my way of giving back.”**

—Paula Helmer

“We’re now able to tell more and more of our patients, ‘I don’t think chemotherapy is going to help you. We’ve got a much less toxic treatment option to give you,’” said Dr. Clemons, who’s also a clinical investigator at the Ottawa Hospital Research Institute and a professor at the University of Ottawa.

“This personalized approach allows us to provide our patients with treatments that have the fewest side effects and the best possible outcome. We don’t waste precious time trying drugs that may not be effective for a patient.”

In Helmer’s case, Dr. Clemons ordered molecular tests that could predict which drugs would – and which would not – slow the progression of her particular type of cancer. The tests provided a detailed profile of the specific genetic flaws causing the tumour cells inside Helmer to grow. Dr. Clemons then matched this information with specific drugs able to target her cancer.

In that way, Helmer has received kinder, gentler drugs that have allowed her to live longer and better than even Dr. Clemons thought was possible. More than four years after her diagnosis, Helmer continues to travel, sing in a choir and enjoy quality time with her husband, children and grandchildren.

“I’m enjoying my life and I count my blessings every day,” she said.

Through personalized medicine, Dr. Clemons has reduced the frequency and dose of the drugs given to Helmer without compromising their effectiveness.

Indeed, Helmer was part of a research study led by Dr. Clemons. The study found that women who had low levels of a certain blood marker could benefit from taking a drug less frequently to treat breast cancer that had spread to the bone.

Dr. Clemons and his collaborators discovered that less frequent treatments – once every three months rather than once every month – were just as effective. They also resulted in fewer side effects and reduced drug

costs. The finding has already changed the way cancer centres around the world treat women with advanced breast cancer.

The personalized approach has also allowed Dr. Clemons to prescribe different drugs for Helmer as her cancer cells have continued to evolve and behave differently over time. His research has demonstrated that women with advanced or recurring breast cancer benefit from having an up-to-date biopsy to determine if their treatment plans should be changed. That’s because four out of 10 women with recurring breast cancer have tumours with a different molecular profile compared to that of their original tumour.

Because of this finding, it’s now considered best practice for oncologists to check the molecular profile of breast cancer that has spread or returned before giving patients the same treatments they previously received.

Dr. Clemons’ finding serves as a reminder of how devilishly complex cancer is and how much more remains to be understood. That’s what motivates Helmer to participate in many of Dr. Clemons’ research studies.

“I have received excellent care at the hospital and this is my way of giving back,” she said. “I’ve benefitted from the people before me who made the effort to join these studies. I want to do whatever I can to move the research along so that other people will benefit down the road.”

Given the promise of personalized cancer therapy, The Ottawa Hospital Foundation is working to raise \$3 million to establish an Oncology Diagnostics Laboratory, allowing Ottawa residents to benefit from quick results for the most advanced molecular testing.

# Beyond hysterectomy:

New options give women their lives back



It's rare to find a woman who has never had any trouble with her period. For most women, the hassles are fairly minor. But for Natalie Reesal, who suffered from crippling pelvic pain and abnormally heavy bleeding that would last for weeks, her menstrual cycle put life on hold every month.

"The pain was so severe that probably two out of the three days of my cycle, I was on the bathroom floor because that was the only relief I could feel from the pain," said Reesal.

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"The pain was so severe that probably two out of the three days of my cycle, I was on the bathroom floor because that was the only relief I could feel from the pain," said Reesal.

## 4 in 10 women have abnormal bleeding due to non-cancerous cysts, lesions or fibroids.

She was diagnosed with non-cancerous tumours in the uterus, known as fibroids, as well as a severe form of endometriosis, in which tissue usually found in the lining of the uterus grows outside of it.

In the past, the only treatment available for women with Reesal's diagnoses was an invasive hysterectomy, which removed the uterus and sometimes other reproductive organs as well. The surgery was particularly devastating for women of child-bearing age because it robbed them of any chance to have children. Reesal, for one, still held out hope of starting a family with her husband, even though she was warned that the odds were against it.

Dr. Sony Singh does not believe that a woman should have to choose between suffering and a surgery that leaves them infertile. "Women are having children later in life," he said. "Those with endometriosis or fibroids don't want hysterectomies if they can avoid it."

As director of the Shirley E. Greenberg Women's

**"I'm still young and I want to have children, so I was very happy."**

—Antonette Deza

Health Centre at The Ottawa Hospital and a clinical investigator with the research institute, Dr. Singh is known for his expertise in treating the one in 10 women who are diagnosed with endometriosis. His program also treats the four in 10 women whose abnormal bleeding stems from non-cancerous cysts, lesions and fibroids. His pioneering work has inspired Ottawa-area residents to donate \$1 million in support of his program.

Dr. Singh specializes in alternatives to hysterectomy, such as minimally invasive surgical methods to remove the growths while preserving the uterus. He also uses techniques that shrink or kill the growths by cutting off their blood supply. These techniques have helped some patients avoid surgery altogether.

**“Women are having children later in life. Those with endometriosis or fibroids don’t want hysterectomies if they can avoid it.”**

— Dr. Sony Singh

Using those surgical methods, Singh was able to give Reesal her life back. She eventually gave birth to a healthy girl. “She’s just a miracle. She has just brought so much joy in our lives.”

Another benefit of minimally invasive gynecology is faster recovery time. Nine out of 10 patients who have surgery under Dr. Singh’s program go home in less than 24 hours. Since the program started nearly a decade ago, fewer women have remained as inpatients to recover from hysterectomies, saving the equivalent of five years of hospital stays.

One of these women is Antonette Deza. A native of the Philippines, Deza had been in Canada for only a few months when she learned that, because of endometriosis, she had a large, non-cancerous tumour pressing against her bladder.

Under Dr. Singh’s care, Deza had a laparoscopy. Tiny incisions, no more than a centimetre long, were made in her abdomen and a camera was inserted to accurately diagnose and treat her condition. When she woke up from the surgery, Dr. Singh told Deza he had removed the tumour while keeping her uterus intact. “I’m still young and I want to have children so I was very happy,” said Deza.

**“We’re not only training the next generation of specialists with the most up-to-date surgical skills; we’re also training people who reflect the cultural diversity of this country.”**

—Dr. Sony Singh

Dr. Singh sees many women like Deza who are in advanced stages of disease, but suffer in silence because they fear that major surgery is their only option. Many of them are either newcomers to Canada, or from under-served cultural communities where there’s a stigma or lack of awareness about women’s reproductive health.

With a multilingual team of surgeons and trainees, Dr. Singh and his colleagues treat many women who would otherwise fall through the cracks of the health-care system. Indeed, as only the second Canadian centre to be internationally recognized as a training ground for minimally invasive gynecology, The Ottawa Hospital attracts a multicultural team of surgical fellows from across the country.

“Collectively, our team speaks English, French, Cantonese, Mandarin, Persian and Punjabi,” said Dr. Singh, who is also an associate professor at the University of Ottawa. “We’re not only training the next generation of specialists with the most up-to-date surgical skills; we’re also training people who reflect the cultural diversity of this country. They can reach out to communities that are currently underserved, so that women of all backgrounds no longer have to suffer in silence. We can give them their lives back.”



## Fast Facts

Ottawa Hospital Research Institute 2013–2014 Annual Report

## Our Research

- **800%** Growth in funds received from the Canadian Institutes of Health Research since 2000
- **3rd** Rank among Canadian research hospitals for peer-reviewed funding from the Canadian Institutes of Health Research
- **4th** Rank in terms of total research revenues among all Canadian hospitals (2013, RESEARCHInfosource)
- **1st** Rank in research intensity (funding per researcher) among Top 5 Canadian research hospitals (2013, RESEARCHInfosource)
- **1,042** Scientific papers published in 2013 by researchers at the Ottawa Hospital Research Institute
- **Top 5%** Rank for global impact of our scientific publications (2013, SCImago Institutional Rankings)
- **2 of 3** National Emerging Research Networks awarded to The Ottawa Hospital by the Canadian Institutes of Health Research in February 2014
- **50** Active patent families under management in 2013–2014 by our Technology Transfer Office
- **888** Active external grants, contracts and salary awards
- **1,586** Active clinical research projects. This includes all projects 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.
- **624** Active clinical trials. Clinical trials are a subset of clinical research projects. They include biomedical or behavioral interventions that involve patients and are designed to answer specific questions about vaccines, drugs, treatments, devices, or new ways of using known drugs, treatments, or devices.
- **160** New clinical trials in 2013-2014
- **\$76.5M** External research grants and contracts
- **10:1** Ratio of external research funding leveraged to every \$1 donated by the community through The Ottawa Hospital Foundation
- **221** Agencies and companies funding our research
- **5** Number of Research Programs
- **3** Crosscutting Strategic Research Areas

# Our People

- **113** Scientists. Our scientists 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.
- **Top 0.003%** Rank of Dr. David Moher among the world's top biomedical researchers, making the list of the 400 most influential biomedical researchers in the world (out of a total of 15 million researchers identified) published by the European Journal of Clinical Investigation.
- **4** Officers of the Order of Canada. In 2013, Dr. Michael Rudnicki was appointed an Officer of the Order of Canada, bringing to four the number of our scientists who have been bestowed with this honour. The others are Drs. Michel Chrétien, Antoine Hakim and Ronald Worton.
- **2005** Year Dr. Jeremy Grimshaw spearheaded first major grant for Cochrane Canada. This grant consolidated Cochrane Canada, which started in 1993 as the Canadian Cochrane Collaboration. In December 2013, on behalf of Cochrane Canada and as its director, Dr. Grimshaw received the CIHR Knowledge Translation Award in recognition of its "outstanding contribution to the health of Canadians." Cochrane Canada provides physicians and patients with the most up-to-date and credible source of information to guide their treatment choices.
- **2** Members of The Canadian Medical Hall of Fame. This year Dr. Ronald Worton was named a member of The Canadian Medical Hall of Fame, joining Dr. Antoine Hakim who was named last year.
- **492** Investigators. Our investigators are generally physicians, nurses, or other health-care professionals at The Ottawa Hospital who are engaged in research while remaining active in clinical practice.
- **415** Trainees. Our trainees 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.
- **749** Research and Support Staff. Support staff members 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.
- **1,769** Total of scientists, investigators, trainees, research and support staff

# Our Facilities

- **173** DNA replication machines
- **214,000** Square feet of dedicated basic and clinical research space
- **1** (and only one) Ottawa Methods Centre! We established the Ottawa Methods Centre to promote and facilitate methodological excellence. It is home to internationally recognized experts in clinical trial design, data management and statistics.
- **3** Operational clinical-grade cell and virus manufacturing laboratories. These manufacturing facilities produce biotherapeutics for use in human clinical trials, such as the EN-ACT-AMI trial.
- **56** Scientific research labs
- **7,345** Pieces of research equipment. (items that require electrical power)
- **3** Campuses at which we conduct our research

For more about our vision, strategic directions and leadership team, please see About Us.



## Top News

Ottawa Hospital Research Institute 2013–2014 Annual Report

### **U.S. emergency rooms adopting made-in-Ottawa diagnostic procedures**

The prestigious JAMA Internal Medicine publishes a Top 5 list of ways to reduce unnecessary procedures in U.S. emergency rooms — three are based on work from Drs. Ian Stiell and Phil Wells.

### **First patient treated in ground-breaking gene and stem cell therapy trial for heart attack**

Ottawa researchers announce their treatment of the first participant in a clinical trial that genetically enhances a patient's own stem cells to repair damaged heart tissue after a major heart attack.

(Photo credit: Julie Oliver / Ottawa Citizen. Reprinted by permission)

### **National app brings immunization records to your fingertips**

Partners launch ImmunizeCA, a smartphone app that is the brainchild of Dr. Kumanan Wilson. ImmunizeCA puts vaccination information into the hands of Canadians, so people across the country can easily and accurately manage their vaccinations and those of their family.

### **Using math to kill cancer cells**

Nature Communications publishes a paper from Ottawa researchers outlining how advanced mathematical modelling can be used in the fight against cancer. The technique predicts which treatments and genetic modifications will make cancer-killing viruses more effective.

### **Targeting the 'hungry gene' to control appetite and obesity**

Dr. Hsiao-Huei Chen publishes a study in Journal of Neuroscience showing how a novel therapy can control the "hungry gene" in the brain and cut food intake in mice by half.

### **Viruses and bacteria join forces against cancer**

In Molecular Therapy, Dr. Bell and his colleagues show how a strain of bacteria can selectively target tumour cells to destroy their already weak antiviral defences, making cancer-fighting viruses more effective. This is the first demonstration that viruses and bacteria can be combined to target cancer.

### **Discovery identifies very early indicator of diabetic kidney disease**

Drs. Chris Kennedy and Dylan Burger publish a paper in the Journal of the American Society of Nephrology that identifies a novel urinary biomarker for diabetic kidney disease — detectable before the earliest symptoms of the condition become evident.

### **New tool identifies high-risk lung patients: Ottawa COPD Risk Scale**

Dr. Ian Stiell and his colleagues publish the first clinical decision tool to help emergency physicians determine which patients with a serious lung condition (COPD) should be admitted to hospital and which can safely be sent home.

## **Genetic test could help tailor colorectal cancer therapy**

In an advance for personalized medicine, Dr. Derek Jonker publishes findings in the British Journal of Cancer that identify a gene that could be used to predict which colorectal cancer patients are likely to benefit from a targeted therapy called cetuximab.

## **Electronic consultation dramatically improves access to specialty medical advice**

Drs. Erin Keely and Claire Liddy publish a study showing that family doctors who use a virtual medical consultation tool usually obtained a specialist's advice in less than three days. Patients can often wait several months for a traditional in-person consultation. The system was developed by Drs. Erin Keely and Claire Liddy with the Champlain LHIN.

## **Powerful, personalized anti-leukemia vaccine made with cancer-fighting virus**

Appearing in Clinical Cancer Research, a study led by Dr. Harry Atkins suggests that a potent anti-leukemia vaccine can be made by infecting leukemia cells with a cancer-fighting virus. This preclinical study showed a strong and lasting immune response against the introduction of leukemia cells that would have otherwise been fatal.

## **New gene identified as risk factor for obesity and diabetes**

Dr. Rashmi Kothary publishes a discovery that 2.5% of the population may carry a genetic risk factor for metabolic disorders, such as diabetes and obesity. This segment of the population carries the defective gene for SMA (spinal muscular atrophy, the leading inherited cause of death in young children) but does not have any related neurological problems. Dr. Kothary's team has previously linked the SMA-causing gene to metabolic diseases.

## **New decision tool improves diagnosis of deadly brain bleeding**

The Journal of the American Medical Association publishes a simple clinical decision rule developed by Dr. Jeffrey Perry to help emergency doctors identify which patients with headache have a dangerous subarachnoid hemorrhage or SAH (bleeding in a certain area of the brain). Called the Ottawa SAH Rule, this tool could save up to 1,750 lives annually in Canada and the U.S.

## **Concussion guidelines to help adults manage persistent symptoms, resume life**

Dr. Shawn Marshall and the Ontario Neurotrauma Foundation publish guidelines that provide evidence to support health-care providers who are assisting their adult patients return to normal daily life.

## **Brain videos improve treatment for bleeding strokes**

In Stroke, Dr. Dar Dowlatshahi shows how a novel CT scanning video procedure could help determine which stroke patients are likely to benefit from blood clotting drugs. Approximately 13% of all strokes are caused by bleeding (hemorrhage) in the brain, but only those patients with active bleeding could potentially benefit from these drugs.

## **Stem cell discovery tops U.S. list of science media releases**

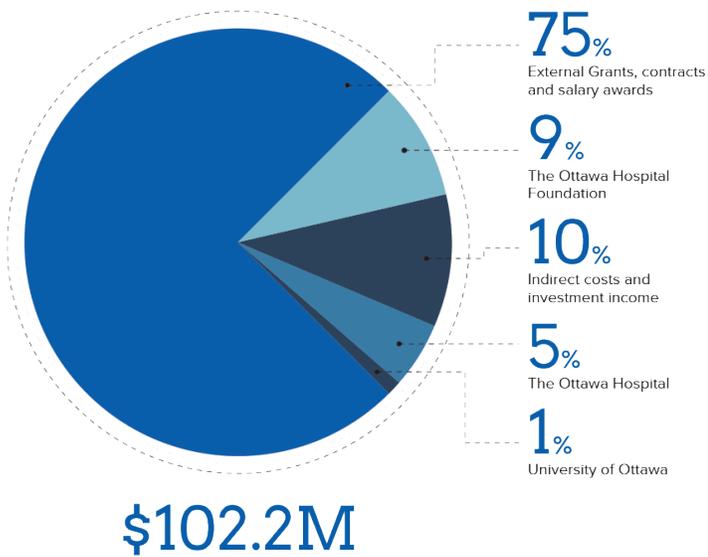
EurekAlert! identifies "Fighting fat with fat: Stem cell discovery identifies potential obesity treatment" as its top news release of 2013, visited more than 660,000 in the year. Its subject was Dr. Michael Rudnicki's discovery of a trigger that turns muscle stem cells into brown fat.



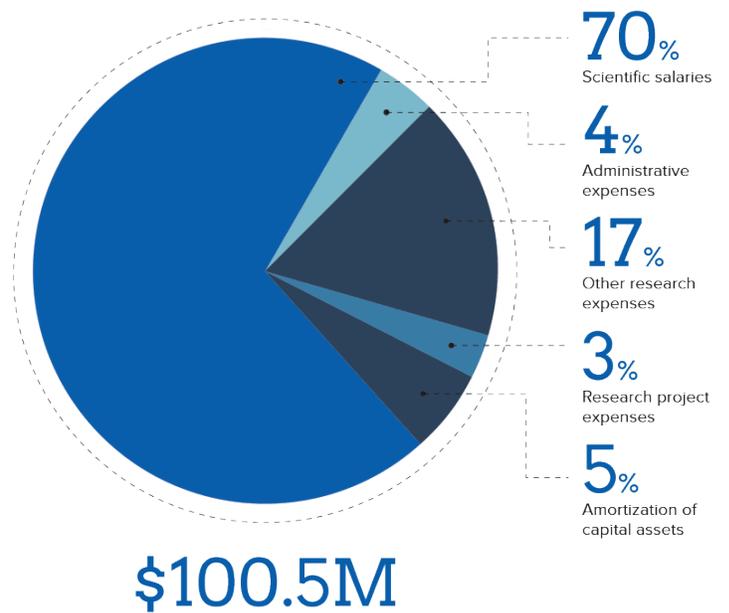
# Financials

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## Revenue Distribution 2013-2014



## Expenditure Distribution 2013-2014



# Top 10 sources of peer-reviewed funding

- \$17.8M Canadian Institutes of Health Research
- \$2.4M Ontario Research Fund – Research Excellence
- \$1.6M Heart and Stroke Foundation of Canada/Ontario
- \$1.6M Ontario Ministry of Health and Long-Term Care
- \$1.5M Ontario Institute for Cancer Research
- \$0.9M Canada Research Chairs Secretariat
- \$0.9M Canadian Breast Cancer Foundation
- \$0.8M The Ottawa Hospital Academic Medical Organization
- \$0.6M The Terry Fox Research Institute
- \$0.6M Canadian Cancer Society

Canadian dollars (millions)