2017 Annual Report

St. Joseph's Healthcare Hamilton | The Research Institute of St. Joe's Hamilton

Introduction

The Research Institute of St. Joe's Hamilton represents a collaborative community of researchers that strive to improve the quality of life of patients in Hamilton and around the world. The impacts in science and medicine that our researchers make reach deep into the local community and stretch far and wide internationally.

Our researchers often form collaborative research teams that extend across medical and scientific disciplines both within our Research Institute and beyond its borders. Working in partnerships fosters a culture of exploration, and inquiry in the academic and scientific community at St. Joseph's Healthcare Hamilton.

The creation of the Research Institute in 2014 has ensured this culture has spread across our organization – inspiring administrators, nurses, learners and allied health professionals to not only take pride in research, but to help create solutions that implement new discoveries into practice.

Our organization strives to deliver the best possible care to our local community while also making a global impact through the new diagnostics, processes and treatments developed at St. Joseph's Healthcare Hamilton.

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Author: Sebastian Dobosz
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A Word from Dr. Gail Martin

Executive Director,
The Research Institute
of St. Joe's Hamilton

It is an exciting time to join the Research Institute of St. Joe's Hamilton as it enters its next phase of operation. A major goal is to deepen the synergistic interactions with our partners across the city and beyond to collaborate and apply the latest technologies in our research for the societal and economic benefit of all Canadians.

The vision to create the research institute in 2014 enabled us to operate dynamically, and proactively. We work to simplify administrative processes, advocate for our researchers, reduce risk by making better decisions faster - allowing our researchers to work more efficiently and grow our research volume across clinical, translational, evaluative, and fundamental research.

The scientific understanding we gain today becomes the healthcare of tomorrow. That knowledge drives the Research Institute of St. Joe's Hamilton. Our researchers are united in their common goal of improving the quality of life of patients across Canada and globally. We hope you enjoy reading about the impacts that they are making.

A Word from Sonny Monzavi

Chair, Board of Directors,
The Research Institute
of St. Joe's Hamilton

To improve the care that patients receive, we first need to better understand the issues that our patients face. Research and scientific inquiry allows us to bring better diagnostics, treatments and care practices to patients within the walls of our hospital and beyond.

Research in Hamilton benefits tremendously from the environment of collaboration and teamwork found within our city. Our partnership with McMaster University and the Michael G. DeGroote School of Medicine enables us to leverage our talents across Hamilton, creating an integrated ecosystem of research and medical care delivery.

This Annual Report will share with you the inspiring stories of some of the brightest members of our research community. We invite you to join us in learning more about their work.

Tackling anxiety around the world

My favourite part of conducting research in my field is being able to directly make a difference to clinical care and improve the lives of the patients we serve. I work with our team to develop research questions based on the real issues that arise in the clinical setting. We then design studies that will inform and potentially transform the clinical care that we provide.

Dr. Randi McCabe

The Anxiety Treatment and Research Clinic (ATRC) combines psychiatric and psychological treatment for anxiety disorders with cutting-edge research. The ATRC serves patients in the greater Hamilton community; the research it generates makes global impacts in helping patients manage anxiety disorders.

Through collaboration, research, and publishing, Dr. Randi McCabe and her team have been able to make impacts that reach far beyond the walls of St. Joseph's Healthcare Hamilton.

In 2004, ATRC researchers published *10 Simple Solutions to Panic*, a workbook for overcoming panic symptoms. Since that time, it has sold over 25,000 copies and has been translated into six languages. It is used by consumers and mental health professionals around the globe.

In 2012, they published *The Cognitive Behavioural Workbook for Menopause*, which gives women in menopause the tools to use cognitive-behavioural therapy to manage problematic symptoms related to this life transition, including anxiety.

In 2015, they published *Phobias: The Psychology of Irrational Fear, An Encyclopedia*. This work is a key reference source that is used by students, researchers, and faculty across North America.

Today, anxiety researchers at St. Joseph's Healthcare Hamilton are working on a free, open-source, structured diagnostic interview called the Diagnostic Assessment Research Tool or DART. Structured diagnostic interviews are critically important tools used by both clinicians and researchers. In the field of mental health, structured diagnostic interviews can be used to identify mental disorders and to determine appropriate care pathways and advance research on understanding the nature of symptoms and their treatment.

DART will be made available at no cost, in an effort to ensure broad uptake and to help researchers, hospitals and academic institutions to conserve budgets.

"In the past, researchers at the ATRC helped patients around the world treat themselves by learning and implementing cognitive behavioural therapy. Now, our work is helping clinicians and researchers around the world complete diagnostic assessments in a thorough and efficient way that reduces time burden on patients and provides significant cost savings" says Dr McCabe.

Work is presently underway to develop the DART on an electronic platform that will allow for comprehensive data extraction at a symptom level. This data will facilitate our ability to research specific risk factors and presentations of mental illness.

McMaster and St. Joe's cultivate medicinal cannabis knowledge

Medicinal cannabis has been legal in Canada since 2001, but there is still little research on its effectiveness. A new research centre has been launched by McMaster University and St. Joseph's Healthcare Hamilton to address the issue.

The multidisciplinary Michael G. DeGroote Centre for Medicinal Cannabis Research (CMCR) will focus on conducting research, sharing evidence-based information and creating a network of professionals interested in further understanding medicinal cannabis.

Leading this initiative are co-directors Dr. James MacKillop and Dr. Jason Busse.

Dr. MacKillop is a professor of psychiatry and neurosciences at McMaster's Michael G. DeGroote School of Medicine, and director of the Peter Boris Centre for Addictions Research at St. Joseph's Healthcare Hamilton. Dr. Busse is an associate professor of anesthesia for McMaster's medical school and a researcher for the Michael G. DeGroote National Pain Centre.

"Medicinal cannabis use is skyrocketing in Canada and the number of possible conditions keeps rising, but the state of the evidence is often quite poor," says Dr. MacKillop. "There is an urgent need for rigorous, objective, multidisciplinary research on medicinal cannabis. That need was the impetus for creating this centre."

The leadership team, working with more than 25 researchers, seeks to understand the use of medicinal cannabis in managing pain, and other clinical indications, as well as its potential for addiction and other adverse events.

The CMCR is funded by the Michael G. DeGroote Initiative for Innovation in Healthcare, with contributions from philanthropists Michael G. DeGroote and the Boris family of Hamilton.

"A reality of the mental health landscape is that cannabis use and misuse are very common among psychiatric patients," says Dr. MacKillop. "That's why it is important for this research centre to be directly connected to a major mental healthcare provider."

A breath of hope for patients with lung fibrosis

Understanding more about an incurable disease is the first step towards finding a cure.

According to the Canadian Pulmonary Fibrosis Foundation, idiopathic pulmonary fibrosis (IPF) affects as many as 30,000 Canadians – resulting in around 5,000 deaths every year. This represents a higher mortality rate than most types of cancer, and IPF is currently incurable.

Patients diagnosed with IPF experience scarring in their lungs – making it difficult for them to breathe. Doctors and scientists don't know exactly why this scarring occurs.

Dr. Kjetil Ask and his team have discovered new ways to protect cells affected by fibrosis. The group found that two proteins – named GRP78 and CHOP – help to stop the unfolding protein response that causes scarring at a cellular level.

"It's not easy identifying how to stop a disease with unknown origins – so every new breakthrough and finding matters," says Dr. Ask. "Once you know what to target at the cellular level, you have a target for drug development."

Previous research and testing at St. Joe's has contributed to the development of two new medications that successfully slow down the progression of IPF by 50%. Thanks to clinical trials led in our hospital and around the world, both of these drugs are now covered by the Ontario Drug Benefit program.

Drug development has been able to give patients an extra couple years of life by slowing down their disease, and it also gave patients, physicians and scientists hope that this incurable disease may one day be curable.

By continuing to uncover ways to slow down this difficult disease, scientists such as Dr. Ask are making significant contributions to the global effort to fight IPF.

Standing on the shoulders of giants

It is tremendously gratifying to be able to use our research laboratories at St. Joe's to try and come up with solutions for patients who are referred to us from across the province with severe and complex airway diseases. Translating our laboratory findings to something that is meaningful for patients is a wonderful example of the bedside-bench-bedside medicine that has been the hallmark of research and clinical care at the Firestone Clinic.

Dr. Parameswaran Nair

"Mentorship is a very, very important aspect of a researcher's career," says Dr. Parameswaran Nair, respirologist and researcher at St. Joseph's Healthcare Hamilton and a professor of Medicine at McMaster University. "Anybody can be a supervisor, but not everybody can be a mentor."

In 1996, Dr. Nair was working as a research registrar in England. Shortly afterwards, he was recruited to St. Joe's by Dr. Freddy Hargreave. Dr. Hargreave was a pioneer in asthma research – developing not only new ways to measure airway inflammation and responsiveness, but also changing the focus of respirologists from treatment to prevention and control. He served as Dr. Nair's mentor until his untimely death in 2011.

"He was a true mentor in every sense of the word. He and his family provided me with unselfish love and affection, expecting nothing in return," says Dr. Nair. "It was a very humbling experience when he retired and handed over his lab to me and entrusted his patients to my care."

Building upon Dr. Hargreave's research program, Dr. Nair and his team published evidence in the New England Journal of Medicine that a biologic, called Benralizumab, may reduce the need for steroid-based medications by up to 75% in patients with severe asthma. Steroid-based medications carry with them a risk of long-term side effects, such as osteoporosis, glaucoma, cataracts, diabetes, headaches, nausea, sleep problems and weight gain. Reducing patients' need for them represents a significant improvement to their quality of life.

After regulatory review, this treatment could soon be available for doctors to prescribe in Canada, the United States, Europe and beyond.

In 2016, Dr. Nair was appointed the inaugural holder of the Frederick Hargreave Teva Innovation Chair in Airway Diseases. It was through the mentorship of Dr. Hargreave that Dr. Nair was able to come to St. Joe's and establish himself as a world-renowned expert in asthma and chronic obstructive pulmonary disorder (COPD) – contributing to advancements in asthma care that benefit patients in our hospital and around the world.

A Year in Numbers

Total # of Researchers

172
+
520
Research Staff

Total Publications

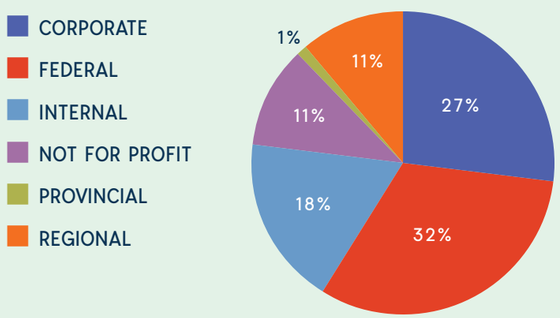
914

Total Funding

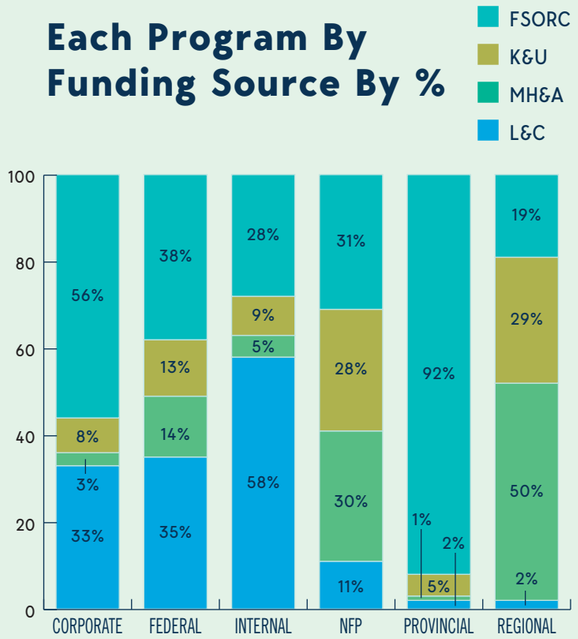
$26,429,766

144 Clinical research projects started this year

Funding Sources by %

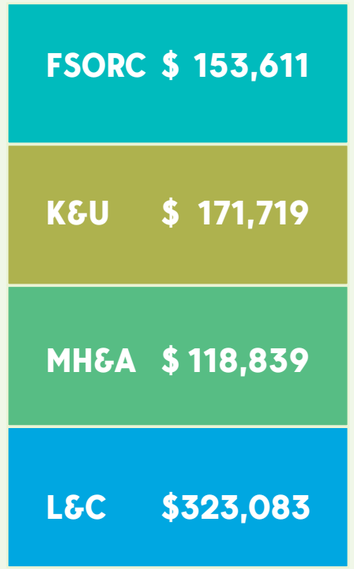


Each Program By Funding Source By %

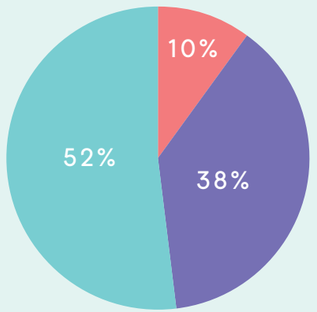


	CORPORATE	FEDERAL	INTERNAL	NOT FOR PROFIT	PROVINCIAL	REGIONAL
FSORC	56%	38%	28%	31%	92%	19%
K&U	8%	13%	9%	28%	5%	29%
MH&A	3%	14%	5%	30%	1%	50%
L&C	33%	35%	58%	11%	2%	2%

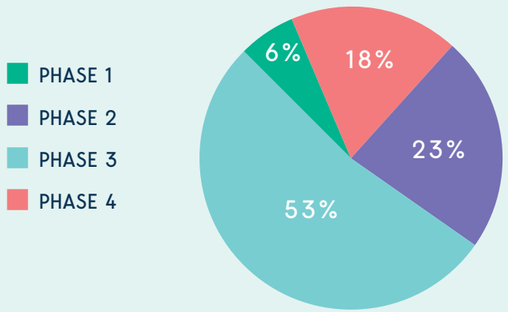
Research Funding Per PI Per Program 2016/17



40 New Clinical Trials



171 Ongoing Clinical Trials



Hospital with a heart

The leadership of our staff - especially nurses - has encouraged us. The family reactions have inspired us. One son said to us, 'This is an extraordinary program. Once something extraordinatory like this is in the making, you shouldn't give it up.' The legacy work of the 3 Wishes Program makes end of life care extra meaningful for all those who engage."

Dr. Deborah Cook

From renewing wedding vows to reuniting lost family members – the 3 Wishes Projects strives to bring compassionate care to dying patients and their families in the intensive care unit (ICU).

The project began 5 years ago at St. Joseph's Healthcare Hamilton to honour patients who are dying, and to try to bring peace to their families in the final hours and days. A set of 3 wishes are elicited from patients, families or their clinicians; these wishes are then then implemented by families and staff in the ICU to try to ease the grief.

Initially a pilot project led by Dr. Deborah Cook, a research publication published in the Annals of Internal Medicine demonstrated how the 3 Wishes Project improved the experiences of patients, families and clinicians in the ICU and brought meaning to those involved at times of loss. The study noted how the project successfully implemented 98% of the wishes requested.

Additional research led by junior doctors indicated how residents found the project to re-engage humanism in their training. Clinicians in the ICU have found many expressions and experiences of spirituality in the high technology setting. After nearly 5 years, the 3 Wishes Project records show that over 1,000 wishes have been implemented and the average cost of a wish is $2.00 - most cost nothing. The 3 Wishes Project is now a clinical program - encouraging the realization of unmet hopes and needs - invariably simple ones, like music at the bedside, a visit from the family pet, and favourite items from home.

Leads France Clarke, Chaplain Feli Toledo, and Drs. Boyle and Wood from critical care, spiritual care and palliative care have helped other wards in our hospital, and other ICUs in our region to start similar programs. This special collaboration with diverse practitioners including nurses, physicians, respiratory therapists and physiotherapists has also expanded to hospitals on the East and West coasts, and as far south as Los Angeles.

Through initiatives such as the 3 Wishes Project, our hospital lives the legacy of the Sisters of St. Joseph's – going above and beyond to deliver compassionate care to those who need it most.

Better, faster and safer diagnostics for a rare disease

Vasculitis is a rare condition characterized by inflammation of the blood vessels. Typically caused by an autoimmune disease, it causes the body to attack its own blood vessels – making them swell and narrow. The most common type is giant cell arteritis – which usually affects arteries in the head but also the large blood vessels of the body. Patients diagnosed with giant cell arteritis usually experience headaches, fever and can experience vision loss.

It can be difficult for physicians and rheumatologists to successfully diagnose this rare condition, as patients can have many different types of symptoms and display varying test results. The standard diagnostic test for giant cell arteritis has historically relied on performing a temporal artery biopsy. However, this test is invasive and patients may still have giant cell arteritis if this biopsy is negative.

New research from St. Joseph's Healthcare Hamilton shows that a Magnetic Resonance Imaging (MRI) test can be useful in the diagnosis of giant cell arteritis. A normal MRI of the temporal artery strongly predicts a negative temporal artery biopsy.

"Our research suggests that an MRI could be used as the initial diagnostic procedure for giant cell arteritis, with temporal artery biopsy being reserved for patients with abnormal MRI findings," says Dr. Nader Khalidi, rheumatologist at St. Joseph's Healthcare Hamilton and the study's senior author.

MRI has several advantages over temporal biopsies. It's less invasive – meaning that it's more comfortable for patients. It can also reveal other conditions that can mimic temporal arteritis like sinusitis and brain aneurysms.

Further research led by Dr. Khalidi is investigating how patients with a normal or abnormal MRI diagnoses fare over the long-term.

"By using our REDCap database, we're analyzing the results of many of these new MRI diagnoses," says Dr. Khalidi. "This research will hopefully help predict the severity of the illness and how much medication should be given."

Discovering new pathways to treat high blood pressure

High blood pressure affects more than one in five Canadian adults, and is considered by the World Health Organization to be the leading risk factor for premature death in the world today.

Through studying proteins in blood vessels, scientists at St. Joseph's Healthcare Hamilton may have found a new way to treat high blood pressure.

"This is very exciting for us. The last time science found a new way to lower blood pressure was 20-25 years ago," says Dr. Dickhout. "It usually takes two or three medications for blood pressure to drop to a level where it isn't harmful anymore. Because this compound uses a new pathway, it potentially presents a new treatment for those with refractory hypertension that need multiple medications."

The research team has tested a compound named 4-phenylbutyric acid in animal models, and found that it corrects an imbalance between dilation and constriction in blood vessels that causes high blood pressure.

The study was led by Dr. Jeffrey Dickhout and Dr. Rachel Carlisle and has been published in the *Journal of Hypertension*. It was funded by the Canadian Institutes of Health Research with additional support from St. Joseph's Healthcare Hamilton.

"In addition to currently existing treatments, such as vasodilators and diuretics, this new pathway gives us a whole new tool for treating high blood pressure," states Dr. Jeffrey Dickhout, nephrology researcher at St. Joseph's Healthcare Hamilton and assistant professor at McMaster University.

4-phenylbutyric acid has several other therapeutic properties, and has received FDA approval for urea cycle disorder in children and adults.

While the compound doesn't seem to cause adverse effects in laboratory testing, clinical trials are needed to determine its safety and effectiveness in humans for blood pressure lowering.

Research in my area is aimed at addressing the problems of chronic diseases (such as cardiovascular and kidney disease) that are currently the major determinants of human morbidity and motility later in life. We seek to allow people to live healthy lives well into their old age.

Dr. Jeffrey Dickhout

Finding the perfect match

Kidney transplants help patients with kidney disease regain lost kidney function. Diseases, such as diabetes and high blood pressure, can harm the kidneys, and patients that lose kidney function may undergo either regular dialysis or a kidney transplant.

For a kidney transplant to be successful, the donor needs to be matched with the patient. Better matching means a better chance that the transplant will succeed without complications.

Compatible genetics are one important aspect of kidney matching. At St. Joe's, this process is performed in the HLA laboratory led by Dr. Christine Ribic.

HLA testing identifies specific genes and proteins called antigens both in donors and recipients. A match means that the recipient has a lower chance of having their immune system attack the new kidney. At St. Joe's, HLA lab technologists complete testing on over 3,000 donor and recipient samples per year. They provide donor and recipient testing 24 hours a day with staff being on-call if an organ becomes available. HLA testing is specialized, and requires a unique, specific skill set.

"The HLA lab collaborates closely with our local clinical programs as well as our national colleagues. We are dedicated to ensuring quality and are invested in finding the best match for our patients," says Dr. Ribic, Director of the HLA Lab and kidney transplant nephrologist at St. Joseph's Healthcare Hamilton. "Each donor recipient case is unique, and HLA testing is key to ensuring a successful transplant outcome."

Better kidney donor matching means that there's a higher chance of the new kidney being accepted – leading to better post-transplantation outcomes for the patient.

Dr. Ribic is developing techniques to better match kidney donors in the lab. With her colleagues across Canada, she is looking at strategies to help transplant patients that are difficult to match with donors. This research is directed at exploring new ways of defining matching between donors and recipients as well as new classification system for antibodies that traditionally were thought to be barriers to successful transplantation. This will hopefully find new opportunities for kidney transplants for patients that were initially considered difficult to match.

"Matchmaking a donor and recipient requires a large amount of testing, interpretation and collaboration. Together, we are able to provide the gift of life through innovative technology, expertise and ongoing research at St. Joes", says Dr. Ribic.

Every gift to St. Joe's *inspires*

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