Contents

Unlocking a healthier future for our communities

We've reached an important time for health care in Canada. We're at a crux. We need total, transformational change to mount some of the big challenges that our health systems are facing country-wide. In Ontario, we hear phrases like "hallway medicine" every day, and that's because issues like hospital overcrowding are impacting our patients and healthcare workers on a consistent basis. We're living a new reality. But at Hamilton Health Sciences (HHS), in partnership with McMaster University, we're exploring and implementing innovative solutions to change the tides for the better, and we're doing it through world-leading health research.

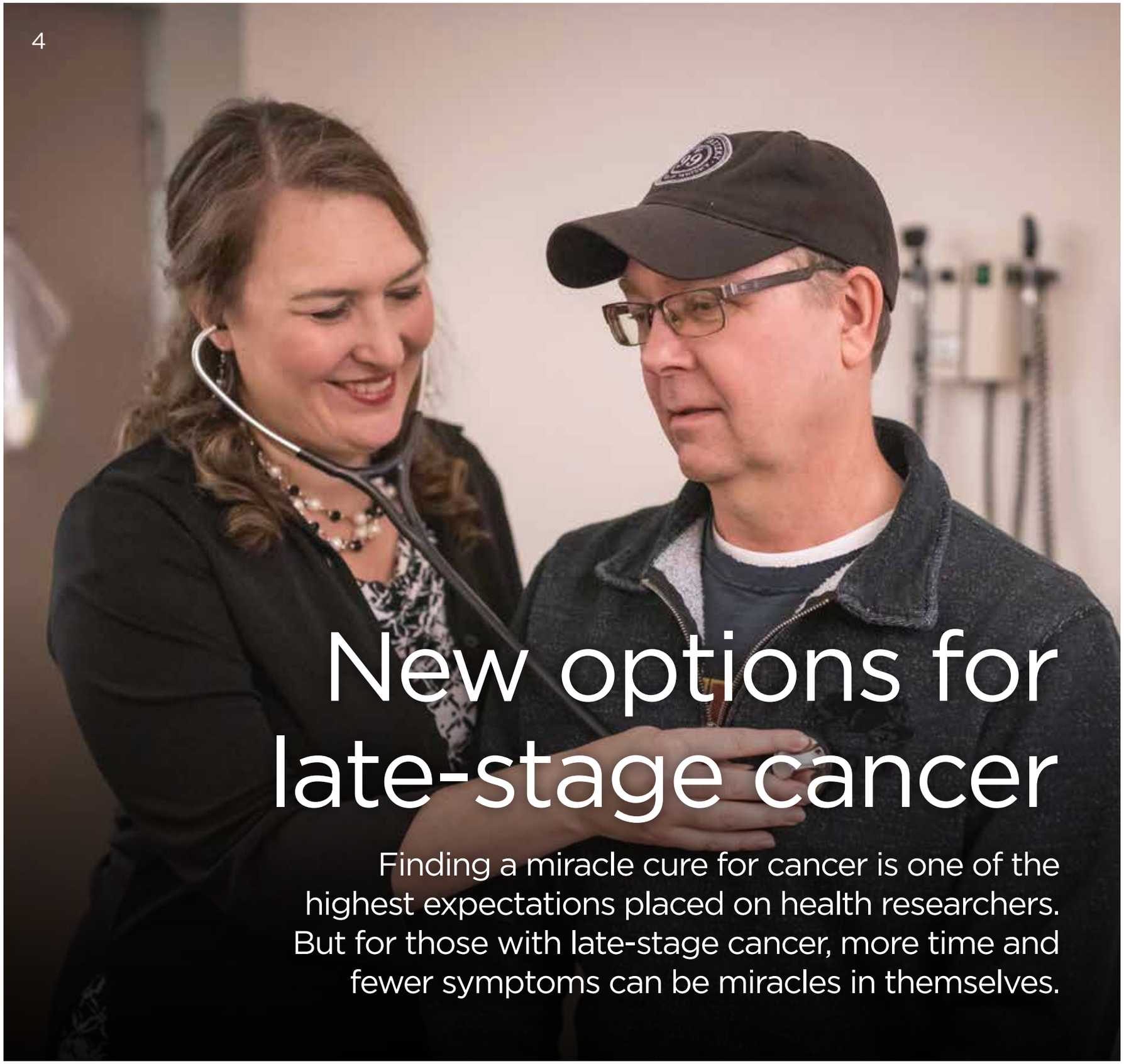
At HHS, we're proud that so many of our industry's leading health research experts call our hospitals 'home'. They're helping us unlock important answers about health and health care so that we can bring more value to our patients and their families. For example, our teams are helping patients with heart rhythm issues live better and with fewer complications. They're finding new treatment options for patients with late-stage cancer so that they can live longer and more comfortably. And, they're working with our Indigenous and other at-risk families to create healthier futures for their children by detecting and mitigating potential health issues earlier on.

I used to say that research was Hamilton Health Sciences' best-kept secret, but I think that's changed. Earlier this year, we were ranked among Canada's top three research hospitals by Research Infosource. More than ever, our research is making a difference in healthcare in Ontario, in Canada, and even beyond.

Please read on to learn more about how research at HHS is making a difference in people's lives and in our healthcare system, for the better.

Dr. Ted Scott

Vice President, Research and Chief Innovation Officer
Hamilton Health Sciences



New options for late-stage cancer

Finding a miracle cure for cancer is one of the highest expectations placed on health researchers. But for those with late-stage cancer, more time and fewer symptoms can be miracles in themselves.

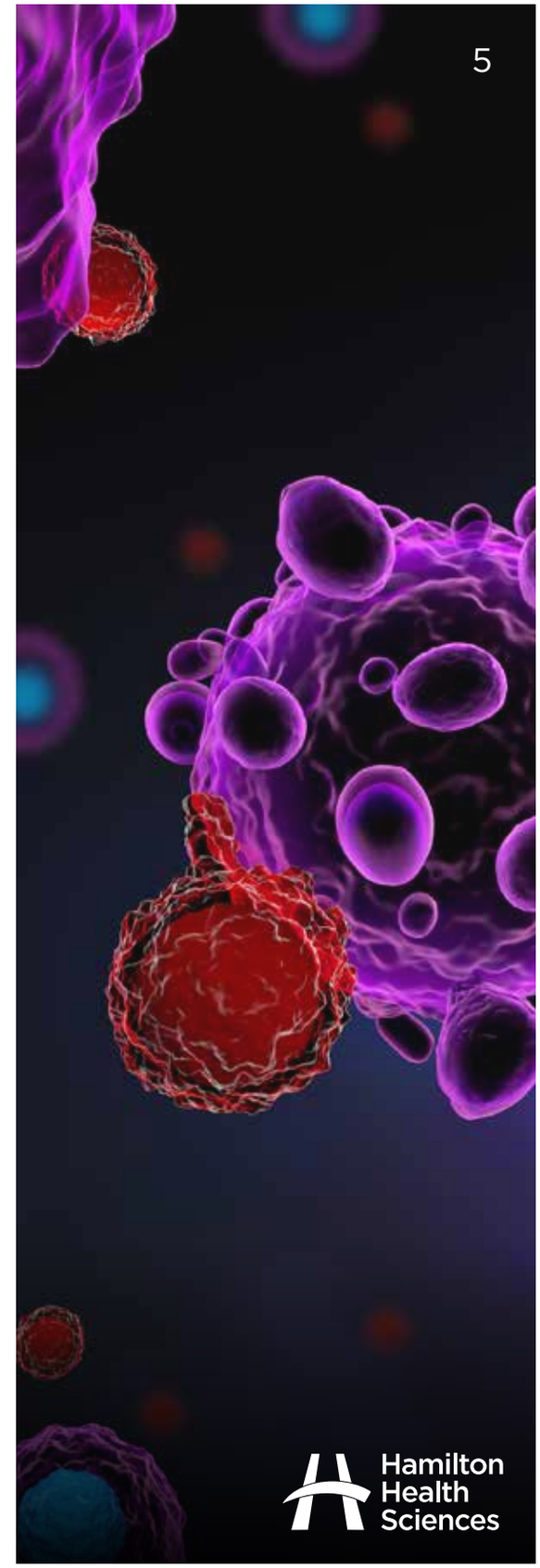
Offering new options, when there are few

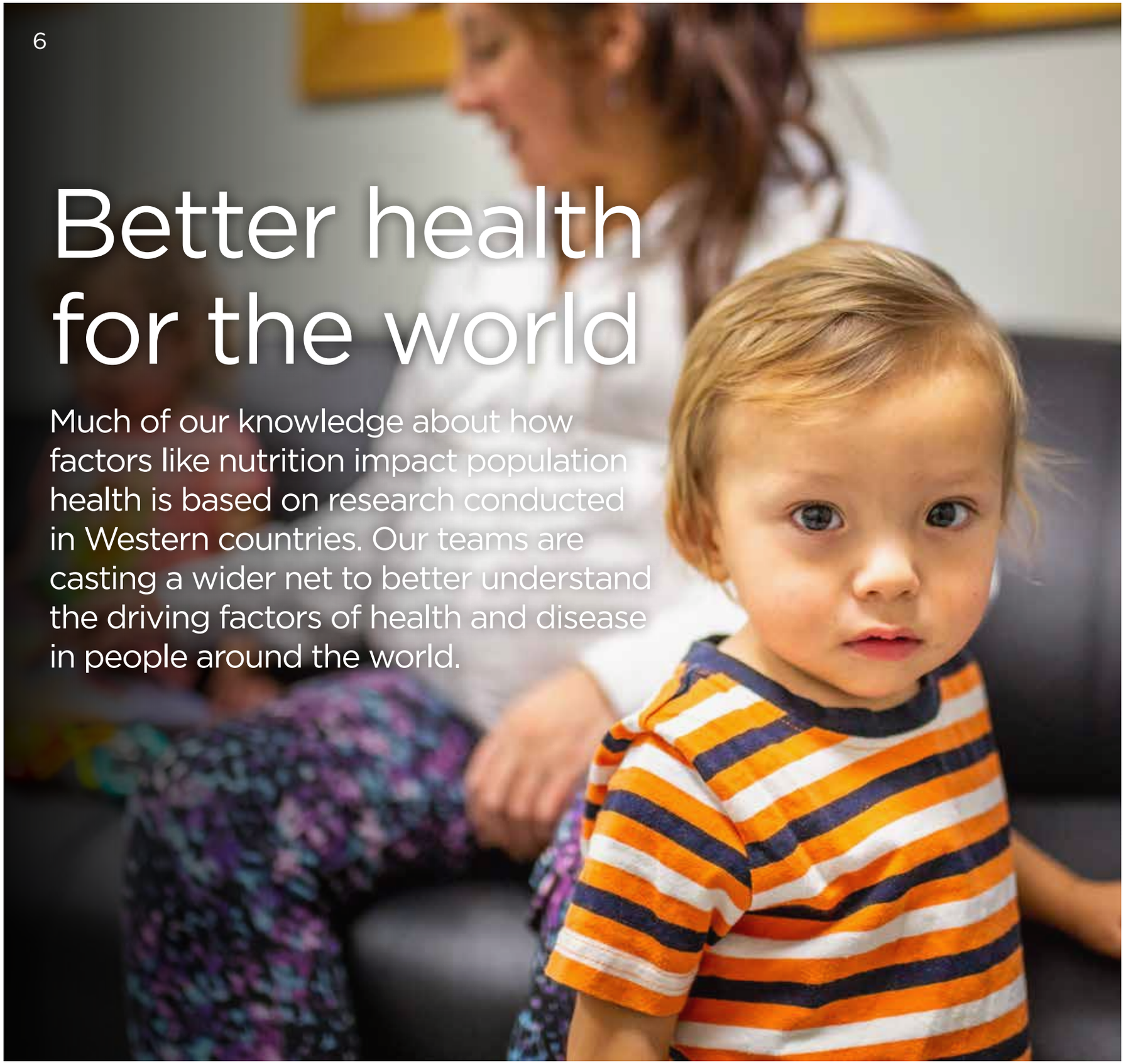
The latest innovation in cancer treatment is harnessing the power of a patient's own immune system to fight the cancer. Dr. Ronan Foley is spear-heading a study at Hamilton Health Sciences' Juravinski Hospital & Cancer Centre, which is one of only four Canadian hospitals that are testing a new therapy for two very aggressive types of cancer that usually have very poor outcomes and few treatment options: acute lymphoblastic leukemia (ALL) and diffuse large B-cell lymphoma (DLBCL). In both of these cancers, normal lymphocyte cells have become malignant. The treatment, called CAR-T cell therapy, involves the extraction of the patient's own T cells – the soldiers of our immune system – that are then modified to recognize and attack cancer cells and re-infused in to the patient's system. When other options have been exhausted, this custom-tailored approach offers a path forward for patients living with ALL and DLBCL.

More time for people with late-stage lung cancer

Lung cancer is a silent killer: it often goes unnoticed until long after the disease has taken hold. In Canada, 28,000 people develop lung cancer diagnosis each year, of whom 75 per cent will be diagnosed late, when there are few treatment options.

Dr. Rosalyn Juergens (pictured, left) is on a mission to help improve life for these patients and their families. She and her team at Hamilton Health Sciences' Juravinski Hospital & Cancer Centre and Escarpment Cancer Research Institute (ECRI), in partnership with The Ottawa Hospital, are exploring a potentially groundbreaking new treatment that may offer more time for those living with advanced stage lung cancer. The approach combines two different viruses with a cancer drug, designed to trigger the body's immune system to recognize and attack cancer cells. It's part of a new wave of treatment called "immunotherapy", which some are heralding as the future of cancer care. It's not a cure, but it offers the potential for a longer and better quality of life for those with aggressive lung cancer.





Better health for the world

Much of our knowledge about how factors like nutrition impact population health is based on research conducted in Western countries. Our teams are casting a wider net to better understand the driving factors of health and disease in people around the world.

Healthier moms, healthier babies

Diet is as unique to an ethnic population as its culture. Yet, there's little understanding around how nutrition impacts health in both European and non-European populations. Drs. Sonia Anand, Russell de Souza and Koon Teo of Hamilton Health Sciences' Population Health Research Institute (PHRI) are breaking that knowledge barrier by zeroing in on babies, where nutrition and lifestyle habits cross the bridge to future generations.

The team is studying four Canadian birth cohorts involving 5,500 mom and baby pairs to understand how factors like diet can increase the risk of diseases in both mom and baby. Most recently, they found that one-third of South Asian pregnant women develop gestational diabetes (GDM) – which can develop into type 2 diabetes in both mothers and their children. In addition, a mother's pre-pregnancy weight and diet influence the development of GDM. Dr. de Souza is now leading a randomized clinical trial to determine if a high quality diet in pregnancy can reduce the risk of GDM in South Asian women living in Canada.

Challenging global dietary guidelines

Dr. Andrew Mente, Mahshid Dehghan and Salim Yusuf at PHRI are conducting the broadest research on nutrition ever done, involving over 250,000 people in a series of studies in over 50 countries. The largest of these is a multi-pronged study called PURE (Prospective Urban Rural Epidemiology) that has been running for nearly two decades. The findings are already challenging current nutrition guidelines and information in Western countries and around the world.

For example, contrary to popular belief, a moderate intake of fat (which is higher than current recommendations) such as that in meats and dairy are actually linked to lower death rates. On the other hand, a diet higher in carbohydrates, especially refined ones, are linked to greater health risks. The PHRI team has also found that salt is safe in moderation, and that both high and low salt intakes are harmful. A higher intake of potassium-rich foods is linked to lower risk of stroke, worldwide.

Seeking a healthier future for Indigenous families

Indigenous peoples Canada are at a high risk of developing type 2 diabetes and heart disease. Research suggests that major risk factors for these diseases may be programmed early in life and influenced by both genetics and environment.

Dr. Gita Wahi, a pediatrician at McMaster Children's Hospital and her research colleagues at PHRI are searching for the causes of increased risk among Indigenous infants in their first three years of life. In partnership with the Six Nations of the Grand River in Southern Ontario, the team is working directly with pregnant women, new mothers, healthcare providers, and elders of the Six Nations community to learn about the community's knowledge, beliefs and priorities towards the health of pregnant mothers and the care of newborns. As the first Indigenous birth cohort study in Canada, and by working in partnership with Julie Wilson, supervisor of the Six Nations Birthing Centre, their findings will set the stage for healthier futures for Indigenous mothers and their families.

Leading to a healthi

Hamilton Health Sciences (HHS) is proud to be ranked among the top three research hospitals in Canada, as per the most recent Research Infosource Inc. data release.

Research Infosource Inc. is an independent, leading source of ranking information on research universities, corporations, hospitals and colleges in Canada. Each year, it releases results on the top 40 research hospitals in the country, based on total research revenue.

In 2017, Hamilton Health Sciences generated $207 million in research revenue, which is a 20 per cent increase over the previous year.

"As an academic teaching hospital with a mandate to improve patient care and our healthcare system through research, we take great pride in being ranked among some of Canada's most accomplished health research communities," says Ted Scott, vice president of research at HHS.

Leading research at
1,500
centres in
101
countries

1 million+
participants
enrolled
worldwide

Hamilton Health Sciences

Canada
ier future

450+
researchers

As healthcare providers, our researchers are on the front lines of our healthcare system. This gives them the insight needed to explore answers to questions that will make an impact to not to only our patients, but to people all over the world.

To date, more than one million people from across the six inhabited continents have participated in research led by HHS across a wide range of health and disease areas.

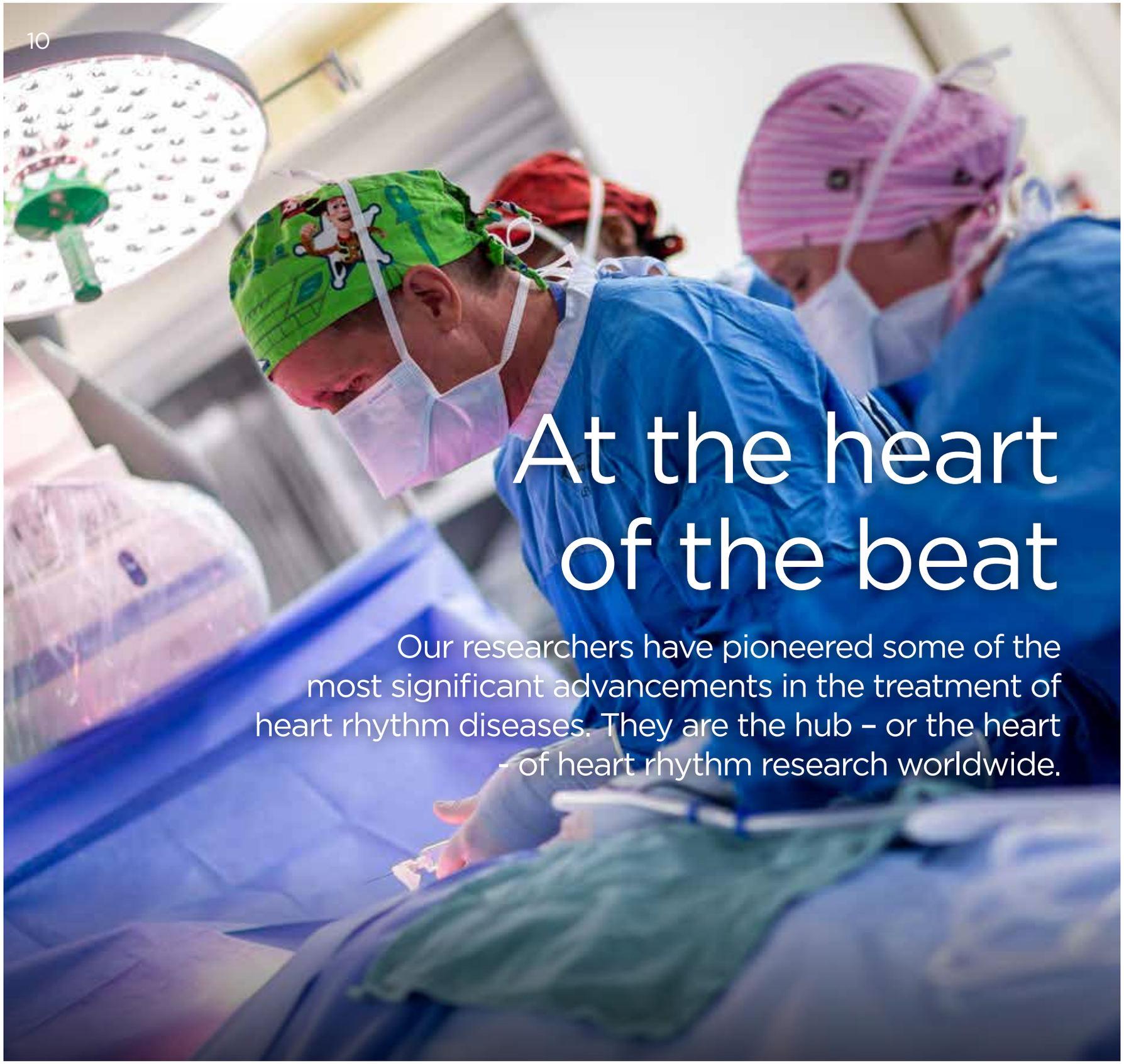
Samples collected by these participants are stored in Hamilton Health Sciences' biobank, which is the largest research biobank in Canada. This cellular and molecular database is at the fingertips of our researchers to help solve some of the world's greatest health challenges.

We encourage our researchers to continue to seek answers and challenge the unknown as it's because of them we're changing the way we care for people.

4 million
samples in Canada's largest research biobank

McMaster University

over
1,000
research staff



At the heart of the beat

Our researchers have pioneered some of the most significant advancements in the treatment of heart rhythm diseases. They are the hub – or the heart - of heart rhythm research worldwide.

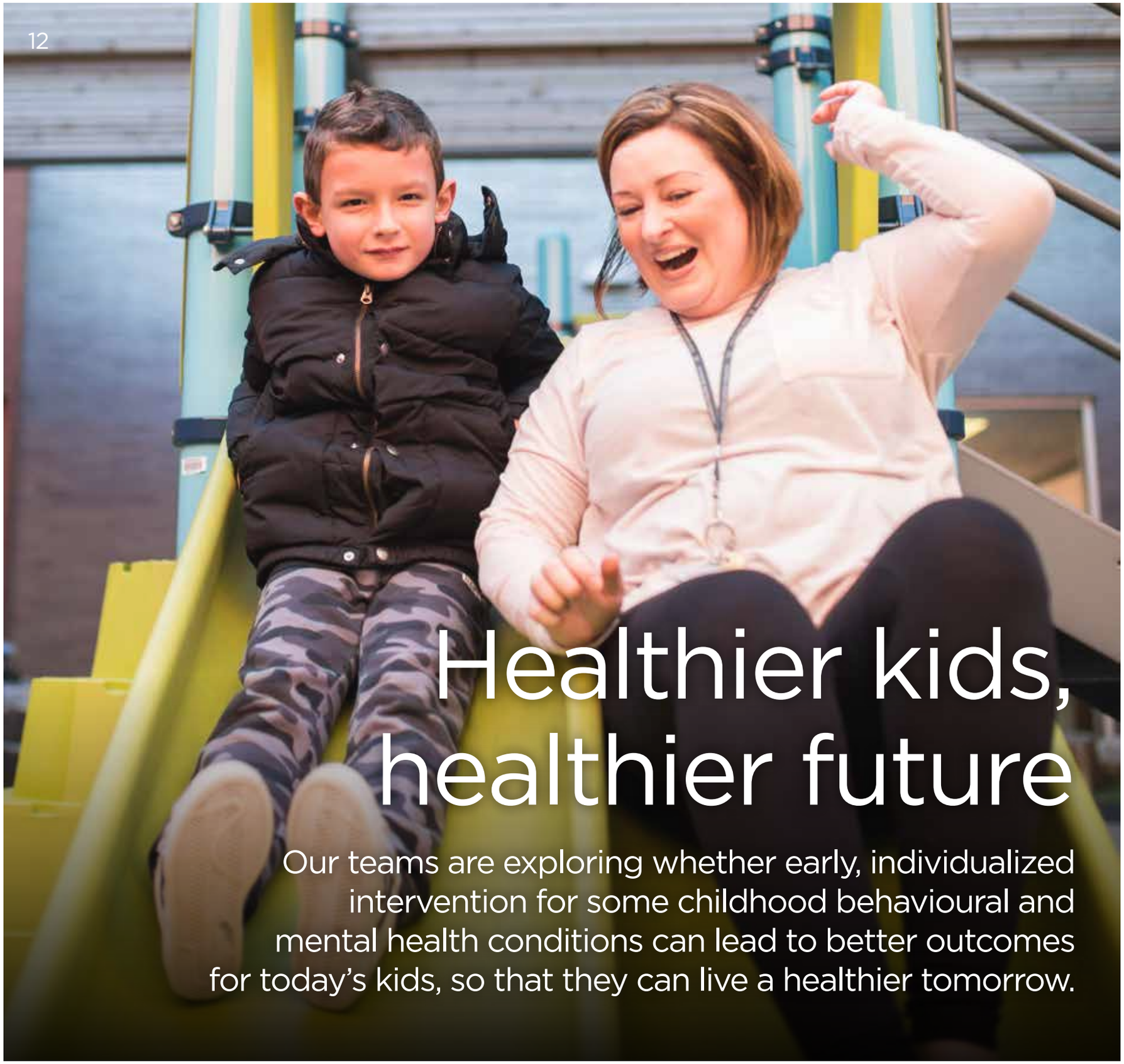
The history and future of arrhythmia treatment lives here

With incredible precision, Dr. Jeff Healey (pictured, left) places a tiny electronic device in to the chest of his patient. Once it's in place, that device – a pacemaker – will play a crucial role in ensuring the safety of its human host. Pacemakers were introduced in the 1950's as a solution to make sure that hearts that beat too slowly speed up. Now, pacemakers do much more; with accuracy, they detect dangerous and fast rhythms and shock the heart, stopping cardiac arrest in its tracks and reducing deaths by 30 per cent. Newer pacemakers can also detect fibrillation of the atrium which, if left untreated, is a leading cause of stroke. Treating atrial fibrillation early before patients even know there's an issue may reduce the risk of stroke by up to two-thirds.

Researchers at Hamilton Health Sciences and McMaster University have long been world-leading experts in the field of arrhythmia and atrial fibrillation (AF). Some drugs were introduced in the 1980's to treat AF, but they actually ended up causing more harm than good. In the late 1990's, HHS' and McMaster University's Population Health Research Institute formed a research team* determined to find new and better ways to treat arrhythmia. They were successful and was among the first researchers in the world to explore the use of Warfarin, a blood thinner, to reduce complications from AF. But warfarin was difficult to use, needed regular blood tests to get the dose right, and increased bleeding, especially into the brain.

Working with several major pharmaceutical companies, our teams have demonstrated that new oral blood thinning drugs (such as dabigatran, rivaroxaban and apixaban) are more effective and safer than warfarin, and don't need blood tests to monitor their effects. And, they've also conducted two key early studies looking at medication that can be used to reduce the side effects of blood thinners. As a result, these drugs are now more commonly used worldwide than Warfarin, and have played a major role in improving disease management and reducing the risk of complications in patients with heart rhythm problems worldwide.

* The team, led by Dr. Stuart Connolly and including PHRI founder Dr. Salim Yusuf, later grew to include Drs. John Eikelboom, Jeff Healey, Carlos Morillo, David Conen, Jorge Wong and Deborah Siegal. The team also recruited Dr. Robert Hart, a leading stroke researcher and pioneer of using warfarin in atrial fibrillation.



Healthier kids, healthier future

Our teams are exploring whether early, individualized intervention for some childhood behavioural and mental health conditions can lead to better outcomes for today's kids, so that they can live a healthier tomorrow.

An individualized approach to autism

In the past, researchers have studied autism by studying children's symptoms and behaviours at a specific point in time. However, the symptoms of autism change over time as children develop. Autism is a complex disorder that affects different children in different ways. So, Dr. Stelios Georgiades and his colleagues at the McMaster Autism Research Team are approaching autism research at the individual level. They're taking a strengths-based approach to understand how children grow and develop within their surroundings. The team hopes that by understanding the perspectives and resulting interactions of each child they'll be able to provide guidance to parents and care teams on effectively navigating the services and supports system.

The goal is to ensure that every child with autism has an optimal outcome. But, Dr. Georgiades believes this should be based on each child's personal characteristics and individual growth over time, within a system that adapts to their changing needs. Only then will we see greater advancements in autism care.

Early intervention for children with challenging behaviours

Parenting is no easy feat. There are good days and bad days. What do you do when the bad days become more frequent and the "terrible two's" become worse?

Dr. Terry Bennett and her team at the Offord Centre for Child Studies are exploring whether a program called "Family Check-Up" can help decrease challenging behaviours and emotions in young children. Since early parenting practices influence kids' ability to learn emotional self-regulation, the program works with parents and caregivers to develop family goals and strategies to achieve them. By guiding these kids towards a positive path, they're better set up for success as they progress into their school-aged years and adolescence. The team hopes to follow participants long-term to understand whether early intervention continues to benefit them as they age.

Childhood obesity

One in three Canadian children are overweight or obese. Many of these children have associated health issues such as prediabetes, abnormal cholesterol, depression and anxiety.

Dr. Katherine Morrison and her teams at McMaster Children's Hospital, the Population Health Research Institute and the Centre for Metabolism, Obesity and Diabetes Research are working to improve treatment and prevention options for Canadian children with obesity across their lifespan. Although physical activity, nutrition and adequate sleep are key elements to improving health, there are many factors that influence obesity that go beyond weight. All need to be considered to ensure the health of these children. So, Dr. Morrison is also tackling better ways to deliver care for obesity-related health conditions, and evaluating the impact of weight management programs on metabolic and psychosocial health.

Changing the course of Type 2 diabetes

Diabetes is a growing and costly burden in Ontario. Our experts think it can be reversed, and they're building up the evidence to prove it.

Can diabetes be reversed? We think so.

Type 2 – or adult onset – diabetes is one of the fastest-growing diseases in Canada and accounts for 90 per cent of all cases of diabetes. A cure has yet to be discovered. However, Dr. Hertzel Gerstein (pictured, left), Dr. Natalia McInnes and Dr. Zubin Punthakee at Hamilton Health Sciences' Population Health Research Institute are trying to reverse diabetes by using a number of novel approaches.

Type 2 diabetes occurs when the body is unable to make sufficient insulin for its needs, and can cause several serious, lifelong symptoms including blindness, heart disease, stroke and kidney failure. Dr. Gerstein's team is leading research exploring whether a combination of medications, a personalized nutrition and exercise regimen, and insulin can put diabetes in to remission. So far, the results are promising: in the pilot study led by Dr. McInnes, up to 40 per cent of participants remained in remission three months after stopping diabetes medications. The study has since expanded to include more than 450 patients in eight Canadian cities.

Targeting diabetes' key partner in crime

Cardiovascular disease is deadly and all too common, and is the second leading cause of death in Canada and the leading cause of death worldwide.

Dr. Gerstein is leading a global team to determine whether the addition of various drugs to a person's medication regimen can reduce his or her chance of developing heart disease or other serious health consequences of diabetes.

"Diabetes currently affects more than 10 per cent of adults in Canada, and causes heart attacks, strokes and a variety of other health problems," says Dr. Gerstein. "Therapies that reduce the symptoms of diabetes as well these serious health consequences can clearly improve the well-being of those living with diabetes."

Hamilton Health Sciences

www.WeAreExplorers.ca

In partnership with:

McMaster University