

Research Bringing you Tomorrow's Health Care Today

Ottawa Hospital Research Institute 2011-2012 Annual Report



Welcome Message

A Message from Ken Newport, Chair of the Board, and Dr. Duncan Stewart, CEO and Scientific Director. [Watch the video \(en/execut](#)

Welcome

OHRI Annual Report Board Chair / CEO Message

Our goal at the Ottawa Hospital Research Institute (OHRI) is to make tomorrow's health care possible today: bringing new hope to our patients while advancing health research at a global level. Thanks to the hard work and dedication of our many scientists, clinical investigators, students and staff, we've met and exceeded this goal in many ways this year, while also balancing our [budget](#) ([en/financials/](#)), in challenging economic times.

We've made particularly exciting progress in the development of [cancer-fighting viruses](#) ([en/highlights/research-providing-hope-for-tomorrow/#fighting-cancer-with-viruses](#)) and [stem cell therapies](#) ([en/highlights/research-providing-hope-for-tomorrow/#stem-cell-therapies](#)), with a number of world-first clinical trials underway or about to start soon. We also led the largest clinical trial in the world in [cardiac arrest patients](#) ([en/highlights/research-improving-health-today/#cardiac-arrest-patients](#)). The results have changed medical practice globally and have, without a doubt, saved lives.

Our success is also evident in our ability to obtain peer-reviewed funding for our research. For example, we're delighted that this year we [ranked third](#) ([en/highlights/milestones-and-special-recognition/#ranked-third](#)), among Canadian hospital-based research institutes for funding from the Canadian Institutes of Health Research (CIHR), up from eighth just 10 years ago. CIHR is the most important and most competitive source of peer-reviewed funding for health research in Canada, so our growing success with CIHR provides important evidence of the overall success of our Institute.

We've also opened a new [Centre for Practice-Changing Research](#) ([en/highlights/milestones-and-special-recognition/#centre-for-practice-changing-research](#)) and [Centre for Innovative Cancer Research](#) ([en/highlights/milestones-and-special-recognition/#centre-for-innovative-cancer-research](#)). These cutting-edge facilities are greatly accelerating our research, improving care for our patients, and helping us attract the best and brightest scientists, clinicians and trainees. Our Sprott Centre for Stem Cell Research also celebrated its fifth anniversary this year. The amazing impact of this Centre is described in more detail in our [video success story](#) ([en/success-stories/stem-cell-therapies/](#)).

Over the last several years, we've also made great progress in strengthening our partnerships with The Ottawa Hospital, the University of Ottawa and its Faculties of Medicine and Health Sciences. We've also worked closely with CHEO, the University of Ottawa Heart Institute and other local research centres on many projects. This strategy of collaboration has helped Ottawa quickly become a major destination for health research, with health and economic benefits for the whole community.

Of course, the people of Ottawa are also crucial to our success, especially the many generous individuals who have supported us through The Ottawa Hospital Foundation. Your generosity will ensure that together, OHRI and The Ottawa Hospital can provide you and your families with the best, most innovative care today and well into the future.

Ken Newport

Chair, Board of Directors, OHRI

Dr. Duncan Stewart

CEO and Scientific Director, OHRI
Vice-President, Research, The Ottawa Hospital
Professor of Medicine, University of Ottawa

At A Glance

The Ottawa Hospital Research Institute (OHRI) is the research arm of [The Ottawa Hospital](http://www.ottawahospital.on.ca/) (<http://www.ottawahospital.on.ca/>) and an affiliated institute of the [University of Ottawa](http://www.uottawa.ca/) (<http://www.uottawa.ca/>). Our goal is to make tomorrow's health care possible today; bringing new hope to our patients, while advancing health research at a global level. With more than 1,700 scientists, clinical investigators, trainees and staff, as well as total revenues of more than \$100 million, OHRI is one of the foremost Canadian hospital-based research institutes.

Key Facts

- [1,766 researchers, trainees and staff \(en/at-a-glance/who/\)](#)
- [855 active grants, contracts and salary awards \(en/at-a-glance/what/\)](#)
- [552 active clinical trials \(en/at-a-glance/what/\)](#)
- [More than 40 active patent families under management \(en/at-a-glance/what/\)](#)
- [230,000 sq. ft. of research space \(en/at-a-glance/where/\)](#)
- [3rd largest hospital research institute in Canada as measured by funding from the Canadian Institutes of Health Research \(en/highlights/milestones-and-special-recognition/\)](#)

At A Glance

Who

Research is a team activity at the OHRI, involving scientists, clinical investigators, trainees and specialized support staff. Patients also play a crucial role in research by volunteering for studies and providing inspiration and ideas for improving care.

Scientists

OHRI has 110 scientists leading teams of five to 30 people each. Scientists have MDs, PhDs, or both, and spend the majority of their time on research. All OHRI scientists are also professors at the University of Ottawa and many are active physicians at The Ottawa Hospital.

Investigators

Investigators are generally physicians, nurses, or other health-care professionals at The Ottawa Hospital. They devote significant time to research while also being very active in clinical practice. OHRI has more than 400 investigators.

Trainees

OHRI has about 400 trainees who conduct much of the hands-on research at OHRI and come up with many of the innovative ideas for new studies. Trainees include graduate students, postdoctoral fellows, undergraduates, summer students and volunteers. Most are undertaking research at OHRI as part of a degree at the University of Ottawa.

Support staff

OHRI depends on more than 800 highly specialized support staff to conduct groundbreaking research. 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.

At A Glance

What

Research at OHRI is focused on answering important health questions and translating new findings into benefits for patients and the community. With more than 1,700 scientists, clinical investigators, trainees and staff, we are investigating virtually every major disease and condition. Our research spans the full spectrum of health science, from basic molecular biology and epidemiology, to clinical trials and the development of new therapies, to health services and knowledge translation research.

We have 855 active research grants, contracts and salary awards, and 552 active clinical trials. We also have more than 40 active patent families under management.

At A Glance

Where

The OHRI is a multi-sited research facility based at The Ottawa Hospital's Civic, General and Riverside campuses, with additional space at the University of Ottawa's Faculty of Medicine. With 230,000 square feet of dedicated basic and clinical research space, the OHRI has a number of specialized facilities, including the [Sprott Centre for Stem Cell Research](http://www.ohri.ca/centres/StemCellResearch/default.asp) (<http://www.ohri.ca/centres/StemCellResearch/default.asp>), the [Centre for Innovative Cancer Research](http://www.ohri.ca/newsroom/newsstory.asp?ID=258) (<http://www.ohri.ca/newsroom/newsstory.asp?ID=258>), the [Centre for Practice-Changing Research](http://www.ohri.ca/newsroom/newsstory.asp?ID=286) (<http://www.ohri.ca/newsroom/newsstory.asp?ID=286>) and several Good Manufacturing Practice Laboratories.

At A Glance

Leadership Team

The OHRI is a not-for-profit corporation governed by a Board of Directors that includes members of the University of Ottawa, The Ottawa Hospital, The Ottawa Hospital Foundation and the community.

Board Chair

- Ken Newport, Biotech Entrepreneur

Board Vice-Chair and Treasurer

- Ian Mumford, Chief Operating Officer, Canadian Blood Services

Board of Directors

- Dr. Jacques Bradwejn, Dean, Faculty of Medicine, University of Ottawa
- Ian Curry, President and CEO, DNA Genotek
- Gary Hannah, President and CEO , Vocantas
- Don Hewson, President and CEO, HBS Marketing
- Dr. Jack Kitts, President and CEO, The Ottawa Hospital
- Louis Lamontagne, President and CEO, LTL Global Innovations and Management
- Rose Lipiec, Financial Planner, TD Waterhouse Financial Planning
- Randall Marusyk, Managing Partner, MBM Intellectual Property Law
- Dr. Mona Nemer, Vice-President, Research, University of Ottawa
- Dr. Denis Prud'homme, Dean Faculty of Health Sciences, University of Ottawa
- Dr. Duncan Stewart, CEO and Scientific Director, Ottawa Hospital Research Institute, Vice-President of Research, The Ottawa Hospital and Professor of Medicine, University of Ottawa
- Bashir Surani, Member of The Ottawa Hospital Board of Governors
- D. Lynne Watt, Partner, Gowling Lafleur Henderson LLP
- Shirley Westeinde, Chair, Westeinde Group of Companies

Senior Management Team

The OHRI's senior management team provides scientific and administrative leadership.

- Dr. Duncan Stewart, CEO and Scientific Director
- Dr. Jay Baltz, Associate Scientific Director, Trainees
- Dr. Dean Fergusson, Program Director, Clinical Epidemiology
- Dr. Antoine Hakim, Program Director, Neuroscience
- Robert Hanlon, Chief Operating Officer
- Dr. Rashmi Kothary, Associate Scientific Director
- Dr. Michael McBurney, Program Director, Cancer Therapeutics

- Dr. Leo Renaud, Associate Scientific Director
- Dr. Michael Rudnicki, Program Director, Regenerative Medicine
- Dr. Alexander Sorisky, Program Director, Chronic Disease
- Dr. Valerie Wallace, Program Director, Vision

At A Glance

Vision and Strategic Research Directions

The OHRI's vision is to give our patients and their loved ones new hope through research that is making tomorrow's health care possible today.

This vision expresses our commitment to research that is focused on patients and inspired by patients. We approach our work with compassion and dedication each day, knowing that every question we answer and every problem we solve could eventually impact many people, including our own loved ones.

To support our new vision, we have developed two strategic research priorities:

1. **Regenerative and biological therapeutics:** Fostering “bench to bedside” research by turning basic discoveries in cellular and molecular biology into new regenerative and biological therapeutics to improve health.
2. **Practice-changing research:** Putting knowledge to work by performing high quality clinical research that can inform health decisions, and ensuring that results are optimally applied to improve health.

We have also developed a cross-cutting strategic research theme on vascular health, which is designed to foster an exciting area of research that focuses on the role of blood vessels in health and disease. This theme cuts across all of our existing programs, fits well with our partners and addresses a major challenge for the health and wellbeing of Canadians.

Success Stories

Stem cell therapies: the future of regenerative medicine

For more on the OHRI team's recent successes, check out these recent news stories and websites:

[Ottawa researchers to lead world-first clinical trial of stem cell therapy for septic shock](http://www.ohri.ca/newsroom/newsstory.asp?ID=306)
(<http://www.ohri.ca/newsroom/newsstory.asp?ID=306>).

[Dr. Michael Rudnicki](http://www.ottawalife.com/2011/09/top-25-mark-monahan-dr-michael-rudnicki/) (<http://www.ottawalife.com/2011/09/top-25-mark-monahan-dr-michael-rudnicki/>), and [Dr. Lynn Megeney](http://www.ottawalife.com/2011/09/top-25-part-3/) (<http://www.ottawalife.com/2011/09/top-25-part-3/>), among Top 25 People in Ottawa

[Top stem cell scientist, Dr. William Stanford, recruited to Ottawa](http://www.ohri.ca/newsroom/newsstory.asp?ID=275) (<http://www.ohri.ca/newsroom/newsstory.asp?ID=275>).

[Top stem cell scientist and pediatrician, Dr. Bernard Thébaud, recruited to Ottawa](http://www.ohri.ca/newsroom/newsstory.asp?ID=317)
(<http://www.ohri.ca/newsroom/newsstory.asp?ID=317>).

[Quest for a Cure: Going to risky lengths to treat MS](http://www.ctv.ca/CTVNews/WFive/20090213/w-five_ms_090213/#ixzz1tRscYxZq) (http://www.ctv.ca/CTVNews/WFive/20090213/w-five_ms_090213/#ixzz1tRscYxZq).

[Spratt Centre for Stem Cell Research website](http://www.ohri.ca/centres/StemCellResearch/default.asp) (<http://www.ohri.ca/centres/StemCellResearch/default.asp>).

[Stem Cell Network website](http://www.stemcellnetwork.ca/) (<http://www.stemcellnetwork.ca/>).

OHRI researchers are making tomorrow's health care possible for patients today

Imagine a world where the heart is repaired after a heart attack or the brain regenerated after a stroke. This is the enormous potential that stem cell research brings, and this is the incredible work that the Ottawa Hospital Research Institute (OHRI) is doing at the Spratt Centre for Stem Cell Research.

Stem cells: The building blocks of our bodies

"I've been working with stem cells my entire career," says Dr. Michael Rudnicki, senior scientist and Director of OHRI's Spratt Centre for Stem Cell Research and Regenerative Medicine Program, and professor at the University of Ottawa. "Stem cells are the building blocks that make up our bodies, and also the building blocks that repair damaged tissue. Stem cells are present with us throughout life, and if we can harness them, we can develop new therapies for treating many devastating and lethal diseases."

This year, the Spratt Centre is celebrating its fifth anniversary – and in this short time, it has quickly become a global leader for stem cell research.

"The Spratt Centre provides a unique multidisciplinary environment, with outstanding basic scientists, clinician scientists, trainees and staff working together to rapidly move discoveries from the bench to the bedside," says Dr. Rudnicki. "We also have cutting-edge equipment and a great environment for collaboration and learning."

Under Dr. Rudnicki's leadership, the Sprott Centre also provides a hub for Canada's Stem Cell Network, which brings more than 100 top stem cell researchers together to develop new therapies.

World-first discoveries and clinical trials

OHRI researchers have made a number of world-first discoveries, such as identifying the first stem cells in a muscle and in heart tissue, leading to the development of experimental protein-based drugs that can stimulate stem cells within the body to repair and regenerate damaged tissue.

They've also made great progress in stem cell transplantation, treating dozens of patients with multiple sclerosis with an experimental bone marrow stem cell transplant procedure, with very promising results.

The past year alone has been marked with many successes, including ground-breaking clinical trials. Dr. Duncan Stewart recently received Health Canada approval to test the world's first engineered stem cell therapy for heart attack, and he and Dr. Lauralyn McIntyre also received funding for the first-ever clinical trial of a stem cell therapy for septic shock.

"As an intensive care physician, I am always looking for new approaches to improve patient care," says Dr. McIntyre, who is also a scientist at OHRI and an assistant professor at the University of Ottawa. "Septic shock is one of the most common and devastating conditions we see, and despite our best efforts, between 30 and 40 per cent of patients don't survive. Researchers at the Sprott Centre have shown that stem cell therapy can triple the survival rate in an experimental model of septic shock, so we're really excited to test this with patients. This trial is just a first step, but it is a very exciting first step."



World-renowned researchers

By cultivating this unique and ambitious research environment, OHRI is proud to continue to recruit the best and the brightest researchers from around the world.

World-renowned scientist Dr. William Stanford joined the Sprott Centre in July 2011. His work on reprogramming normal adult blood and skin cells to turn them into powerful stem cells has enormous potential for understanding and treating many diseases.

World-class scientist Dr. Bernard Thébaud will also join the Sprott Centre this summer. As a pediatrician, jointly recruited with the Children's Hospital of Eastern Ontario (CHEO), Dr. Thébaud aims to develop and test new regenerative therapies for premature babies with underdeveloped lungs.

"I came to the Sprott Centre because I wanted to interact with great stem cell scientists, but also with clinicians who treat patients every day," says Dr. Stanford, senior scientist at the OHRI and professor at the University of Ottawa. "The Sprott Centre is great for this: if I have an idea for a new therapy I can walk down the hall and talk with a cardiologist or a bone marrow transplant specialist to see what they think. Bringing basic and clinical researchers together like this is crucial for the development of new therapies."

Five great years

After five great years, the team is certain there is much more success to come:

“We are all so happy and excited – this has been an extraordinary few years full of discoveries and we expect this productivity and innovation to continue,” says Dr. Marjorie Brand, senior scientist at OHRI and associate professor at the University of Ottawa.

“New stem cell therapies are coming, and within our lifetime we are going to see a radical transformation in the way medicine is practiced,” says Dr. Rudnicki. “And, most importantly, in the way patients are treated.”

The Sprott Centre was named in honour of donors Eric and Vizma Sprott. Many other donors to The Ottawa Hospital Foundation have supported the Centre, in addition to the Canada Foundation for Innovation, the Government of Ontario, the Canadian Institutes of Health Research and the Stem Cell Network.

Success Stories

Changing practice, saving lives

How Minimally Invasive Surgery is transforming patient care at TOH

In February 2007, just three months after he was married, Kevin Shah and his family were shocked to find out his blurred vision was a result of a tumour at the base of his brain.

Kevin underwent two surgeries in his home country of India, but neither operation successfully removed a significant portion of the tumour.

“We were a little surprised when the surgeries did not go well,” says Shah. “But the tumour was very, very deep and doctors could not access it.”

It was in 2012 that Shah came to The Ottawa Hospital (TOH) to be treated by one of the most cutting-edge teams in the world.

Minimally Invasive Surgery at The Ottawa Hospital

TOH has undergone an incredible transformation over the last few years and is now celebrating a huge achievement: a world-class minimally invasive surgery (MIS) program, which uses innovative technology and techniques that cause as little trauma to patients like Shah as possible.

Based on a strategic plan that took shape under the leadership of Dr. Éric Poulin in 2006, TOH made minimally invasive surgery a major priority and set about recruiting new physicians, building new facilities, and bringing in some of the best technology in the world. As a result, TOH’s MIS program is allowing more rapid and less painful recoveries for thousands of patients across Eastern Ontario, Canada and the world.

“We wanted to make a surgical encounter as uncomplicated as a trip to the dentist. Can you imagine having an operation that lays you up for six weeks or three months, versus an operation where you can go back to work next week?”

Dr. Éric Poulin, Head of the Department of Surgery

“We wanted to make a surgical encounter as uncomplicated as a trip to the dentist,” says Dr. Poulin, Head of the Department of Surgery. “Can you imagine having an operation that lays you up for six weeks or three months, versus an operation where you can go back to work next week?”

Over the years surgical technology has progressed by leaps and bounds, says Dr. Poulin. Long before MIS, a gallbladder operation would result in a hospital stay of nine days. Now, more than 90 per cent of these patients are treated as outpatients with no hospital stay at all.

Over the past year, the hospital has performed groundbreaking minimally invasive procedures across all departments: from bariatric and urology, to gynecology, neurology and beyond.

“I didn’t expect that much of the tumour would be removed”

Shah was referred to TOH surgeons Dr. Amin Kassam, Head of the Division of Neurosurgery, and Dr. Martin Corsten, Head of the Department of Otolaryngology - Head and Neck Surgery, and clinical investigator at the Ottawa Hospital Research Institute (OHRI). Using the revolutionary NICO Myriad, a tiny but incredibly precise multi-functional device that

acts as scissors, a dissector and suction device in one, the team was able to operate through Shah's nose and sinuses to remove 90 per cent of his tumour with little impact to the surrounding brain tissue.

Incredibly, Shah was discharged from the hospital after just three days.

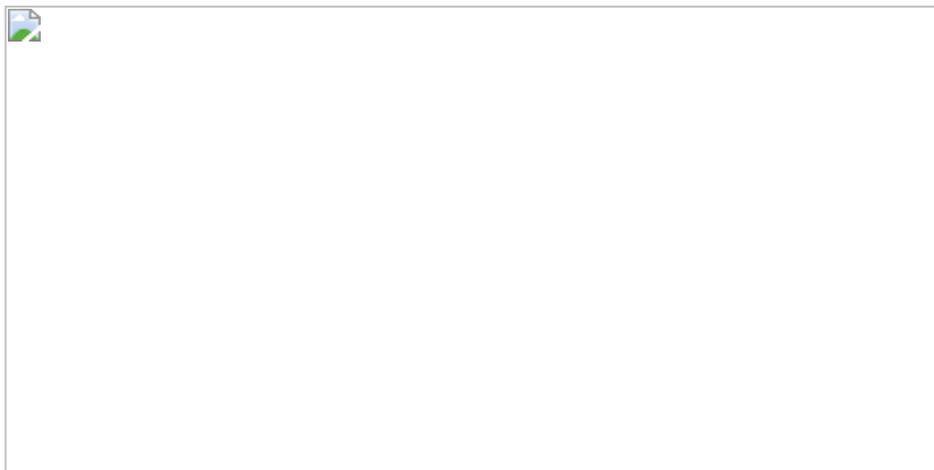
"I feel great," he says. "When you look at me you'd never know I had such a long, arduous surgery."

"I didn't expect that much of the tumour would be removed," says Jayprakash Shah, Kevin Shah's father. "For me, it's a miracle."

Dr. Kassam and Dr. Corsten have been working together for a number of years, and have dedicated much of this time to refining these minimally invasive techniques and conducting research in the field.

"It's not just about avoiding incisions, because folks can live with incisions," says Dr. Corsten. "Minimally invasive surgery brings a dramatically different hospital stay and set of side effects after. This is a tremendous advancement."

"Ottawa seems to be becoming a destination site for minimally invasive neurosurgery," says Dr. Kassam, adding that a group of nurses, surgeons, and anesthesiologists collaborate to make these surgeries possible. "I think this success is reflective of a team that truly works together."



Beyond neurosurgery: how MIS is incorporated across TOH

Shah's story is just one example of the incredible, life-saving work being done every day through TOH's MIS program.

In 2011, with the help of generous donations from the community, TOH acquired the da Vinci Surgical System – a robotic device that can be used for everything from urologic, gynecologic, and cardiothoracic, to general surgeries.

"Some people think that the da Vinci robot is a robot doing the surgery, which it's not," says Dr. Rodney Breau, surgical oncologist at TOH and associate scientist at OHRI, who trained for two years in the United States learning how to use the equipment. "It's an instrument that allows us to do advanced and complex procedures more easily and with more refined movements."

With the da Vinci, the surgeon performs every aspect of the surgery through sophisticated controls and a high-definition 3D image – all connected to miniature instruments that operate through tiny cuts the size of a keyhole.

"Having the robot at TOH will mean that patients living in Ottawa and the surrounding area can be treated here with the best technology available," says Dr. Breau. "With robotic-assisted surgery, our patients are experiencing better outcomes following a surgery and a quicker return to daily life – which is what every patient wants."

MIS techniques are also improving the patient experience for gastric bypass patients.

"Before minimally invasive techniques, gastric bypass surgery meant a pretty large wound – creating a lot of pain postoperatively," says Dr. Isabelle Raïche, bariatric surgeon. "Now we can get access to the abdomen with a camera that is only 10 millimetres in size – so instead of a 20-centimetre incision, we have a few incisions the size of my little finger."

“This decreases infection and hernias, and gets patients back on their feet much faster,” says Dr. Raïche.

“There is not a single department that is not covered by minimally invasive surgery. The impact on patients, and the health-care system, is unbelievable.”

Dr. Éric Poulin, Head of the Department of Surgery

A vision brought to life

Today, minimally invasive techniques and technology are seen throughout all surgical specialties at TOH, not only impacting the patient experience, but also the health-care system in general – reducing wait times and hospital stays.

“This didn’t happen by chance,” says Dr. Breau. “This was the result of a vision, and I think it is really paying off.”

“There is not a single department that is not covered by minimally invasive surgery,” says Dr. Poulin. “The impact on patients, and the health-care system, is unbelievable.”

Success Stories

The virtual road to recovery

How the Rehabilitation Virtual Reality Laboratory helped an injured Canadian diplomat return to normal life

Canadian diplomat Bushra Saeed was 25 years old when an improvised explosive device (IED) ripped through the light-armoured vehicle (LAV) she was travelling in, in Kandahar City, Afghanistan.

“When I woke up... I knew immediately my legs weren’t really working,” she says, adding that after the explosion, soldiers pulled her to a safe area, placed tourniquets on her legs and stayed with her to provide some much-needed comfort.

“I remember looking up in the sky and making sure not to look down, because I knew it was bad,” she says.

“For two years I was in and out surgeries,” Saeed says of the injuries that spanned her whole body. “It was very hard on the soul.”

Saeed’s right leg was amputated through the knee and her lower left leg, broken in two places, had much of the flesh torn from it – losing 50 per cent of its mobility.

“My biggest fear was not knowing where I would be in a year, or even two, five or 10 years,” says Saeed. “I was concerned about being able to have a family, or being dependent on a walker, cane or wheelchair.”

With the support of a dedicated rehabilitation team, it was the leading-edge virtual reality technology at The Ottawa Hospital Rehabilitation Centre (TOHRC) that made all the difference in Saeed’s rehabilitation.

Today, Saeed says, “It’s a shock that I’m able to do as much as I can.”



Virtual Reality Lab provides TOH patients with invaluable rehab tools

In June 2011, TOHRC treated its first patient in the Rehabilitation Virtual Reality Laboratory (RVR Lab). The first of its kind in Canada, the RVR Lab came to TOHRC through a partnership between The Ottawa Hospital and the Canadian Forces Health Services Group.

At the heart of the RVR Lab is a Computer Assisted Rehabilitation Environment system, better known as the CAREN system. The CAREN system allows patients, such as those learning to walk with a prosthetic device, to improve their mobility, balance, and ability to move within complex environments. It is also used for cognitive rehabilitation for patients who have suffered a brain injury, or those with post-traumatic stress disorder.

Using room-size 3D graphics and a moving platform with treadmills, the CAREN system simulates walking in a range of different environments – from a sidewalk, to bumpy park path, or a bridge swaying in the wind.

“Patients feel protected and safe here, so they actually take more risks than they might if we were doing what we used to do, which is take someone outside onto the hills behind the General Campus to walk down the uneven slopes and grass,” says Dr. Nancy Dudek, physiatrist, who specializes in working with amputees. “That can be a bit scary.”

Using world-class motion-analysis technology, the CAREN system has a rigorous safety system.

“I’ve been at the rehab centre for over two years now, and I’ve seen people come in a wheelchair and leave walking without a cane. It’s such a nice feeling to know that [the CAREN system] is doing such positive work.”

Bushra Saeed, Patient

“Patients are attached to a harness while they are working, testing their balance, and pushing their limits,” says Marie-Andrée Paquin, senior physiotherapist. “Because it is such a safe environment, we can try things earlier, things we may not have taken the chance on before.”

A strong multidisciplinary team is required to make the CAREN system a success for patients, including a system operator, medical staff, physiotherapists, psychologists, occupational therapists, researchers, and technical engineers.

At The Ottawa Hospital Rehabilitation Centre, researchers use data gathered from the CAREN system and in their laboratory to develop tailored virtual environments. For example, in partnership with the City of Ottawa, they’ve created a full 3D model of the city.

“We’re at the cutting edge, providing the best care, treatment and access for people in our area,” says Edward Lemaire, research associate at TOH and clinical investigator at the Ottawa Hospital Research Institute.

“Of course this isn’t in isolation,” he adds. “Patients do a full rehabilitation program here, with the CAREN system being a very strong part of that full continuum of care.”

How TOHRC’s team used CAREN to help Saeed run again

“The good thing about the CAREN system is I was able to practice and build not only my confidence, but also my capacity,” says Saeed, adding that it was an incredible achievement the first time she was able to run on the system.

“Patients are attached to a harness while they are working, testing their balance, and pushing their limits. Because it is such a safe environment, we can try things earlier, things we may not have taken the chance on before.”

Marie-Andrée Paquin, Senior Physiotherapist

“To know that if I needed to run quickly I could, was such a relief,” she says. “It brought tears to my eyes.”

Every day Saeed witnesses the benefits of her rehabilitation program as she continues treatment with her dedicated TOHRC team.

“This weekend I was at Dow’s Lake and I was on the dock,” she says. “A year and a half ago, I would have been on my hands and knees afraid of falling, but we had a program on the CAREN system where I was able to practice my balance.”

Her entire team is impressed and inspired by her progress.

“I am proud to be part of the team that helped her get to where she is today and keep encouraging her to move further. Today, at 28 years old, her life is not over,” says Paquin. “She has the ability to attain her goals.”

Saeed believes that too – both for herself and for others.

“I’ve been at the rehab centre for over two years now, and I’ve seen people come in a wheelchair and leave walking without a cane,” says Saeed. “It’s such a nice feeling to know that it is doing such positive work.”

Highlights

Research Improving Health Today



Saving lives by improving CPR

Every year, close to 45,000 Canadians suffer sudden cardiac arrests and less than 10 per cent survive. Prompt cardiopulmonary resuscitation (CPR) and defibrillation are key to getting the heart started again; however, there is still controversy about how best to perform these procedures. This year, [Dr. Ian Stiell](http://www.ohri.ca/Profiles/stiell.asp) (<http://www.ohri.ca/Profiles/stiell.asp>), and his colleagues resolved a major debate by showing that one minute of CPR from paramedics and firefighters before defibrillation is just as good as three minutes, and may even be better in some cases. The [study](http://www.ohri.ca/newsroom/newsstory.asp?ID=270) (<http://www.ohri.ca/newsroom/newsstory.asp?ID=270>), which is the largest cardiac arrest clinical trial in the world, was published in the prestigious [New England Journal of Medicine](http://www.nejm.org/doi/full/10.1056/NEJMoa1010076?query=featured_home) (http://www.nejm.org/doi/full/10.1056/NEJMoa1010076?query=featured_home), and the results have influenced CPR practices globally.

Personalizing cancer treatment

Breast cancer treatment has become highly personalized, with women routinely receiving treatments tailored to the molecular profile of their tumour. But what if the cancer changes over time as it spreads to other organs? [Dr. Mark Clemons](http://www.ohri.ca/Profiles/clemons.asp) (<http://www.ohri.ca/Profiles/clemons.asp>), designed a clinical trial to answer this question in 121 women with metastatic breast cancer. He found that in nearly 40 per cent of cases, the cancer had changed, making it more or less susceptible to certain treatments. Doing a second biopsy to check the molecular profile of the secondary tumours resulted in better treatment for one in seven women in the study. The [results](http://www.ohri.ca/newsroom/newsstory.asp?ID=284) (<http://www.ohri.ca/newsroom/newsstory.asp?ID=284>), published in the [Journal of Clinical Oncology](http://jco.ascopubs.org/content/early/2011/11/28/JCO.2010.33.5232.abstract) (<http://jco.ascopubs.org/content/early/2011/11/28/JCO.2010.33.5232.abstract>), have changed medical practice around the world.

Better diagnosis of bleeding strokes

New research led by [Dr. Jeff Perry](http://www.ohri.ca/Profiles/perry.asp) (<http://www.ohri.ca/Profiles/perry.asp>) could save thousands of severe headache patients each year from having to undergo painful invasive testing for subarachnoid hemorrhage - a rare type of bleeding stroke. Traditionally this type of stroke could be ruled out only with a CT scan and a spinal tap, but Dr. Perry's new study shows that a CT scan is enough, if done with a modern machine within six hours. The findings, published in the [British Medical Journal](http://www.bmj.com/content/343/bmj.d4277.abstract) (<http://www.bmj.com/content/343/bmj.d4277.abstract>), could help increase hospital efficiency, in addition to the direct benefits to patients.

New advance in managing HIV

People with HIV are increasingly able to avoid taking unnecessary antibiotics associated with major side effects, thanks to research led by Dr. Jonathan Angel (<http://www.ohri.ca/Profiles/angel.asp>). It was previously assumed that HIV patients with a low CD4 immune cell count always had to take these antibiotics to avoid getting pneumonia and other infections, however a systematic review led by Dr. Angel revealed that if the amount of virus in the blood is very low, it is safe to stop taking these medications even if there hasn't been what has generally been accepted as an adequate improvement in immune function. This research, published in PLoS One (<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0028570>), has already improved health and quality of life for many people with HIV in Ottawa, and it is beginning to have an impact around the world.

Rapid research reviews improve health decision-making

Health care administrators may try their best to incorporate research evidence into the development of new policies and procedures, but with more than 500,000 medical research papers published each year, it can be difficult to keep up. The establishment of "The Ottawa Hospital Evidence Secretariat" is now making it easier for decision-makers to quickly access research evidence, with benefits for both patients and the hospital budget. Under the leadership of Dr. David Moher (<http://www.ohri.ca/Profiles/dmoher.asp>), the group has already conducted 16 rapid evidence reviews (<http://www.ohri.ca/hta/>), which have contributed to the development of innovative new approaches to improve care for pregnant women, newborns, people with chronic diseases and patients in the emergency department. They have summarized their experience in a recent Systematic Reviews (<http://www.systematicreviewsjournal.com/content/1/1/10>), paper.

Highlights

Research Providing Hope for Tomorrow



Fighting cancer with viruses

While viruses are normally thought of as parasites that cause colds, flus and other infectious diseases, Dr. John Bell (<http://www.ohri.ca/Profiles/bell.asp>)'s research has shown that certain viruses can be harnessed to selectively attack cancer cells without harming normal cells. This year, Dr. Bell and his team made a major breakthrough by showing for the first time that a viral therapy can consistently and selectively replicate in cancer tissue after systemic delivery through the human bloodstream. The research (<http://www.ohri.ca/newsroom/newsstory.asp?ID=269>), published in renowned journal Nature (<http://www.ncbi.nlm.nih.gov/pubmed/21886163>), suggests that viruses may be able to treat advanced cancer that has spread to multiple organs with minimal side effects. We'll soon know for sure, with larger clinical trials (<http://www.ohri.ca/newsroom/newsstory.asp?ID=271>), now underway at The Ottawa Hospital and other centres around the world.

Novel stem cell therapy for septic shock

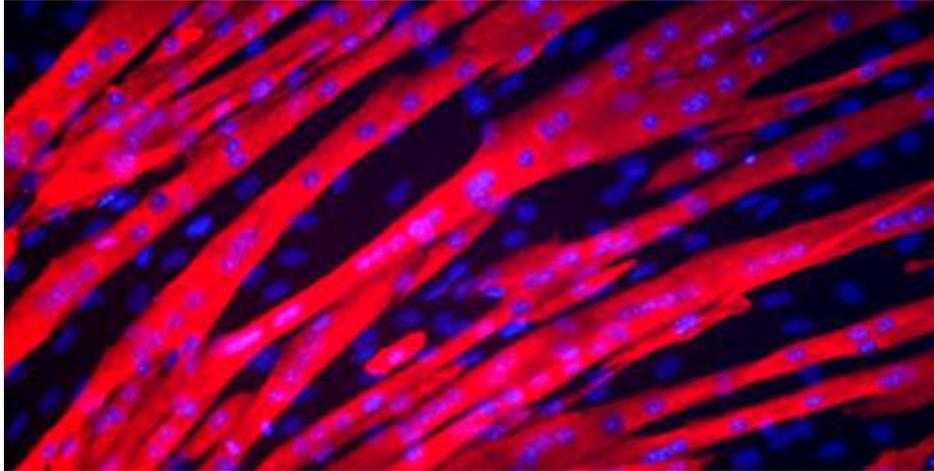
Patients at The Ottawa Hospital will soon be the first in the world to receive an experimental stem cell therapy for septic shock, a highly deadly condition that can occur when an infection spreads throughout the body and damages vital organs. The Canadian Institutes of Health Research and the Stem Cell Network have awarded nearly \$450,000 for a clinical trial (<http://www.ohri.ca/newsroom/newsstory.asp?ID=306>), of this new therapy, which will be led by Dr. Lauralyn McIntyre (<http://www.ohri.ca/Profiles/mcintyre.asp>). The trial is based on extensive pre-clinical research led by Dr. Duncan Stewart (<http://www.ohri.ca/Profiles/stewart.asp>), which has shown that stem cell therapy can triple survival in a mouse model of septic shock by preventing organ injury and increasing bacterial killing.

New approach to target genetic muscle disease

Research led by Dr. Rashmi Kothary (<http://www.ohri.ca/Profiles/kothary.asp>) is providing new hope for patients and families affected by spinal muscular atrophy (SMA), a devastating genetic disease that involves the progressive weakening of muscles and death usually in infancy or childhood. Dr. Kothary and his team discovered that a drug called fasudil (<http://www.ohri.ca/newsroom/newsstory.asp?ID=304>) can dramatically extend lifespan, increase muscle fibre size and normalize some kinds of behavior in mice with SMA. This research is particularly promising because fasudil has already been used in human clinical trials for other conditions, meaning that it could possibly be retargeted to use in clinical trials for SMA more quickly than a completely new drug. The research was published in BMC Medicine (<http://www.biomedcentral.com/1741-7015/10/24/abstract>).

New genetic link to cardiovascular disease

Dr. Michel Chrétien (<http://www.ohri.ca/Profiles/chretien.asp>)'s group has discovered a novel genetic variation in a Québec family that cuts their risk of cardiovascular disease by at least half. The variation was found in a gene called PCSK9, which Dr. Chrétien co-discovered in 2003. This gene is involved in cholesterol metabolism, and the variation results in lower levels of “bad” cholesterol. The study, which is a collaboration with l’Institut de recherches cliniques de Montréal, also suggests that such protective variations may be more prominent in the French Canadian population. Further research could lead to the development of novel cholesterol-lowering therapies. The study is published in Clinical Chemistry. (<http://www.clinchem.org/cgi/content/abstract/clinchem.2011.165191v1>).



New insight into muscle development and regeneration

Dr. Michael Rudnicki (<http://www.ohri.ca/Profiles/rudnicki.asp>) identified the first stem cells in adult muscle several years ago and his team has continued to make major breakthroughs in understanding how these stem cells work and how they may be harnessed to repair and regenerate muscle tissue. They recently discovered that a protein called Wnt7a promotes growth of muscle tissue in two ways: stimulating muscle stem cells to produce new muscle fibres, and stimulating these muscle fibres to get bigger and more powerful. The finding, published in Nature Cell Biology. (<http://www.ncbi.nlm.nih.gov/pubmed/22179044>), represents the first example of a receptor being “wired” to different pathways at different levels of tissue development for a common purpose. This research could lead to the development of novel treatments for patients with muscle degeneration.

Highlights

Milestones and Special Recognition

Ranking among the best

OHRI ranked third this year among Canadian hospital-based research institutes for funding from the Canadian Institutes of Health Research (<http://www.cihr.ca/e/193.html>) (CIHR), up from eighth just 10 years ago. In total, OHRI researchers held 156 active CIHR grants and salary awards in 2011-2012, worth more than \$20 million. CIHR is the most important and most competitive source of peer-reviewed funding for health research in Canada, so OHRI's growing success with CIHR provides important evidence of the overall success of the Institute. OHRI also ranked highly in Research Infosource (<http://www.researchinfosource.com/2011Top40sup.pdf>)'s list of Canada's Top 40 Research Hospitals and in SCIMAGO (http://www.scimagoir.com/pdf/sir_2011_world_report_ni.pdf)'s research publication impact ranking. Other local hospitals and universities have also ranked highly in research measures in recent years, helping to build Ottawa's reputation as a leading centre for health research.



New cancer research facility opens

OHRI has opened a new laboratory that is uniquely designed to accelerate the development and testing of new cancer therapies. The Centre for Innovative Cancer Research (<http://www.ohri.ca/newsroom/newsstory.asp?ID=258>), located on the third floor of TOH's Cancer Centre expansion at the General Campus, includes sophisticated equipment to analyze cancer cells at the molecular level and develop and test new treatments in cancer models. Promising treatments can then be manufactured in a new "clean room" laboratory and delivered to patients just one floor below. Another special laboratory allows researchers to analyze patient tumour samples and evaluate their response to treatment so that better, more personalized therapies can be developed. Construction was funded by the Canada Foundation for Innovation and The Ottawa Hospital Foundation.

New research building focused on transforming patient care



Medical research often happens in small steps, but a new facility at The Ottawa Hospital is designed to enable researchers to answer the big questions that can truly change medical practice and make a difference for patients. Called the Centre for Practice-Changing Research (<http://www.ohri.ca/newsroom/newsstory.asp?ID=286>), the new two-storey building provides space for approximately 275 clinicians, researchers and staff from The Ottawa Hospital and OHRI and 60 researchers from the adjacent Children's Hospital of Eastern Ontario (CHEO). All the researchers are affiliated with the University of Ottawa and the building is connected to all three institutions at the Smyth Road academic health sciences centre. Construction was funded by the Canada Foundation for Innovation, The Ottawa Hospital and the CHEO Foundation.

Five years of groundbreaking stem cell research

OHRI's Sprott Centre for Stem Cell Research (<http://www.ohri.ca/centres/StemCellResearch/default.asp>), celebrated its fifth anniversary this year, with a number of major milestones and breakthroughs to look back upon. Under the leadership of Dr. Michael Rudnicki, Sprott Centre scientists have made important discoveries that could help with the development of new therapies for diseases that affect the heart, muscle, brain, blood and other organs. An experimental stem cell therapy for multiple sclerosis developed at OHRI has also continued to show promise in human clinical trials, and further stem cell trials are expected to start soon for heart attack and septic shock. Over the last year, OHRI also recruited world-renowned stem cell researchers, Dr. William Stanford and Dr. Bernard Thébaud, while Dr. Rudnicki and Dr. Lynn Megeney were named two of the Top 25 People in Ottawa this year by Ottawa Life Magazine. See Success Story (<en/success-stories/stem-cell-therapies/>) for further details.

Neurosurgeon researcher named Woman of Influence

Dr. Eve Tsai (<http://www.ohri.ca/Profiles/tsai.asp>), was named one of Canada's Top 25 Most Influential Women (<http://www.womenofinfluence.ca/dr-eve-c-tsai/>) of 2011 by Women of Influence magazine. As a neurosurgeon, associate scientist and assistant professor, Dr. Tsai focuses her influence on bringing clinicians and researchers together to develop better treatments for patients with spine and brain diseases. She has established a multidisciplinary research group focused on investigating stem cells, nanotechnology and tissue engineering for spinal cord repair. She has also developed a novel MRI imaging technique that allows surgeons to easily visualize spinal cord nerve fibres and identify those that are healthy and those that are disrupted.

Outstanding science outreach

Alexis Given, a PhD student in Dr. Dennis Bulman's group, received the prestigious Synapse Mentorship Award (<http://www.cihr-irsc.gc.ca/e/43723.html>), from the Canadian Institutes of Health Research for her outstanding efforts in youth science outreach. As a member of Let's Talk Science, Ms. Given has delivered more than 90 science outreach activities in local schools, involving about 4,000 youth. She also co-organized the first StemCellTalks event in Ottawa, and has travelled to Nunavut and Africa to give science workshops.

