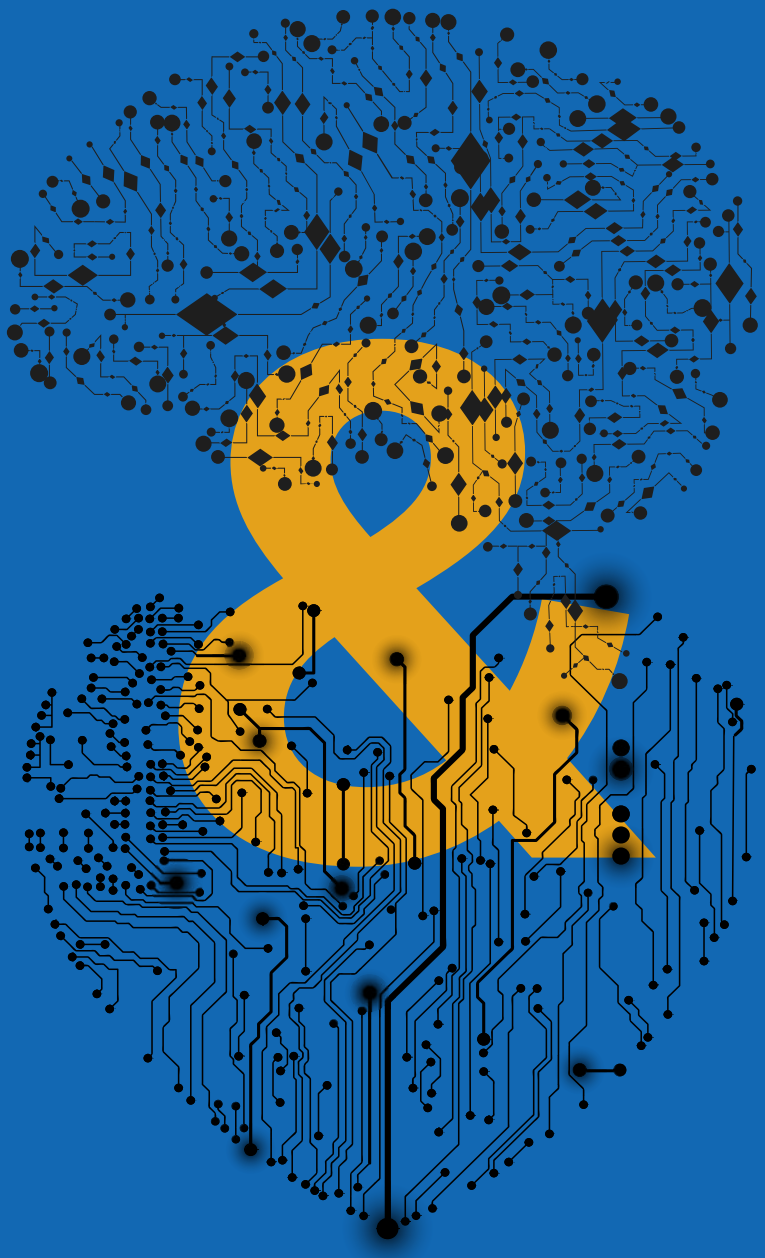
THE URBAN ANGEL | St. Michael's Hospital Foundation



THE CAMPAIGN FOR

THE WALTER AND MARIA SCHROEDER

BRAIN&HEART

CENTRE

STMICHAELSFOUNDATION.COM

~~IT CAN'T BE DONE.~~

INTRODUCING A REVOLUTION
IN BRAIN AND HEART CARE.

THE BRAIN AND HEART, TOGETHER AT LAST.

All over the world, cardiovascular and neuro surgeons and clinicians are working the way they always have. In silos.

But does that make sense? Not really.

The brain and heart are interdependent. What happens to one very often impacts the other. A brain aneurysm can stop a heart. A heart attack can cause a stroke. Degenerative brain diseases like Alzheimer's share a genetic link with heart disease. Though some diseases may manifest in only one area, they still affect both organs.

In fact, says Dr. Andrew Baker, St. Michael's Chief of Critical Care, the separation between the heart and brain is an artificial distinction. The two organs are physiologically similar. They share risk factors. Many treatments are the same. And on a human level, the brain and heart are two sides of a person.

At St. Michael's Hospital, our world-renowned cardiac and neurosurgical experts believe that the historical way of seeing brain, heart and valve diseases as separate entities must give way to an integrated approach to care. They believe that the deeper the collaboration between specialties, the better the patient care and the more robust the medical innovation.

Our teams are already working outside the traditional silos. Our cardiologists and surgeons are joining forces in the operating room. Our radiologists and neurosurgeons are training together and exchanging tools. Our cardiac and radiology teams are sharing systems and best practices for patient care.

It sounds simple. In reality, it's a transformational model of care that is at the vanguard of medicine. It's a cross-disciplinary approach that has our radiologists, cardiovascular and neurosurgeons and physicians working together on some of the world's toughest brain and heart challenges. And it's only happening at St. Michael's Hospital.

Join us as we complete our $42 million campaign in support of life-changing brain and heart care.

DISEASES THAT IMPACT THE BRAIN AND THE HEART.

- Brain aneurysms
- Vascular dementia
- Stroke
- Aortic diseases
- Brain tumours
- Valvular heart and coronary diseases

THE SEPARATION BETWEEN THE HEART AND BRAIN IS AN ARTIFICIAL DISTINCTION.

THE CAMPAIGN FOR THE WALTER AND MARIA SCHROEDER BRAIN&HEART CENTRE.

We have the opportunity to do what no one has done before: Create a hub for the world's top brain and heart specialists to treat the toughest neurosurgical and cardiac cases – and create a platform for innovation that will catapult St. Michael's to the forefront of brain and heart treatment.

Actually, we're getting closer to making it happen. That's thanks to the remarkable $19.125 million gift from Walter and Maria Schroeder, legendary Canadian philanthropists.

Their donation establishes The Walter and Maria Schroeder BRAIN&HEART Centre at St. Michael's, Canada's only hospital that takes an integrated approach to cardiac and neuro care. Already underway is the construction of a multi-disciplinary, state-of-the-art cardiac clinic where all the necessary specialists will diagnose patients, plan their treatment and perform minimally invasive procedures – all on the same floor. Discovery and innovation will be in constant progress, thanks to the Schroeders, who are also funding three research chairs. For the first time, care is structured around the patient.

THE WORLD'S FOREMOST NEURO AND CARDIOVASCULAR SPECIALISTS ARE AT ST. MICHAEL'S.

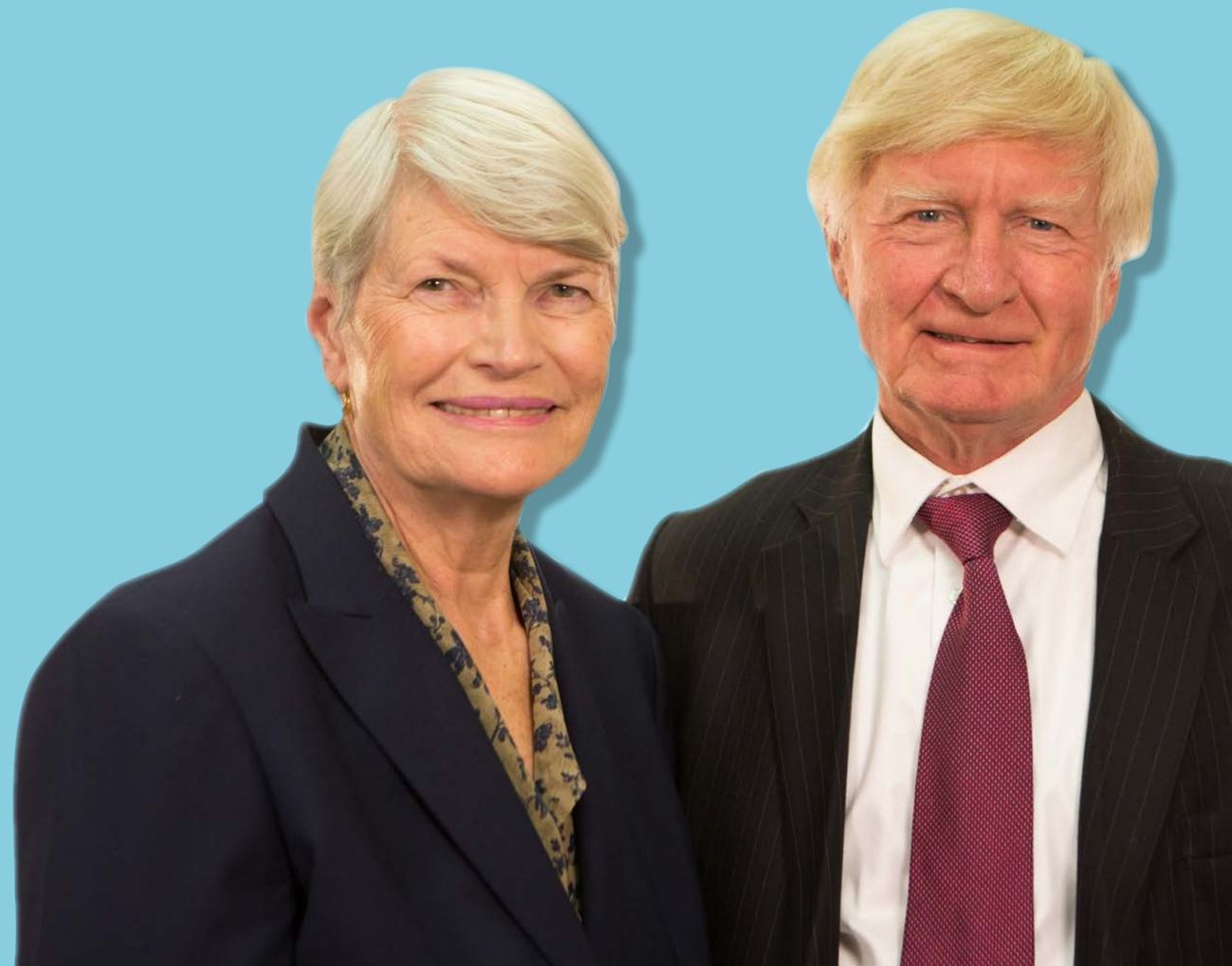
To complete the centre, St. Michael's Hospital is investing $6.4 million and the Foundation is raising another $12 million to fund state-of-the-art facilities and equipment including catheterization labs, echocardiography labs, neuro-interventional operating rooms and a space dedicated purely to medical invention.

Thankfully, we are already home to some of the world's foremost neuro and cardiovascular specialists. Once the infrastructure is in place, The Walter and Maria Schroeder BRAIN&HEART Centre can begin to realize its revolutionary vision: a place where collaboration is protocol, where life-enhancing tools are invented, and where exploring the unknown is just another day at the office.

Please join us.

"ST. MICHAEL'S IS HOME TO SOME OF THE MOST PROGRESSIVE DOCTORS. THAT'S WHAT ATTRACTED US. WE WANTED TO MAKE A DIFFERENCE IN AN AREA THAT'S BEEN UNTOUCHED."

– Maria and Walter Schroeder



STAY INSIDE THE BOX.

ST. MICHAEL'S HAS ALWAYS BEEN A PIONEER IN BRAIN AND HEART TECHNOLOGY.

Half a century ago, St. Michael's Hospital performed Canada's first heart transplant. Today, our cardiac and neuro surgeons are at the forefront of minimally invasive procedures – surgeries that are reshaping the fundamentals of care.

It was once the case that all surgeries meant BIG operations that involved surgeons cutting patients open and manually repairing what needed fixing in the body.

No longer.

Minimally invasive surgeries, which use small incisions and rely on catheters and wires, are now the gold standard.

The challenge? Small incisions mean surgeons can't see inside. But medical imaging can. In fact, imaging has become so sophisticated that physicians, surgeons and radiologists – the imaging experts – can repair a brain aneurysm or fix a leaky valve so effectively that patients can go home within days with less pain, less trauma to the body, and less need for narcotics.

In 2016, our surgical teams achieved a world-first when they minimally invasively implanted a new cardiac device into a patient who could never have withstood open heart surgery.

It was so successful that the patient went home three days later. And recently, cardiologist Dr. Neil Fam and cardiac surgeon Dr. Mark Peterson became North American leaders in transcatheter tricuspid intervention (TTI), a minimally invasive procedure that repairs damaged heart valves.

We're also leaders in the brain world. Our neurosurgery department is one of the largest and most specialized in Canada, and performs the most aneurysm and brain tumour procedures.

We treat as many cases as some of the biggest hospitals in the U.S. And, in Ontario, no one sees more complex neurosurgical cases or achieves the same results: statistics confirm that our 30-day morbidity and mortality rates are the lowest in the province.

As new technologies blur the lines between physicians, surgeons, and radiologists, there is a huge opportunity to reshape specialties, and to borrow techniques and tools from different areas of medicine that can be adapted for new uses.

Thanks to our world-class experts, no hospital is better positioned to capitalize on this opportunity than St. Michael's Hospital.

St. Michael's Cardiac & Neuro F1RSTS

- **First in the world to remove tumours by bi-nasal endoscopy, now the international standard in brain surgery.**
- **First in Canada to scoop out a pituitary tumour using a 3D camera.**
- **First in Canada to perform a novel catheter-based valve replacement technique during transseptal heart surgery.**
- **First in Canada to perform a mitral valve-in-valve procedure that allows cardiac patients to go home within days.**
- **First in Toronto to perform brain surgery using 5-ALA, an amino acid that lights up highly malignant tumours in bright fuchsia.**
- **First in the world to implant a device called the Pascal system in a patient with tricuspid regurgitation.**

THE BEST AND BRIGHTEST ARE AT THE WALTER AND MARIA SCHROEDER BRAIN&HEART CENTRE.

Dr. Kim Connelly

Cardiologist | Director of the Krembil Stem Cell Facility at St. Michael's Hospital | Head of Dr. Kim Connelly's Lab at the Keenan Research Centre for Biomedical Science | Associate Professor, University of Toronto.

Award-winning scientist and cardiologist Dr. Kim Connelly's groundbreaking research includes 'super-charging' stem cells to heal the hearts of heart attack patients.

Dr. Tim Dowdell

Radiologist-in-Chief | Medical Director of the Centre of Excellence in Medical Imaging | Associate Professor, University of Toronto.

Top radiologist Dr. Dowdell believes that if you can see it, you can treat it. He leads a team that not only embraces technological advancements, but is at the forefront of using AI to provide critical diagnostics in real time.

Dr. Neil Fam

Interventional Cardiologist | Director, University of Toronto | Interventional Cardiology Fellows | Director, Cardiac Intensive Care Unit.

Dr. Fam has been at the helm of world and national firsts in minimally invasive procedures. He is pioneering advancements in valve repair and reinforcing St. Michael's leadership in this field.

Dr. Teodor Grantcharov

Staff Surgeon | Professor of Surgery, University of Toronto | Keenan Chair in Surgery at St. Michael's and the University of Toronto | Canada Research Chair in Simulation and Surgical Safety.

Dr. Grantcharov's research specialties are minimally invasive surgery, surgical education and patient safety. He's also the visionary behind the OR black box project at St. Michael's.

Dr. Muhammad Mamdani

Vice President, Data Science and Advanced Analytics | Director, Li Ka Shing Centre for Healthcare Analytics Research and Training (LKS-CHART) | Professor, Leslie Dan Faculty of Pharmacy, University of Toronto.

Dr. Mamdani is a pioneer in using data analytics to advance medical innovations and improve patient outcomes.

Dr. Tom Marotta

Interventional Neuroradiologist in the Medical Imaging Department | Project Investigator in the Keenan Research Centre of the Li Ka Shing Knowledge Institute | Associate Professor, University of Toronto.

Dr. Marotta is a leading neuroradiologist who also trains young doctors from Canada and around the world, invents and introduces new devices for better patient care, reverses brain injury in acute stroke, and repairs aneurysms using cutting-edge, minimally invasive endovascular procedures.

Dr. Mark Peterson

Medical Director, The Walter and Maria Schroeder BRAIN&HEART Centre | Cardiac, Aortic, Transcatheter Heart Valve Surgeon | Chair, Structural Heart Disease Committee | Scientist, Li Ka Shing Knowledge Institute | Associate Professor of Surgery, Department of Surgery, University of Toronto.

Dr. Peterson was one of the first cardiac surgeons to train in catheter-based procedures and has successfully integrated open, hybrid and fully percutaneous procedures into his practice at St. Michael's. Dr. Peterson has worked closely with his colleagues in interventional cardiology, vascular surgery and radiology to form de novo multi-specialty care teams. He is pushing the boundaries of traditional medicine and establishing St. Michael's as the go-to integrative heart repair centre.

Dr. Julian Spears

Head of Neurosurgery | Co-Director of the Neurovascular Program | Associate Program Director of the Division of Neurosurgery Training Program, University of Toronto.

One of Canada's busiest neurosurgeons, Dr. Spears continues to take on the most complex cases in Ontario. One of only a few neurosurgeons in Toronto who perform both open brain surgery and minimally invasive endovascular surgery, Dr. Spears has successfully treated about 1,500 brain tumours and more than 2,000 aneurysms in his career.

ST. MICHAEL'S BRAIN AND HEART EXPERTS ARE NOT ONLY MASTER SURGEONS, THEY ARE ALSO RESEARCH INNOVATORS.

St. Michael's is made up of leaders who dream big and scientists, physicians and surgeons who pursue the unknown. They are guided by a spirit of relentlessness, an ethos of entrepreneurship and a commitment to persevere.

Dr. Julian Spears, Head of Neurosurgery

JACK HOPE'S STORY ISN'T JUST ABOUT SURGICAL SUCCESS. ALTHOUGH IT IS THAT.

And it's not just a story about a grateful patient, although it is that too.

This is a story of how a surgical success led a grateful patient to make an investment that enabled the department of neurosurgery to expand the limits of care and innovation.

This is a hospital circle-of-life story.

A few years ago, Canadian Jack Hope became very ill with a massive meningioma – a brain tumour.

Though he was spending the winter in Florida, he decided to come home to one of the largest, busiest and most successful neurosurgery departments in North America.

Jack was treated by renowned neurosurgeon Dr. Julian Spears. Because of the care he received, Jack made several donations to St. Mike's. One of those went to purchase a special adaptor for a microscope that would end up changing how neurosurgeons see the brain.

This year, in a first for a Toronto hospital, Dr. Spears performed brain surgery using 5-ALA, an amino acid that lights up malignant tumours in bright fuchsia, allowing him to see them better. Attached to his microscope was the special adaptor donated by Jack Hope. Without it, the technique would not have been possible.

Our world-class surgeons, with support from our visionary donors, are why St. Mike's continues to lead in the world of neurosurgery.

And Jack Hope? He's healthy and robust to this day.

GAIL WAS THE WORLD'S FIRST PATIENT TO HAVE THE PASCAL DEVICE IMPLANTED IN HER TRICUSPID VALVE, RIGHT HERE AT ST. MICHAEL'S.

At 82, Gail* had been hospitalized five times for heart failure and was considered too high-risk for conventional surgery. But thanks to Dr. Neil Fam and his team, patients with damaged heart valves now have new life-saving options.

After the Pascal device was inserted in a minimally invasive procedure, Gail's recovery went so well that she was discharged from hospital three days later. According to Dr. Fam, her quality of life has improved dramatically. And she hasn't been in hospital since.

Gail's situation is not unique. More and more patients are simply too fragile or medically unfit for open-heart surgery. Without new kinds of care, many face life-threatening risks.

The good news is that St. Michael's heart specialists have saved countless lives by using minimally invasive devices to seal leaking heart valves.

At St. Michael's, we're known for our ability to tailor procedures to the needs of our patients – and for our commitment to leaving no stone unturned.

Fortunately for people like Gail, Dr. Fam and his colleagues are North American leaders in transcatheter tricuspid intervention, a minimally invasive procedure that uses a novel device called MitraClip to repair damaged heart valves.

Dr. Neil Fam, Director, Cardiac Intensive Care Unit

**Out of concern for privacy, the patient's name has been changed.*

INVEST IN WORLD-CLASS INFRASTRUCTURE.

We're almost there. Please help us complete our new centre and give Canadians the brain and heart revolution they deserve.

THE WALTER AND MARIA SCHROEDER MULTIDISCIPLINARY CLINIC **(FUNDED)**

For patients with structural heart disease, this is where the journey begins. Our new Multidisciplinary Clinic will be the only place patients come for fully integrated, holistic and patient-centred care.

Simply put, this is a hub. A hub for integrated care. A hub for innovation where technology and techniques are shared across specialties. A hub for a global network of clinicians and researchers who can share best practices, harmonize treatments and leverage their expertise. (Rooms within the Clinic are also available to be named).

CARDIOVASCULAR INVESTIGATIONS UNIT

A comfortable and stress-reducing space where our experts perform heart catheterizations and angiograms to detect problems in the heart's circulation and its different chambers or valves.

CATHETERIZATION LABS (4)

St. Michael's specialists are already renowned for their minimally invasive heart and vascular surgeries. Our new, cutting-edge cath labs – with advanced technology that exceeds industry standards – finally match our experts' care and allow patients to go home within hours or days.

ECHOCARDIOGRAPHY LAB

The Echocardiography Lab at St. Michael's is one of Canada's preeminent models of care. Now it's time to integrate it into The Walter and Maria Schroeder BRAIN&HEART Centre. Patients will have access to a one-stop environment where they can see their physicians and other specialists all at once. They will also get their diagnoses and treatments faster and more efficiently. This is nothing short of a revolution in care. (Labs within the Echocardiography Lab are also available to be named).

NEUROINTERVENTIONAL UNIT

A high-tech space housing state-of-the-art operating suites for timely diagnosis and treatment. The Neuro Interventional Unit will allow unique teaching opportunities of novel, first-in-human techniques broadcast to the world.

NEUROINTERVENTIONAL OPERATING SUITES (2)

In a specially designed hybrid operating suite, surgeons can perform minimally invasive endovascular procedures as well as conventional surgery on the brain based on three-dimensional views of the patient's head – from both the front to back and side to side.

ANGIO SUITE

A state-of-the-art environment that provides a seamless vascular treatment experience.

INNOVATION SPACE

This is a hub located adjacent to the interventional operating suites where cardiac and neurosurgical thinking can converge and where technology and techniques are shared across specialties. Here is also where a global network of clinicians and researchers exchange best practices. High tech conference and meeting rooms ensure education and connectivity are the foundations of this new space.

THE WALTER AND MARIA SCHROEDER TERM CHAIR IN MINIMALLY INVASIVE SURGERY **(FUNDED)**

Pushing the boundaries of treatment for structural heart diseases is integral to the mission of The Walter and Maria Schroeder BRAIN&HEART Centre. The successful candidate for this chair is either a cardiologist or a cardiac surgeon, a leader in the field of catheter-based cardiac interventions such as TavR, MitraClip and Tricuspid Clip, and a researcher who is making contributions that are changing global knowledge and practice.

THE WALTER AND MARIA SCHROEDER TERM CHAIR IN STRUCTURAL AND VALVE INTERVENTION **(FUNDED)**

A recognized national or international leader in the field of minimally invasive surgery, this surgeon will be an expert in mitral valve repair using small incisions. The candidate will have a powerful reputation for both clinical and academic work.

The chair will entail inventing new tools and techniques, determining ways to improve minimally invasive surgeries and teaching both experienced surgeons and the next generation of surgical innovators.

A world-leading centre requires world-leading talent. Thanks to this chair, we'll have it.

THE WALTER AND MARIA SCHROEDER TERM CHAIR FOR BRAIN&HEART DIRECTOR **(FUNDED)**

This chair will enable the centre's medical director, Dr. Mark Peterson, to create an entirely new program that will change the way modern health care approaches brain and heart diseases.

Change of this scope is no easy task. First it's a matter of breaking down what exists today. Then it means rebuilding in ways that have been inconceivable until now. This chair will ensure Dr. Peterson has the time and the tools to develop the right plan and harness the team's full creativity to forge the necessary changes to the existing clinical programs and pathways.

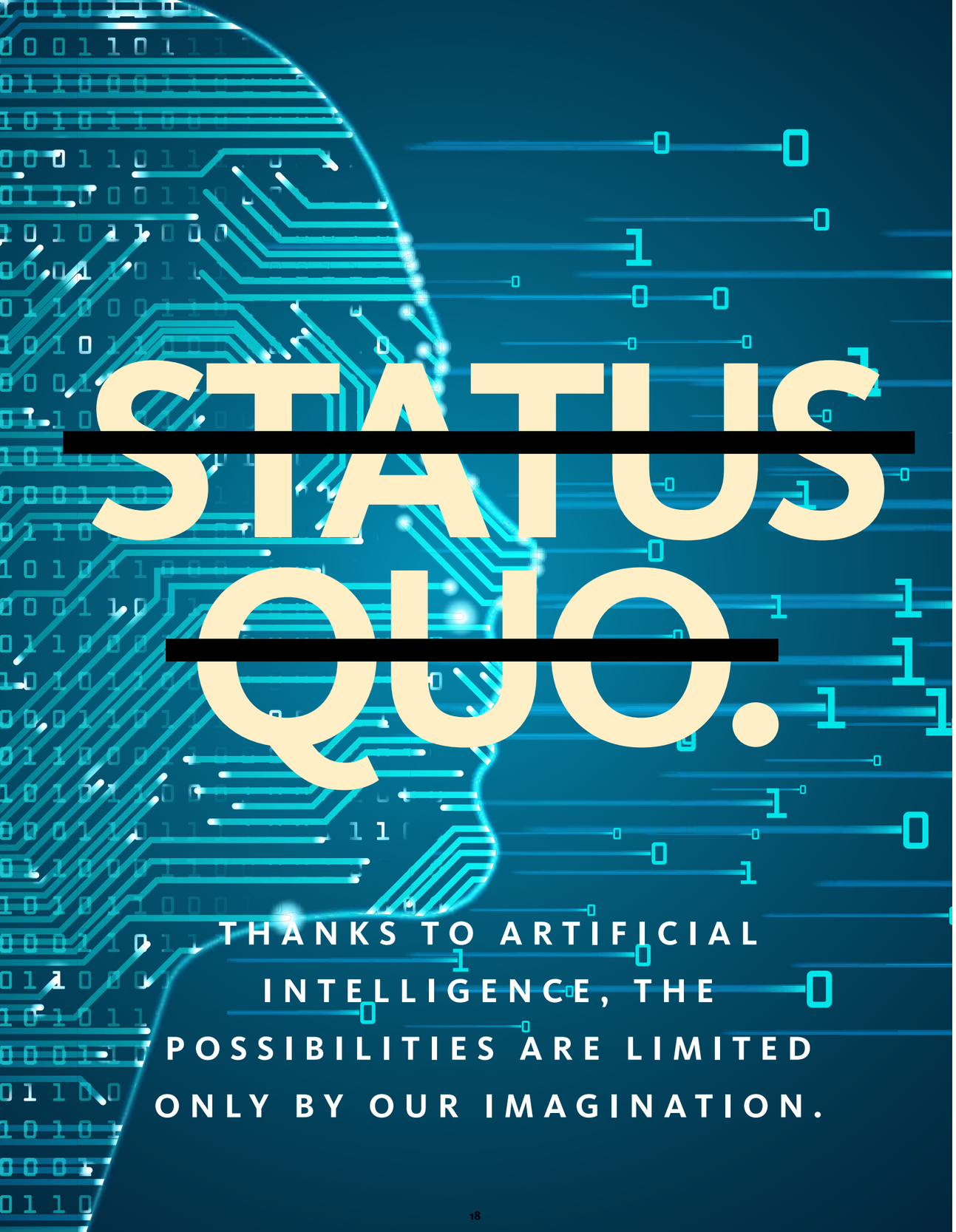
Thanks to this chair, Dr. Peterson will continue to develop new technologies and techniques while building a revolutionary health care paradigm.

THE ODETTE CHAIR IN ADVANCED ANALYTICS **(FUNDED)**

This chair allows AI pioneer Dr. Muhammad Mamdani to pursue cutting-edge scholarship in support of scalable AI brain and heart solutions. It will also support a user experience expert, a visualization expert, a software developer and a data engineer – as well as sophisticated hardware and software to translate advanced analytics into user-friendly tools. The work will be done in partnership with Dr. Teodor Grantcharov's International Centre for Surgical Safety – bringing two renowned thought groups together.

THE ODETTE PROFESSORSHIP IN AI FOR MEDICAL IMAGING **(FUNDED)**

Real-time medical imaging data can now be placed in the hands of clinicians at The Walter and Maria Schroeder BRAIN&HEART Centre so they can make preemptive decisions – like expediting procedures based on predictive patterns – and produce better patient outcomes.



WHAT'S NEXT FOR THE WALTER AND MARIA SCHROEDER BRAIN&HEART CENTRE?

A machine turns on music and gives us directions – and we don't leave our chairs. Online stores know what we want before we do. Our homes heat and cool based on our preferences – without us doing a thing. Cars that drive themselves are tomorrow's bestseller.

We are on the brink of the Fourth Industrial Revolution – and health care is ripe for reinvention.

The world's boldest tech and medical entrepreneurs – St. Michael's among them – are developing the artificial intelligence (AI) solutions to some of the most intractable health problems.

A global AI pioneer in health, St. Michael's is home to Canada's most sophisticated, comprehensive, hospital-based data warehouse.

There is no doubt that AI is the next frontier of medicine. Fortunately, our AI specialists are already working with The Walter and Maria Schroeder BRAIN&HEART Centre.

ARTIFICIAL INTELLIGENCE IN HEALTH CARE.

The use of complex algorithms and software to analyze complicated medical data. Specifically, AI is the ability for computer algorithms to approximate conclusions without direct human input.

CAN AI CHANGE THE FACE OF BRAIN&HEART SURGICAL SAFETY?

TAILORING TREATMENT.

Can we train machines to examine glioma – the most malignant adult brain tumour – so that neurosurgeons can tailor treatments with stunning precision?

Thanks to Dr. Teodor Grantcharov, head of St. Michael's International Centre for Surgical Safety, it already has.

Preventable medical errors claim the lives of 30,000 Canadians every year.

That number didn't sit well with Dr. Grantcharov. So he invented a technology – modelled after the airline industry – that tracks every movement in the operating room. The OR black box uses video, audio and multiple sensors to capture data that surgeons use to scrutinize and perfect their techniques. His work is already changing the way surgeries are performed in hospitals across Canada, Europe and the U.S. And for the first time in the world, black boxes will be installed in our new neuro-interventional operating rooms and catheterization labs at The Walter and Maria Schroeder BRAIN&HEART Centre.

Now, thanks to advancements in AI, Dr. Grantcharov is taking his innovation to the next level. As data from the black box is fed into algorithms, feedback to surgeons on the best way to proceed will be given during an operation, potentially transforming neuro and cardiovascular surgeries.

"We have access to one of the most secretive environments in modern society," said Dr. Grantcharov of the black box data. "Secrecy is not a good thing in a high-risk industry, where the principles that should guide us are openness, transparency, accountability and continuous improvement."

St. Michael's is at the forefront.

Dr. Teodor Grantcharov, Head of St. Michael's International Centre for Surgical Safety

UPENDING AN EPIDEMIC.

Can an algorithm help cardiologists predict and treat heart failure – a condition that touches one in two Canadians and costs the economy $2.8 billion every year?

DR. MUHAMMAD MAMDANI, ST. MICHAEL'S VICE PRESIDENT OF DATA SCIENCE AND ADVANCED ANALYTICS, IS USING AI TO GO WHERE NO SCIENTIST HAS GONE BEFORE.

"Health care is data-rich, but there is often too much to process for the average human mind," says award-winning scientist Dr. Muhammad Mamdani. When he discovered that artificial intelligence can make meaning out of this data, he began testing ways to harness it to change clinical practice, inform health-care policy and improve patient outcomes.

Dr. Mamdani is certain that advanced analytics will have transformational effects on neuro and cardiac care. "We want to know, for example, if an algorithm that is able to whip through hundreds of patient records within a minute can identify the seven patients eligible to take blood-thinning drugs that reduce the risk of a stroke by up to 70 per cent," says Dr. Mamdani.

Dr. Mamdani and his team are already tackling risk prevention. They are using AI to predict whether a patient will need intensive care so that clinicians can transfer them to the ICU within 12-24 hours – and save their lives.

And because of donor support, Dr. Mamdani now has The Odette Chair in Advanced Analytics, which will allow him to pursue cutting-edge scholarship in support of scalable AI brain and heart solutions; and The Odette Professorship in AI for Medical Imaging, which will empower our specialists to assess risks and expedite life-saving procedures. His goal: to put meaningful data in the hands of clinicians; to advance teaching and research with AI-enabled visual simulation and learning tools; and to foster advanced informatics research in AI.

Dr. Mamdani and his team are not working alone. As director of our Li Ka Shing Centre for Healthcare Analytics Research and Training (LKS-CHART), he has formed pivotal partnerships with computer science research and innovation giants such as the University of Toronto and Ryerson University, as well as the Vector Institute, Toronto's most sophisticated AI research centre.

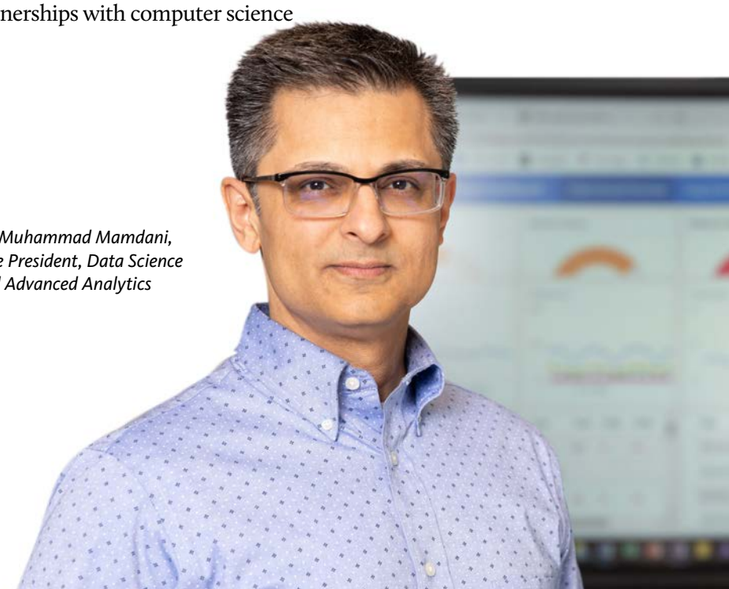
Innovations like LKS-CHART and the black box will be integral to the work of our pioneering neuro and cardiovascular teams.

BEFORE IT'S TOO LATE.

Can AI analyze brain scans to detect aneurysms – a life-threatening condition that causes blood vessels in the brain to bulge – before it's too late?

CHANGING THE GAME.

Can we harness the power of AI to promptly pinpoint the most effective stroke treatments when lives are on the line?



Dr. Muhammad Mamdani, Vice President, Data Science and Advanced Analytics

We are St. Michael's Hospital, and we

STOP AT **NOTHING.**

THE URBAN ANGEL | St. Michael's Hospital Foundation

THE CAMPAIGN FOR
THE WALTER AND MARIA SCHROEDER
BRAIN&HEART
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