

Sunnybrook

SAVING LIVES, ONE INNOVATION AT A TIME

SAVING GEORGIA'S LIFE

A world-first procedure brought this mom back to her family after a terrifying double aneurysm

THE EVOLUTION OF CARE:
LOOKING BACK AT 75 YEARS
OF INNOVATION

SUNNYBROOK RESEARCH
INSTITUTE: LEADING THE WAY
IN COVID-19 RESEARCH

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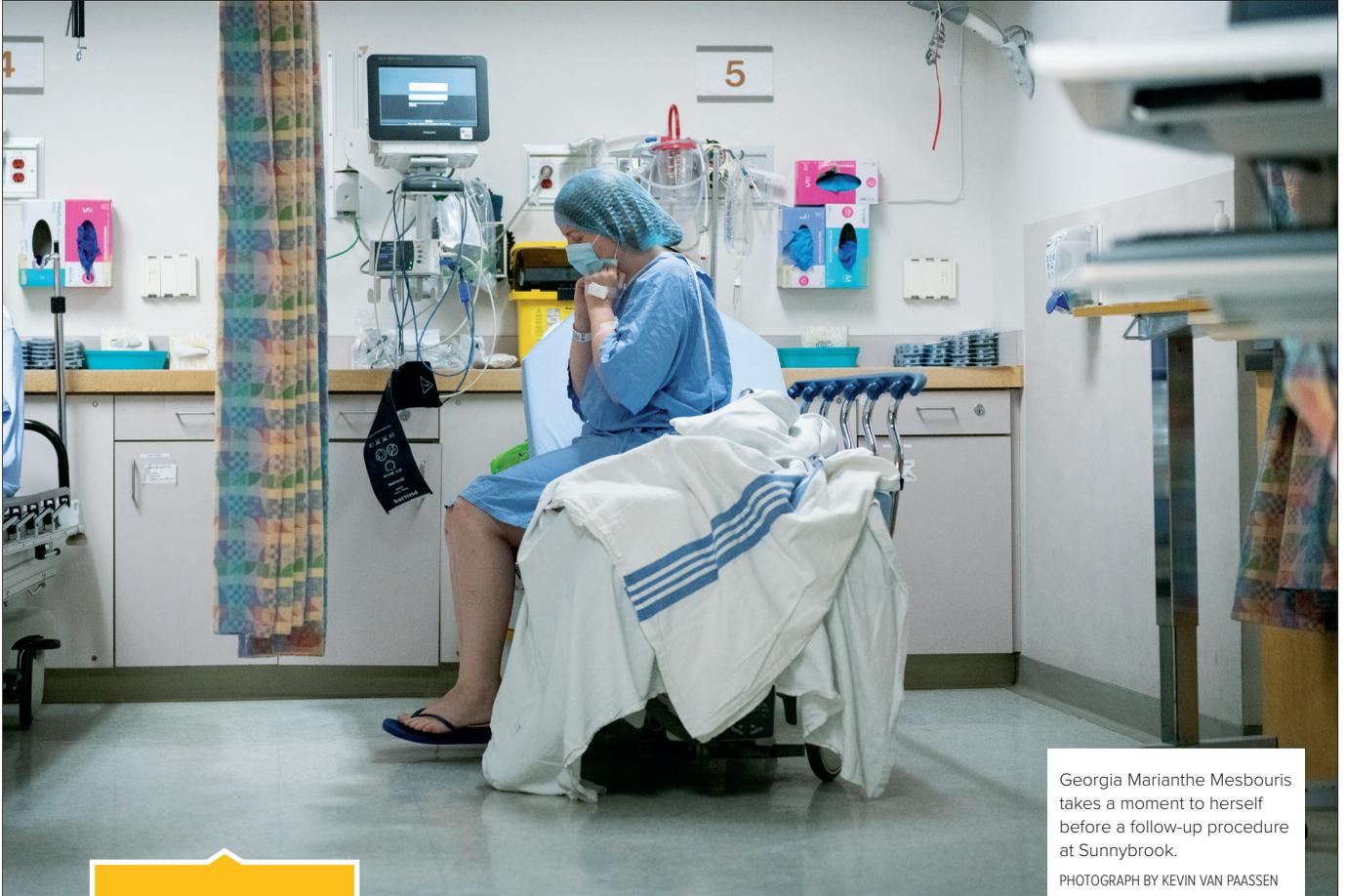
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Georgia Marianne Mesbouris takes a moment to herself before a follow-up procedure at Sunnybrook.

PHOTOGRAPH BY KEVIN VAN PAASSEN

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After her recovery from a double aneurysm, Georgia Marianne Mesbouris and her children enjoy a walk along the shores of Lake Ontario.

PHOTOGRAPH BY KEVIN VAN PAASSEN

A MESSAGE FOR OUR SUPPORTERS

Important milestones

Years ago in this magazine, I was interviewed as Sunnybrook's new president and CEO. The writer asked me about my most treasured possessions, and I spoke about a picture of my wife and me in the operating room on the day we met in 1993.



Time passes so quickly. After more than 22 years as a surgeon and administrator at Sunnybrook, my office is filled with photos and momentos – important reminders of the achievements of my many great mentors and colleagues, the milestones reached and the lives we have changed by working together.

These milestones matter more than ever. They show how far we've come and our inherent hope for the future.

This September marked 75 years since the first patients were transferred to what was then Sunnybrook Military Hospital. From Canada's largest Veterans hospital, we have grown into an internationally recognized academic health sciences centre.

Today, we are known for our discoveries and our determination to take on the most complex and challenging conditions of our time. We couldn't do it without the support of the entire community who make up Team Sunnybrook. I am grateful and proud to be a part of this incredible team. And to our dedicated donors, who continue to make so much of our work possible, thank you all.

Let's remember, reflect and honour how far we've come and then use that inspiration to drive the many achievements still to come.

Take care and be well,



Andy Smith, MD, M.Sc., FRCS, FACS
President and CEO, Sunnybrook Health Sciences Centre

Sunnybrook

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We are Sunnybrook

by Vanessa Milne



Leading with passion

Being flexible, adaptive and responsive are skills Alicia Stewart has honed for the past 20 years – skills that have proven essential during the pandemic.

“We’ve all been called upon to pivot. It’s a manoeuvre I’ve had to adopt throughout my career, and I try to help others learn to do the same,” says Alicia.

Alicia joined Sunnybrook a decade ago as an advanced practice nurse in the Acute Care Nursing Resource Team. “It was there I discovered how much it fuelled me to help nursing staff and students navigate their career and realize their potential,” says Alicia, who carried her passion for mentorship and coaching into numerous leadership roles.

A patient care manager in the Nephrology Program, Alicia oversees the Multi-care Kidney Clinics and home dialysis services for patients living with chronic kidney disease.

Amid the pandemic’s first wave, Alicia co-led a committee to design new safety protocols, including the

adoption of telehealth and virtual care models. When elective procedures were paused, Alicia led a team who introduced the first peritoneal dialysis catheter insertion at the bedside, which previously required a dedicated treatment space.

“I am proud of how quickly the team pivoted to make it possible for patients to receive their preferred dialysis treatment at home without delay,” says Alicia, whose oversight contributed to the program’s growth.

Alicia’s impact is felt beyond the Nephrology Program. She co-chairs the President’s Anti-Racism Taskforce, which has come together to implement an anti-racism action plan at Sunnybrook.

“Just as I believe in investing in people, I felt compelled with this team to address the issues that preclude racialized staff, patients and learners from achieving their goals,” Alicia says.

“When staff can work in diverse, inclusive and equitable spaces, they’re positioned to achieve their potential, which in turn impacts care experiences and outcomes for all patients.”

Taking a mindful approach

In Sunnybrook’s Outpatient Mental Health Department, Alan Largo helps patients through some of the most challenging periods of their lives.

The soft-spoken nurse psychotherapist delivers outpatient care and assists with non-invasive electrical and magnetic interventions to provide relief from some mental disorders. Alan also supports patients as they transition back into the community through a six-week outpatient program after discharge.

“To see that transformation of a patient – from coming in completely depressed or anxious to them seeing a new path forward – there’s a huge sense of fulfillment that comes with that,” he says.

Alan has also led unique initiatives, including helping to develop the hospital’s Psychiatric Urgent Care Clinic and creating a cognitive-behavioural therapy program at Sunnybrook’s Holland Centre for people with debilitating chronic

pain. “One of the hardest parts about chronic pain for patients is dealing with the loss of function in their lives, so this program is designed to help support them through that,” he explains.

When the pandemic was declared, Alan used his problem-solving skills to help deliver virtual therapy to outpatients. It’s challenging, he says, but he also sees the upside. “It’s easier to access, and they can have psychotherapy in the comfort of their own home.”

Aware of the extreme stress some of his colleagues were also facing, Alan began offering regular mindfulness meditation sessions virtually twice a week. During these sessions, he reminds staff to look for ways to reflect and ground themselves; for Alan, this most often involves spending quality time with his wife and five-year-old son.

Helping colleagues cope with the challenges of the pandemic has been rewarding for all involved, he says.

“Everybody has been really stressed out, so it’s nice to share how we’re doing, put everything on pause, and think, ‘How can we take care of ourselves?’”



Supporting patients every step of the way

As a cardiac surgical coordinator, Elli Clarke says her job is “like moving pieces on a chess board.”

The ICU-trained nurse is the triage coordinator for the Division of Cardiac Surgery in Sunnybrook’s Schulich Heart Program. Her role includes managing schedules, educating patients and their families and booking all patients requiring urgent cardiac surgery.

“What’s always amazed me is the transformation patients undergo,” Elli says. “It is a privilege to support them and see how fast they recover – often within five to seven days they’re back home. It’s remarkable.”

What Elli likes most is the autonomy of her position. “I do the job that I need to do, but also try to be a resource for patients. I am able to be whatever they need me to be,” she says.

As COVID-19 restricted family visits, Elli sometimes filled the role of a support person. When patients said they were scared to go through surgery without family beside them, Elli replied, “I’ll be your family.”

That might mean sitting with patients in the waiting room before their procedures and talking with them about their lives. “Then I would see them after in the ICU, and we would video call their families,” she says.

Even before the pandemic, Elli went above and beyond for her patients. After discovering how many felt anxious or depressed after heart surgery, she partnered with Sunnybrook’s St. John’s Rehab and created a cardiac support group. Along with Jay Davis, a former patient and volunteer, Elli facilitates the group’s monthly sessions that continue online throughout the pandemic.

“I feel very fortunate and blessed that I get to be part of these patients’ journeys,” she says. “The patients trust me enough to let me sit in and listen to their stories. It’s so empowering to watch.”

the
CARDIAC SURGICAL
COORDINATOR



the
PATIENT SERVICE
PARTNER

Connecting with patients and Veteran residents

Kevin Kirnon earned the affectionate nickname “Big Kev” because of the size of his heart, the magnitude of which is evidenced by the connections he makes with patients, Veteran residents and fellow staff members as a patient service partner.

Over the past 20 years, Kevin has worked in program areas across Sunnybrook, and each time he’s become well-known for the impressions he makes on everyone around him. Kevin provides a variety of supports for patients and residents, from basic care to serving meals and more. As a member of the team who often patients see most consistently, he has a knack for breaking the ice and learning each of their stories.

“My most recent work in the Veterans Centre lets me get to know each resident,” Kevin says. “Their rooms often have photos from war, and that gives me a chance to

start a conversation. I find it all so interesting. Everyone has a story to tell.”

Most residents are in their 90s; the oldest on the units he works with is 103. “He’s as sharp as a pencil,” says Kevin. He recalls another memorable resident, an ex-Argonauts player who won a championship ring – a thrill for Kevin, who loves watching sports and playing basketball. He has passed that passion down to his three children, including his daughter, who played the sport professionally.

This year, everything changed because of COVID-19. “It’s been a sad time,” he says. “People are feeling disconnected.”

But Kevin knows brighter days are on the horizon, having weathered the 2003 Toronto SARS outbreak. At that time, he was working in the fast-paced Emergency Department, but these days Kevin values the lasting bonds he’s making in the Veterans Centre.

“I love being on the Veterans wing,” he says. “You’re by each person’s side every day, and they become part of your life.”



the
POSTDOCTORAL
RESEARCH FELLOW

Pursuing a lifelong passion

A high school internship at Sunnybrook nearly a decade ago set Dr. Kristiana Xhima, PhD, on a course that has defined her career. That summer, she got a peek into focused ultrasound – a specialty she has pursued to this day.

“It was a new program at the time,” she explains. “I’ve been so lucky to be part of an inspiring environment where the technology has gone from device development to clinical trials.”

Dr. Xhima just completed her PhD and published studies involving potential treatments for Alzheimer’s and Parkinson’s. With Dr. Isabelle Aubert, PhD, who leads Sunnybrook’s Brain Repair Group, Dr. Xhima is part of a team investigating the use of focused ultrasound to safely and temporarily open the blood-brain barrier, allowing drugs to enter the brain from the bloodstream.

Dr. Xhima is acutely aware of the effects of Alzheimer’s and Parkinson’s, having had family members who have been affected by the diseases. She also volunteered with a University of Toronto outreach team to learn from people in the community who have been affected by these diseases.

“I’m interested in the biology, but this is a chance to connect with people and [understand] how these conditions have impacted their lives so deeply,” she says.

In her spare time, Dr. Xhima is a passionate long-distance runner – partially because she knows the research on how exercise may help ward off these diseases.

Focused ultrasound has the potential to be a “transformative platform” in treating Parkinson’s, Alzheimer’s and other neurological diseases like ALS, depression and brain cancer, Dr. Xhima says.

“I’m grateful to have seen how much bench-to-bedside progress has happened in the last 10 years,” she says. “It makes me so excited to be a part of what’s yet to come.”

Preparing for future pandemics

When Dr. Peter Kiiza was asked to join a unique Ebola study nearly three years ago with Sunnybrook researchers Drs. Robert Fowler and Neill Adhikari, he jumped at the chance. Having cared for Ebola patients in Sierra Leone, Dr. Kiiza was ready to lend his expertise.

In a simulated Ebola treatment unit, the researchers assessed how health-care workers performed relevant tasks wearing personal protective equipment in conditions ranging from high humidity and warm temperatures to dry environments at room temperature.

At the time, Dr. Kiiza was a research fellow, eager to gain insights into Ebola treatment. He was also keen to help prepare for future outbreaks of other highly infectious diseases – although, he says, “I didn’t quite think that would happen this fast.”

When the COVID-19 pandemic hit, Dr. Kiiza’s

experience providing aid and management during serious viral outbreaks in Uganda and in West Africa came in handy.

“It gave me the mindset that, if an outbreak happens, you have to act fast,” he says.

Along with Dr. Fowler, who is chief of Sunnybrook’s Tory Trauma Program, Dr. Kiiza is now studying which drugs may be most effective in treating the novel coronavirus. The research is not only informing care during this pandemic, but it’s also setting up a framework to study drug efficacy should future outbreaks arise.

Outside work, Dr. Kiiza takes time to bike and explore Toronto’s parks, but he is never far from his research. He spends his spare time in the evenings and on weekends taking part in virtual classes for his master’s in public health, with a focus on global epidemiology.

“Working alongside the brilliant minds at Sunnybrook as a researcher has been great,” he says. “And as a doctor, I have a passion to help people who are sick. Doing this work, providing solutions where I can, makes me feel like I am doing my part.”



the
PHYSICIAN
RESEARCHER

Hospital Notes

By Kira Vermond



Left: Internationally renowned Sunnybrook neurologist Dr. Sandra Black. Inset: Margaret Casey (left) and her friend Deborah Cumming skiing in Whistler, B.C.



UNLOCKING THE MYSTERIES OF ALZHEIMER'S AND DEMENTIA

Margaret Casey has two main goals these days. A lifelong sports enthusiast, the 72-year-old Toronto resident wants to ski Whistler Blackcomb until she's 75. She also wants to maintain brain health for as long as possible, with the help of the team at the new Dr. Sandra Black Centre for Brain Resilience & Recovery at Sunnybrook's Hurvitz Brain Sciences Program.

An active senior with a family history of Alzheimer's disease and dementia, Margaret is participating in an Alzheimer's clinical trial investigating the potential

benefits of a disease-modifying drug to slow the progression of the degenerative brain disease if caught early enough. While she has not shown outward signs of the brain disease thus far, Margaret is deeply committed to the cause. She visits the centre every four weeks for an infusion and for periodic memory tests and scans.

"When I was offered this study, I said yes. Because if I can help other people, I will," she explains.

The clinical trial is one of many examples of world-leading research happening at the centre, which

launched in September 2020 thanks to a generous \$10-million gift from a local anonymous donor. Scientists, staff and trainees have been working tirelessly – even during the most challenging days of the COVID-19 pandemic – to advance research around all aspects of Alzheimer's disease and dementia. These areas of focus include examining the genetic roots of these diseases, the use of focused ultrasound to target areas deep within the brain and even whether exercise keeps brains resilient and sharp.

Dr. Sandra Black, an internationally renowned neurologist and the centre's inaugural scientific director, says there are new, exciting innovations on the immediate horizon, including diagnostic blood tests that could

indicate whether a person has Alzheimer's or is at risk for other neurodegenerative diseases.

"It's a good time in the field to be upbeat and optimistic," says Dr. Black of the scientific advances. "We're making some real strides toward precision medicine. We're aiming to develop blood tests for diagnosis and brain scans to guide interventions with some promising new antibody treatments now undergoing testing."

Still, it's patients like Margaret who give Dr. Black hope that those advances will eventually help patients live better, healthier lives.

"This is a team effort. It's not just about the investigator. It's the staff doing the procedures and the patients who are giving of themselves to make progress," she says. "It's quite inspiring."

ANOTHER STEP TOWARD PERSONALIZED TREATMENT FOR CANCER PATIENTS



Researchers at Sunnybrook's Odette Cancer Centre have launched an exciting new trial in their ongoing quest to bring personalized treatments to more patients. The Elekta Unity MR-Linac, a marvel of leading-edge technology that promises to revolutionize radiation treatment, is at the centre of the trial, called UNITED. This first-of-its kind pilot study uses adaptive radiotherapy to treat glioblastoma, an aggressive type of brain tumour.

The MR-Linac team will create a new, personalized radiation plan for the patient each day based on data from the MR-Linac machine, which combines radiation and high-resolution magnetic resonance imaging (MRI) to target tumours with pinpoint precision. Doctors monitor the patient in real time. The hybrid technology also helps protect healthy surrounding tissue with the aim of reducing side effects.

The UNITED trial builds on early breakthroughs

going back to 2019, when Sunnybrook became the first site in Canada to treat brain cancer and prostate cancer with the MR-Linac. In Canada, the machine is still in the re-search phase, so all patients are treated as part of clinical trials. Yet Sunnybrook has already made significant progress in using it.

As of July 2021, close to 200 patients with brain or prostate cancers have been treated with the MR-Linac, and the team anticipates treating head and neck as

Members of the Sunnybrook radiation team treat the first patient in Canada on the MR-Linac in August 2019.

well as pancreatic cancers within the year.

"There's huge potential in terms of improving the patient experience," says Mikki Campbell, manager of the MR-Linac and cancer ablation therapy programs. "And it brings us closer to delivering advanced MRI-guided personalized and precise treatments."

SUNNYBROOK'S YOUTUBE CHANNEL INFORMS AND REASSURES

Baby tummy time tips, how to manage a fear of needles, what to expect during an angioplasty. Sunnybrook's YouTube videos aren't just

informative; they also give peace of mind.

Since launching 10 years ago, Sunnybrook's YouTube channel has been viewed an astounding 31 million

times and counting. People around the world turn to the videos for practical and helpful information at all times of the night and day.

That tummy time video? It has garnered five million views alone.

YouTube isn't the only social media platform where Sunnybrook's presence is growing. Overall numbers are trending up as well, with 16 million impressions across platforms such as Facebook and Twitter in 2020, including a spike on Instagram.

Brent Creelman, manager of digital communications, says Sunnybrook's digital team includes experienced video journalists and photographers who are committed to creating resources that help people live more informed, healthier lives. In the past year, videos posted by the team have

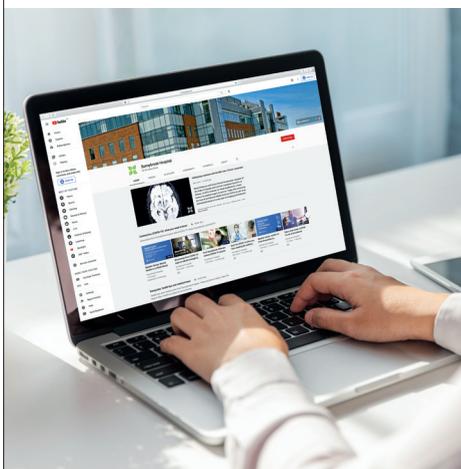
covered topics such as recovering from COVID-19 and a world-first trial for Parkinson's disease.

"We've always focused on telling compelling stories and offering practical health information," he says.

The wealth of positive comments posted on the videos demonstrate that they are an invaluable tool, Creelman says.

"That's why Sunnybrook is committed to creating resources like this for our patients and those around the world."

Watch and subscribe at [Sunnybrook.ca/YouTube](https://www.sunnybrook.ca/YouTube)



PHOTOGRAPHS BY KEVIN VAN PAASSEN (MR-LINAC) AND ISTOCK (COMPUTER)



INVENTING THE FUTURE OF HEALTH CARE

In conversation with Dr. Kullervo Hynynen, PhD, Sunnybrook’s vice-president of research and innovation

Q: You took on this role at Sunnybrook on January 6, 2020. Then the entire world upended due to COVID-19. What has it been like to lead the Sunnybrook Research Institute (SRI), Sunnybrook’s research arm, during the pandemic?

Dr. Hynynen: It definitely wasn’t the start I had imagined. In my first few months, we were forced to briefly pause research during the initial pandemic response. What I found truly inspiring was how quickly our researchers stepped up – regardless of their research specialty – to advance our understanding of COVID-19. In roughly one year, more than 100 COVID-related studies were initiated. This really speaks to the world-class research community we have here.

Q: SRI is not only one of Canada’s top 10 research hospitals, it’s at the global forefront of novel and innovative advances in medical science. Your own lab, which is dedicated to focused ultrasound, is an excellent example of some of the cutting-edge research taking place (see story on page 11). In what other areas is Sunnybrook leading?

Dr. Hynynen: At SRI, our research is changing how patients are treated

in Canada and worldwide. As you mentioned, we are world leaders in image-guided focused ultrasound research, particularly for the treatment of disorders affecting the brain, in which we have achieved many notable firsts. We are also leaders in critical care, cancer and cardiology research, just to name a few, and our significant work in both trauma and rehab research has helped change practices and policies that improve patient outcomes. SRI is also a hub of innovation, the seedbed for many new technologies, as well as 20 start-up companies to date.

Q: What is your vision for SRI?

Dr. Hynynen: As we work to invent the future of health care, it’s so important that researchers and clinicians work together to solve some of the greatest challenges in medicine. That’s something that has worked well with our focused ultrasound research, and I’d like to expand that collaboration across the board. Our aim is to bring as many of our discoveries as possible to the bedside. That way, Sunnybrook patients can continue to receive the best care, as well as cutting-edge treatments they can’t get anywhere else.

SUNNYBROOK RESEARCH INSTITUTE *By the Numbers*

From leading world-first clinical trials for personalized cancer care to researching therapies for degenerative brain diseases to inventing new technologies, the scientists at Sunnybrook Research Institute (SRI) are committed to solving complex medical conditions and changing lives.

SRI spans Sunnybrook’s three campuses – Bayview, the Holland Centre and St. John’s Rehab. A hub of scientific exploration and innovation, SRI’s wide range of research programs touch on all aspects of tomorrow’s health care, today:

10 Research programs:

Research spans brain sciences, cancer, heart, bone and joint, rehabilitation, trauma, integrated community, precision diagnostics and therapeutics, Veterans, and women and babies



\$94.4-million

Research funding in 2019–20

250,000 Square feet of state-of-the-art research space

362

Scientists and clinician-scientists

409

Research associates, engineers, technicians, technologists and support staff



200+

Students and trainees

10

Canada Research Chairs

40

Patents filed in 2019–20



500

Active clinical trials

hope.

That's what the Garry Hurvitz Brain Sciences Centre represents.

A place where experts from across different disciplines will come together to advance the world's understanding and treatment of the brain and mind. With state-of-the-art facilities, such as the Murphy Family Centre for Mental Health and the Harquail Centre for Neuromodulation, research will partner with care, giving patients and their families hope when they need it most.

A vision of this magnitude is not possible without our generous donors. We are grateful to everyone who has helped move this urgent initiative forward, including the Government of Ontario.

But we're not done yet. We still need your support to fully realize our vision. To learn more or to donate visit sunnybrook.ca/brain.



A world-first trial brings new hope

More than 25 Canadians are diagnosed with Parkinson's disease each day. An exciting new trial involving focused ultrasound is showing promise in slowing the progression of this debilitating disease

By Anna Sharratt

PAT WILSON never thought she would be able to reverse the symptoms of her early-onset Parkinson's disease. Having watched her father succumb to Parkinson's after a diagnosis at age 50, the former secretary at a private school in Cookstown, Ont., knew that muscle pain, tremor and memory loss would gradually set in, profoundly affecting her quality of life.

Yet, there she was, in July 2020, wearing a specialized helmet and lying in a magnetic resonance imaging (MRI) machine at Toronto's Sunnybrook Health Sciences Centre. Pat, 55, was participating in a world-first clinical trial at Sunnybrook's Hurvitz Brain Sciences Program using focused ultrasound (FUS) technology to deliver a key enzyme that is missing in the brains of patients with Parkinson's.

As she waited for the procedure to begin, Pat felt apprehensive but excited. She knew she was taking part in an experimental treatment that researchers hope may one day become an effective way of slowing down the disease. Pat would go on to have three treatment sessions in total, and the results for her have been dramatic.

"I feel like I'm back to the beginning stage of the disease," she says. Pat reports a significant reduction in tremors, emotional upsets, muscle pain and difficulty writing – symptoms that first began when she was in her late 40s. Pat says that she's even been able to decrease the dosage of the medication she takes to alleviate her Parkinson's symptoms.

And though it's important to note that these results may not be typical or occur in other patients, Pat is pleased with her results so far.

"Hopefully, that will last a long time," she says.



Pat Wilson on her farm in Cookstown, Ont.

BYPASSING THE BLOOD-BRAIN BARRIER

A diagnosis of Parkinson's can be devastating for patients. Symptoms of the neurological disease can begin with numbness or pain in the extremities, trouble writing, internal trembling and changes in facial expressions, leading to cognitive impairment and dementia over time. According to Parkinson Canada, more than 25 Canadians are diagnosed with Parkinson's per day, and that number is expected to rise to more than 50 people per day by 2031.

This growing prevalence is why researchers are racing to find effective ways of reducing symptoms and hopefully slow down this progressive disease. Sunnybrook has become the first site worldwide to research FUS in the delivery of a therapeutic to Parkinson's patients. The trial is a collaborative and multidisciplinary effort in conjunction with the movement disorders team at University Health Network – and a testament to the pioneering spirit of patients.

Studies have shown that mutations in a particular gene known as GBA can lead to the development of Parkinson's disease. When this gene is mutated, harmful levels of a specific gene-related fat accumulate in the brain, leading to the neurological symptoms experienced by patients.

By delivering infusions of an enzyme called glucocerebrosidase, researchers hope the body will clear away the excess buildup, which may improve patients' symptoms.

However, delivering the enzyme isn't so simple, explains neurosurgeon Dr. Nir Lipsman, co-principal investigator of the study and Sunnybrook's director of the Harquail Centre for Neuromodulation. The blood-brain barrier, a semi-permeable border of cells responsible for protecting the brain from toxins and pathogens, also keeps out some beneficial medicines.

"Glucocerebrosidase is a large compound that ordinarily can't get into the brain because of the blood-brain barrier," Dr. Lipsman says. "Our goal was to determine whether we can use focused ultrasound to open the blood-brain barrier to safely deliver the enzyme directly to the brain of patients with Parkinson's disease."

Dr. Lipsman and his team have been pioneering FUS at Sunnybrook for the better part of a decade, recently using it in research to open the blood-brain barrier to deliver chemotherapy to the brain in glioblastoma patients. They have established that the use of FUS is a safe and temporary way of opening the blood-brain barrier, using extensive imaging before and after each procedure.

The current technique involves infusing the enzyme through an IV, while delivering ultrasound waves to the brain. A helmet-like device ensures the ultrasound waves are directed into specific parts of the patient's brain, guided by the precision of an MRI. A positron emission tomography (PET) scan measures how brain activity in key regions involved in Parkinson's changes over time,



while blood tests, MRIs and spinal fluid tests give researchers important information about the safety of the procedure and whether the enzyme has been effectively delivered.

A TRIP 'BACK IN TIME'

The trial has treated four patients, including Pat. While Dr. Lipsman can't yet speak to specific results, he notes any changes in symptoms will need to be assessed over weeks or months to determine if the enzyme is having an effect.

In Pat's case, she noticed some effects shortly following the procedure. For example, she experienced dyskinesias – involuntary movements she couldn't control – and also felt cold and had strange tremors that came and went. But after several weeks, the exaggerated symptoms passed, and Pat began to feel much better. She could control her handwriting and had less twitching.

As Pat says of her results: "I went back in time."

Dr. Lipsman says that other patients have reported similar reactions to the procedure and that all have tolerated it well. "These are remarkable patients who are taking part in an early phase trial. We are grateful for all they are contributing to our understanding of Parkinson's and ultrasound."

Having been delayed by the pandemic by several months, Dr. Lipsman and his team are now looking for two more patients before moving into Phase 2 of the clinical trial, which will target larger brain regions for enzyme delivery. As time goes on, he believes the procedure will become even less invasive, more efficient and shorter in duration.

"There is a lot of promise here," Dr. Lipsman says. "And there are a lot of questions still to answer. But can we now say that ultrasound can be used to safely deliver a therapeutic in Parkinson's disease? Yes, we can." 📌

Neurosurgeon Dr. Nir Lipsman speaks to a patient before a focused ultrasound procedure, part of Sunnybrook's world-first clinical trial.



A new-found sense of stability

For people with essential tremor, the simple act of holding a pen or drinking a glass of water can be impossible. Focused ultrasound is helping restore their independence

By Anna Sharratt

A CHANCE MEETING on a VIA train from Montreal to Toronto convinced Aidan Bolger that the clinical trial he had signed up for would change his life for the better.

Aidan, the president and CEO of an Oakville, Ont.-based transportation equipment company, had suffered from essential tremor for the last 10 years of his life.

“My father had it, and my sister has it,” he says of the neurological condition that causes uncontrollable shaking of the hands. As he got older, the shaking worsened and he was referred to several neurologists who prescribed medication.

“Over a period of five years, it got to the point where I had maxed out the medication,” he says. He needed something else.

In 2018, he got an appointment with Dr. Michael Schwartz, a neurosurgeon at Sunnybrook’s Hurvitz

“Now there’s nothing I can’t do.”

Aidan Bolger

Brain Sciences Program who was treating patients with unilateral essential tremor with focused ultrasound (FUS). After some tests, Aidan was accepted as a patient and told the wait time for the procedure would be just under one year.

Several months later, Aidan unexpectedly found himself face to face with Dr. Schwartz on a Montreal train bound for Toronto. “I walked into the car, and a gentleman stood up and said ‘I know you,’” he recalls.

As Aidan and Dr. Schwartz chatted, Aidan ordered dinner. But due to his hand shaking severely, he couldn’t eat his lasagna or hold a glass to drink water and ended up asking an attendant for help. “My quality of life was non-existent,” he remembers.

It’s these kinds of challenges faced by people like Aidan that have driven Dr. Schwartz and his team at Sunnybrook’s Harquail Centre for Neuromodulation to expand the use of FUS to treat essential tremor.

Since Sunnybrook’s world-first clinical trial investigating FUS for unilateral essential tremor in 2012, Dr. Schwartz and his team have successfully treated more than 200 patients. The team’s groundbreaking research led to approval for FUS treatment of essential tremor in Canada and the United States.

Now, Dr. Schwartz and his co-principal investigator Dr. Agessandro Abrahao, a neurologist and FUS investigator with Sunnybrook’s Harquail Centre for Neuromodulation, are enrolling patients in their clinical trial for bilateral essential tremor, which has the potential to improve a patient’s

function in both hands.

Dr. Schwartz notes that essential tremor, which strikes 4 per cent of Canadians over age 60, can be severely disabling.

“People can’t write. They can’t eat. Their hands are shaking so much they can’t hold a cup,” he says.

The FUS procedure allows people to resume the normal everyday activities their tremor had prevented: cutting food and eating it themselves, writing with a pen or doing up buttons on their shirt.

Despite his challenges that day on the train, Aidan says having that time to speak with Dr. Schwartz confirmed for him that he would be in good hands for the procedure to come. And in January 2019, after a series of tests, Aidan was given the good news: he would undergo FUS for the tremor on his right hand.

The procedure involves placing a helmet on a patient’s head, which has elements that aim ultrasound waves into the part of the brain that acts as a centre for motor control in the body.

“We rely on the patient to tell us what they’re feeling,” says Schwartz. “If I see the tremor get better, I raise the temperature a little more.”

In general, FUS in the treatment of essential tremor is effective in the majority of patients. Approximately half of patients experience complete or near complete relief from symptoms, with about 40 per cent having some degree of improvement with their essential tremor.

Aidan says immediately after the procedure, his tremor was completely gone. “It was miraculous,” he says. “By the time I was out [of the MRI], my hand was as solid as the Rock of Gibraltar.”

Aidan has since undergone the same procedure for the tremor on his left hand, having participated in Dr. Schwartz’s most recent clinical trial studying the impact of FUS on bilateral essential tremor. He says the second procedure was as successful as his first.

“I used to get my wife to cut my food and I couldn’t drink a cup of coffee,” he says. “Now there’s nothing I can’t do.”



OPPOSITE: Aidan Bolger takes a sip of water, something he wasn’t able to do without severe shaking before his focused ultrasound procedure. ABOVE: After the procedure, Dr. Michael Schwartz assesses Aidan’s tremors.

Pushing boundaries

When an extra-large aneurysm threatened the life of Georgia Marianne Mesbouris, the team at Sunnybrook's Centre for Neurovascular Intervention found an innovative way to get her back on her feet again

By Claire Gagne



ONE WEEKEND in August 2020, on a morning when Georgia Marianne Mesbouris and her family were planning to leave for a family vacation, the 42-year-old resident of Scarborough, Ont., woke up with an incredible pain at the back of her neck. Knowing how much this vacation meant to her kids, she took a pain reliever and hoped the throbbing and sensation of burning hot ears would go away.

It didn't.

Georgia, a mother of two and a tech expert on a national TV channel, considers herself a healthy person. "I don't have high blood pressure. I don't smoke. I [rarely] drink," she says. So it was a complete shock when – after a trip to the emergency room – she was told that the pain she was experiencing was the result of two aneurysms in her brain.

One was small, but the other was very large. Aneurysms occur when a blood vessel wall weakens and bulges out, and the largest ones, called "giant aneurysms," are typically no more than 2.5 centimetres across. Georgia's was 3.5 centimetres long – one of the biggest the team at Sunnybrook had ever seen.

As long as the aneurysms remained in her head, Georgia's life was at risk. One quarter of people with a ruptured aneurysm die within 24 hours, while another 25 per cent die within six months. For those who survive, many are left with permanent neurological damage.

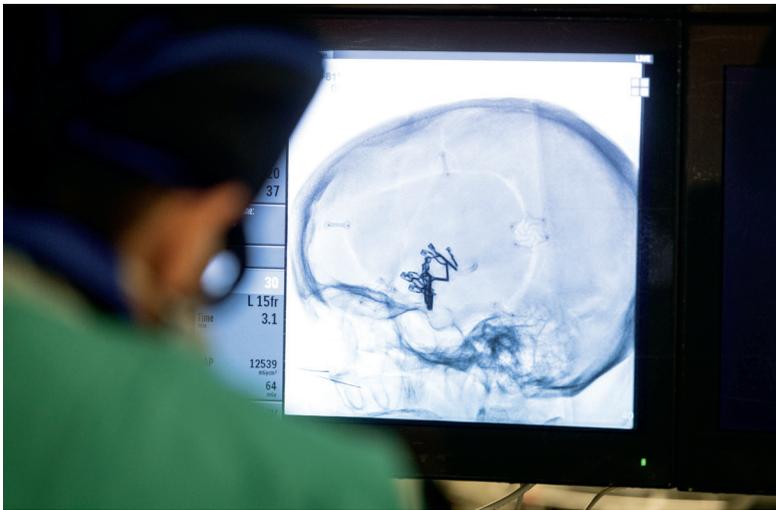
Fortunately, Georgia's care was in the hands of a Sunnybrook neurosurgeon whose expertise and ingenuity led to a novel approach to treatment that saved her life.

A PROBLEM WITH NO EASY SOLUTION

When faced with an aneurysm of this size, Sunnybrook neurosurgeon Dr. Leo da Costa knew he needed to come up with a unique treatment plan. Most aneurysms are berry-shaped, called saccular. But in Georgia's case, the aneurysm was what's called fusiform – wide in the middle and tapered at both ends.

Another complication was that the larger aneurysm was located in the left hemisphere of Georgia's brain, in the middle cerebral artery. This artery is responsible for providing much of the blood flow to the hemisphere, including the area of the brain responsible for speech. A rupture could have been devastating for Georgia, but she could not be treated using routine techniques.

"The easiest treatment for such large aneurysms is to close the vessel, which was not an option in this case. She could have a stroke on the left side of the brain and be paralyzed on the right side and unable to speak," says Dr. da Costa, medical director of Sunnybrook's Centre for Neurovascular Intervention.



OPPOSITE: Georgia Marianne Mesbours and her children enjoy a sunny day in the park.
 ABOVE: An X-ray shows the metal clips in Georgia's brain following her craniotomy.
 TOP: Sunnybrook neurosurgeon Dr. Leo da Costa.

Georgia says it was “surreal” to learn that her medical condition could be fatal or debilitating. But she felt hopeful that she would come through it all.

“My husband turned to me and he held my hand and [said], ‘Don’t die.’ So I told him, ‘I’m not going to die.’”

The neurovascular team’s initial treatment for Georgia was a craniotomy – brain surgery to reconstruct the affected blood vessel with metal clips. But while surgery was successful and Georgia went home, a month later an angiogram showed the aneurysm had grown again.

With Georgia’s life once again in jeopardy, Dr. da Costa decided that the situation called for another approach involving flow diverter stents. These special, tiny stents are made of mesh with very fine holes that change the way the blood flows around a vessel.

“If you imagine a tunnel, the blood goes mostly inside, and the [aneurysm] outside will slowly clot and shrink,” explains Dr. da Costa.

The problem with this approach was that Georgia’s aneurysm was far too long for these stents.

So, Dr. da Costa decided to try something unprecedented. He would telescope three minuscule stents into one another to bridge the distance of Georgia’s aneurysm.

A WORLD-FIRST PROCEDURE

On October 2, 2020, Dr. da Costa and his team accessed Georgia’s brain through a small incision in her groin. Using a combination of catheters and wires, he navigated the tiny stents through her aorta and into the brain vessels where the aneurysm was located.

Dr. da Costa placed one stent from the edge of the healthy area of the blood vessel into the aneurysm, then placed another just inside that one to extend into the middle part of the aneurysm. Finally, a third stent was placed to complete the “bridge” to the other side.

“This has not been done before using these small stents; [we] were the first globally to telescope three flow diverters to successfully treat a small vessel middle cerebral artery aneurysm,” Dr. da Costa says.

In total, the surgery was just over an hour. Georgia woke up to hear a nurse complimenting her toenail polish. “That made me laugh, and when I laughed, they exclaimed, ‘She’s awake!’” she recalls.

She was released from the hospital shortly after the surgery and is recovering well. Last Christmas, Georgia sent Dr. da Costa a video with her two kids, thanking him for all he’d done to save her life.

“He’s so modest,” says Georgia. “He responded, ‘It wasn’t me. It was all you.’”

LESS INVASIVE AND MORE EFFICIENT

Dr. da Costa says the procedure will have a significant impact on how his team handles difficult aneurysms.

“Until very recently, open surgery was often the safest option for these very large aneurysms, and the procedures are often complex,” he says. “Finding out that we can add one very small stent to the other in a chain to cover longer distances will allow us to treat these aneurysms in a much less invasive and efficient manner.”

In fact, after Georgia’s treatment, Dr. da Costa said they did another similar one, using the same technique, and he is convinced more and more cases will be done in a similar fashion worldwide. That patient also did well and was discharged the next morning.

Dr. da Costa says that his team’s personalized and precise treatments work hand-in-hand with the constant evolution of technology in this space.

“Many improvements in existing devices and new, disruptive technology are launched every year, allowing us to push the boundaries of what can be treated and how we do it.”

A man in a black t-shirt and shorts is walking a black and white dog on a leash through a lush green forest. The man is looking to his right, and the dog is walking ahead of him. The forest is filled with tall trees and dense foliage.

Pain reliever

The orthopaedic surgeons at Sunnybrook's Holland Bone and Joint Program are spreading the word about innovative procedures that treat serious knee problems without artificial joints

By Patricia Hluchy

GROWING UP, Marko Maljukanovic was an active kid who enjoyed basketball, volleyball and track. But by his late teens, Marko noticed a problem with his left leg, which appeared to have a bend in it.

"My knee always hurt," recalls the dump truck driver from Kitchener, Ont., now 37. "When I was younger, I was able to deal with it and go to the gym. But eventually, I had to stop."

By the time Marko was in his early 30s, the pain had become "unbearable," he says. "Sometimes I [could] walk for longer, some days shorter, but the next day I'm not going anywhere [because] my knee hurts."

Marko's family doctor referred him to the Holland Bone and Joint Program at Sunnybrook. There, he says, "they couldn't believe I was still walking on the leg." Marko was told he was bow-legged on his left side and diagnosed with osteoarthritis caused by misalignment of his knee.

Fortunately, Marko's Sunnybrook physicians told him that due to his age and medical condition, he was a prime candidate for joint preservation, a surgical procedure that preserves the patient's own joint rather than replacing it with an artificial one.

It's a treatment option that can be transformative for people with early to mid-stage arthritic

disease that is affecting their quality of life, says Dr. Sebastian Tomescu, an orthopaedic surgeon at the Holland Centre. But because most primary-care physicians don't know about recent breakthroughs in joint preservation, many patients continue to suffer without knowing it's an option.

Dr. Tomescu and his team are hoping to change that.

"We're trying to educate people that this is a modern procedure, and that when practitioners see patients with joint pain without end-stage arthritis, they should consider joint preservation," he says.

A PATHWAY TO BECOMING ACTIVE AGAIN

Dr. Tomescu explains that orthopaedic surgeons mostly avoid joint replacement – or arthroplasty – in younger patients because it can limit a patient's ability to take part in high-impact activities, and the artificial joint might wear out as the patient gets older. Because a person's native joint always functions better than a prosthesis, with joint preservation many patients are able to return to all their usual activities, including running, jumping and downhill skiing. The earlier the intervention, the better the outcome, he adds.

Osteotomy is the most common procedure among an emerging array of highly specialized



OPPOSITE: Marko Maljukanovic walks with his dog in Kitchener, Ont. TOP: The orthopaedic surgery team at Sunnybrook's Holland Centre prepare Marko for his joint preservation procedure. BELOW: Orthopaedic surgeon Dr. Sebastian Tomescu (centre) performs an osteotomy on Marko's leg.



“Every week, my leg is getting better.”

Marko Maljukanovic

osteoarthritis treatments, known collectively as joint preservation. (Also included in this category are minimally invasive soft-tissue reconstruction and cartilage restoration procedures, as well as other procedures dealing with bony spurs that may impinge upon normal joint motion.)

On March 16, 2021, Dr. Tomescu performed a double osteotomy on Marko's leg. This type of surgery cuts and reshapes the bone on the patient's femur (thigh bone) and tibia (the larger bone in the lower leg) to correct alignment. Marko's procedure – which took 2.5 hours – involved cutting a wedge of bone from his femur, which was then stabilized with a plate and screws, and placing the bone wedge in a gap created in his tibia as a graft to expedite healing.

The operation was expected to substantially alleviate Marko's pain by reducing the “load” on the arthritic portion of the cartilage on the inside of his knee, allowing him to be active again, Dr. Tomescu says.

One of the reasons many primary-care physicians are not aware of joint preservation is that

osteotomy, which has been around for decades, was not so successful in the past, explains Dr. Tomescu. “It was traditionally a very invasive operation associated with a number of complications, and the rehab was really slow,” he says.

Orthopaedic surgeon Dr. Albert Yee, chief of Sunnybrook's Holland Bone and Joint Program, says the game-changer with osteotomy and other joint-preservation procedures is that there have been recent, dramatic advances in magnetic resonance imaging (MRI), bone fixation and the understanding of joints and biomechanics.

“Recovery with some of the newer devices and less-invasive surgical techniques are advancing the field, and developments in imaging help us plan more precisely and implement the correction that's required for a joint,” Dr. Yee says.

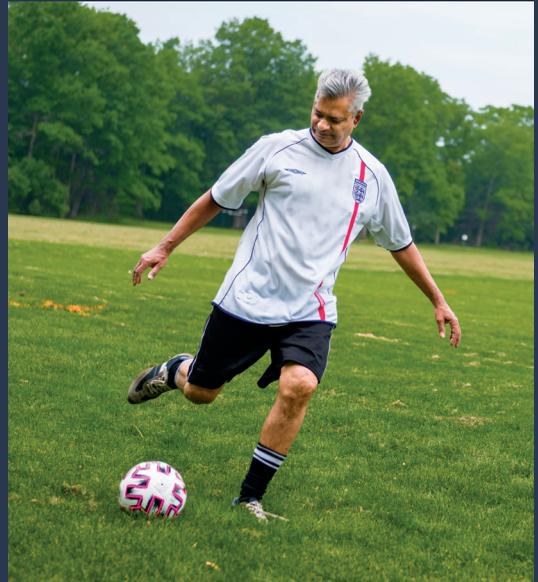
PROCEDURES WITH PROMISE

Last year, to address the treatment gap for those with earlier-stage osteoarthritis, the Holland Centre launched the Schatzker Joint Preservation Initiative for Active Adults, named after



VIRTUALLY PAIN-FREE

After 13 years, Albert Pinto can finally kick a soccer ball again



Albert Pinto played in neighbourhood soccer leagues between the ages of five and 43, but he became bow-legged on both sides, developing pain and swelling to the point where “I just couldn’t play anymore, I couldn’t run,” recalls the Mississauga, Ont., audit manager, now 56.

“I couldn’t even go to shop at the mall because within 20 feet of walking, my right knee would just swell up and become stiff,” he says. “I couldn’t really walk up and down stairs because my knee would lock up, and the pain made it hard to sleep well at night.”

Initially, Albert thought his only option was to suffer. But his family doctor had heard of joint preservation and referred Albert to Sunnybrook’s Holland Bone and Joint Program. He was found to have moderate osteoarthritis on the inside of his right knee because of misalignment, and in 2018 orthopaedic surgeon Dr. Sebastian Tomescu performed a high tibial osteotomy involving a bone graft. That was followed by an osteotomy on his left knee in 2020, when that joint also deteriorated.

Albert, who has done a lot of physiotherapy, says he is now virtually pain-free. “I’m not on any kind of medication, no anti-inflammatories and I am able to kick a soccer ball around with my friends.” Albert can now walk for hours at the mall with his wife, run or bike on weekdays and hike most weekends with his two daughters.

“I don’t know what the future holds,” he says, “but I’m really, really satisfied with the results.”

internationally renowned Sunnybrook orthopaedic surgeon emeritus Dr. Joseph Schatzker, a long-time proponent of this type of treatment. The initiative’s goals include expanding the spectrum of care for such patients, conducting research and teaching orthopaedic surgery residents and fellows these new techniques.

“Joint preservation will have an enormous impact because we are aiming to preserve the patient’s own tissue, which has the ability to heal, rather than replace it,” Dr. Schatzker says.

Dr. Tomescu points to a study released earlier this year by Western University in London, Ont., that found promising numbers for tibial osteotomy. Researchers studied 556 patients who had the surgery and found that 95 per cent of them did not get a full knee replacement after five years, and about 80 per cent after 10 years.

“I think that number may even go higher in the future as we get a better understanding of who is a good candidate for this operation,” he says.

And while most of the osteotomies performed at the Holland Centre have involved the knee, Dr. Tomescu notes that there are plans to expand to the hip.

“We’ve been talking about essentially recruiting surgeons in the near future who are interested in hip preservation at Sunnybrook.”

STRONGER EVERY DAY

Twelve weeks after his joint preservation surgery, Marko is reporting great improvements. He says he is able to walk without crutches or a cane and he’s returned to his job. As well, Marko says the improved appearance of his leg is a confidence booster.

“I’m more mobile now than I was with the bad leg,” he adds. “I think the doctor and his team did a great job. Every week, my leg is getting better.”

Twelve weeks after joint preservation surgery, Marko was able to walk without crutches or a cane.



Redefining trauma care

Recovery from a gunshot, stabbing, car crash or other traumatic injury can be a slow and arduous process. Sunnybrook’s new Jennifer Tory Trauma Recovery Clinic provides integrated and interprofessional care to help trauma patients regain their physical and mental health after their initial hospital stay

BY DIANE PETERS

Wrong place, wrong time: nothing could describe Tyrone Thomas’s situation more aptly. After volunteering at his church in Pickering, Ont., one evening in November 2018, he gave a ride home to a fellow volunteer. As Tyrone sat in the car watching as his friend safely entered her basement apartment, he saw, out of the corner of his eye in his rear-view mirror, something pointing at him. “My memory gets fuzzy after that,” remembers the 39-year-old video producer.

It was a gun. An unknown person shot at his car 14 times,

with 10 of those bullets hitting his body. Still conscious but in shock, Tyrone called his wife to tell her what had happened, and she “went into a tailspin.” He has no idea who called 911, but an ambulance soon arrived.

Tyrone woke up one month later at Sunnybrook. His life had been saved by staff of the Tory Trauma Program, who care for one in three severely injured people in Ontario.

“Why am I here? Why can’t I move?” Tyrone remembers asking again and again.

He was told he had been shot in a case of mistaken identity, and

that 100 people from his church had come to the hospital in his most dire moments to pray in the waiting room.

At the end of two months in hospital, Tyrone was able to walk and talk again. He then spent two weeks at Sunnybrook’s St. John’s Rehab. Once home, he was able to access outpatient physiotherapy, as well as counselling for himself and his wife. By January 2020, Tyrone had returned to much of his life before the shooting, including his job in video services for Peel Regional Police.

Many patients are not able to adjust to life after trauma

as well as Tyrone has, says Dr. Avery Nathens, surgeon-in-chief and medical director of the Tory Trauma Program. Just 30 per cent of trauma patients are back to their “usual major activity,” such as work or caregiving or enjoying retirement, at the one-year mark.

“These people have a very difficult time getting back to their old life,” says Dr. Nathens. People with traumatic injuries face many barriers to getting well: they can struggle to access services; they may find care, but it can be in a patchwork all over town; they may find pre-existing problems such as substance abuse getting worse. Dr. Nathens and his trauma team have always known this, but they did not have the resources to address the issue: patients get discharged, and the focus turns to saving the next life.

FOLLOW-UP IN ONE PLACE

That’s now changed at Sunnybrook. An idea Dr. Nathens and his team, including trauma services manager Corey Freedman, had been working toward for nearly a decade has come to fruition in the Jennifer Tory Trauma Recovery Clinic. This clinic on Sunnybrook’s Bayview Campus serves trauma patients for up to one year after their hospitalization. They gain access to an interprofessional team at Sunnybrook with appointments booked in clusters on the same day wherever possible.

“The goal of the Jennifer Tory Trauma Recovery Clinic is to address gaps in care and ensure that each patient has the greatest chance of returning to the highest level of functional recovery and the best possible quality of life,” says Dr. Nathens.

This is the first trauma clinic of its kind in Canada. Launched in April 2021, the clinic will see as many as 1,500 patients a year through an integrated care approach.

Previously, a trauma patient who had been discharged but still required follow-up with multiple care providers would have needed to visit several different

“We want to really partner with the patient and understand how to provide the best care.”

Dr. Avery Nathens, surgeon-in-chief and medical director of the Tory Trauma Program

areas of the hospital. Now, with the Jennifer Tory Trauma Recovery Clinic, patients are able to see multiple care providers in one place and have access to additional services not previously available such as occupational therapy, physiotherapy, rehabilitation medicine, social work, psychology, clinical psychiatry, pain services and more.

The newly renovated space, made possible by a generous donation from Jennifer Tory and the Tory family, consists of five exam rooms, a dedicated registration and waiting area, staff workstations and equipment areas and a team conference room equipped with the latest in videoconferencing technology.

Grace Walter, patient care manager for the Jennifer Tory Trauma Recovery Clinic, is also the patient care manager for the trauma in-patient ward. She says her dual role is key. “It’s part of the idea of seamless care,” she says.

Once a patient is discharged from the hospital and becomes a patient of the clinic, social worker Janna Di Pinto completes a comprehensive intake that assesses function, pain, mobility, cognition and mental health. After the assessment, she makes the required referrals back to the clinic, or to other services in the community to help the patient on the path to their recovery.

“We can now efficiently facilitate team conferences for complex patients, so we can pull in all the health professionals to discuss a patient and see how

we can best support them,” says Walter.

The interprofessional nature of the clinic means that staff from across the hospital can more easily collaborate, says Dr. Nathens.

“As an example, surgeons might not know what to do if a patient has post-traumatic stress disorder after their injury or is asking for more opioids to help with their pain. Having access to all of that expertise in the clinic will be helpful for both the care providers and the patients,” he says.

Dr. Nathens notes that it’s early days for the new clinic, and there is lots to learn. “The team will be capturing data on how patients are doing at one month, six months and a year down the road,” he says. “We want to really partner with the patient and understand how to provide the best care.”

To that end, Dr. Nathens says clinic patients are given surveys to fill out, in order to gain insight into how well they have been prepared for life outside of the hospital. The team uses the data from those surveys to help them improve the patient experience.

Ultimately, the goal is for the Jennifer Tory Trauma Recovery Clinic to do more for our patients and trauma community, Dr. Nathens says. It will redefine the journey of the trauma patient and transform trauma care into a more collaborative process that is informed and enriched by data.

“We want to create a clinic where we can learn, build and improve,” he says. 🍀



Breaking a dangerous cycle of violent injury

The BRAVE program supports young people who have been treated for a gun or stabbing injury to help them move ahead with their lives

BY DIANE PETERS

The repeat experience of injuries resulting from gun- or stabbing-related incidents is often the result of unmet social needs.

“We see it time and again where a patient is treated for a minor gunshot wound and then returns with a more severe injury from another shooting incident,” says Dr. Avery Nathens, medical director of Sunnybrook’s Tory Trauma Program. “We have an opportunity to intervene and prevent the second injury that may end – or significantly change – the patient’s life forever.”

Patients who experience the physical and psychological impact of violence can benefit from a hospital-based violence intervention program and approach that incorporates trauma-informed care with traditional medical care. Such programs are proven effective in reducing risk factors and optimizing the outcomes of young people negatively affected by community violence.

The Tory Trauma Program, under Trauma Services Manager Corey Freedman, launched Breaking the Cycle of Violence with Empathy (BRAVE) in October 2020. BRAVE supports people aged 17 to 30 who have been treated for a gun or stabbing injury by connecting them to a case manager to support them through their recovery for approximately six months.

“BRAVE uses the ‘teachable moment’ approach to intervene early and support the patient’s overall physical, social and psychological needs,” says Brandy Tanenbaum, injury prevention coordinator at Sunnybrook, who designed BRAVE based on models out of San Francisco and other U.S. cities.

With shooting incidents in Toronto doubling since 2014 and Sunnybrook seeing a rise in the number of violent injury patients, Dr. Nathens and Tanenbaum recognized an urgent need for this kind of program. A \$100,000

above:
from left:
BRAVE case manager Michael Lewis, trauma social worker Ilana Perlman and Dr. Avery Nathens, medical director of Sunnybrook’s Tory Trauma Program.

grant from the City of Toronto to run BRAVE as a one-year pilot made it possible.

The BRAVE journey begins with patients still in recovery. They are visited by Michael Lewis, the program’s case manager, who brings extensive experience in community youth violence prevention. He is able to develop a rapport with patients and their families who are often looking for additional support, but do not know how to find it. Lewis continues his work after discharge by visiting patients as they continue their recovery in rehab or at home. In these visits, he learns about the patients’ circumstances.

“I get to know the patients as people and understand what their needs and goals are and begin to develop a case plan to implement over time as they are ready,” Lewis says.

Through conversations, Lewis is able to assess patients’ needs and start connecting them and their family with services. Connections can include include victim services, peer support, education counselling, mental health and addiction services and more. Most important is the mentorship Lewis provides to the young patients, without the judgment or bias so often experienced by this patient population.

Support can look different for different patients, says Lewis. He recalls one young man with numerous gunshot wounds who was recovering very slowly and kept losing weight. With BRAVE, the patient was supported throughout his physical and psychological recovery. “Now back home and getting stronger, that young man has plans to study engineering,” Lewis adds.

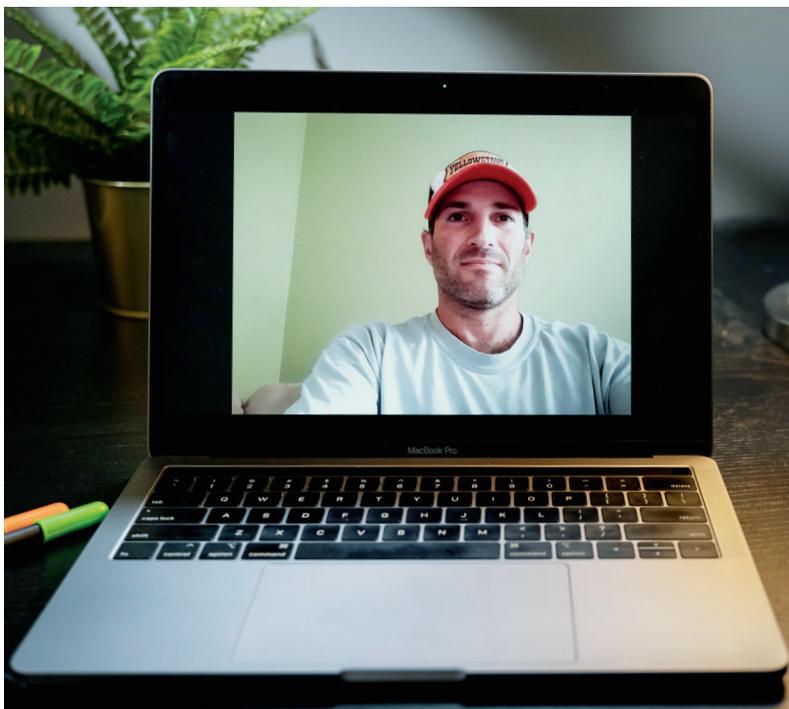
Lewis says his job is to provide an empathetic ear, help people connect to services and nudge them to move ahead with their lives.

“When you meet people in trauma, you often run into patients who’ve been looking to make a change for a long time.”

Ushering in a new era in medicine

COVID-19 presented a vast challenge for medical and administrative staff at Sunnybrook: How could they deliver the programs and services their patients relied on, yet still keep everyone as safe as possible? Here are just a few examples of virtual care initiatives developed at Sunnybrook through the pandemic

BY ANDREA YU



VIRTUAL OCD TREATMENT: A BETTER FIT FOR SOME

Harlan Kirschenbaum has battled obsessive-compulsive disorder (OCD), a chronic psychiatric illness, for most of his life. Over the years, his OCD has led to the repetition of various actions, called compulsions, which have had a dramatic impact on his life.

“At one point, I couldn’t get dressed without looking at the labels on my clothes,” Harlan explains. “In recent years, I couldn’t touch my kids or my wife because I would get bad thoughts, like I would give them cancer.”

When the COVID-19 pandemic hit, Harlan’s OCD worsened. He reached out to Sunnybrook’s Frederick W. Thompson Anxiety Disorders Centre for support through the Intensive Residential OCD Program, which had recently shifted from in-house treatment to virtual care amid the pandemic.

The six-week program includes exposure and response prevention sessions guided by a therapist through video conferencing, as well as group sessions for mindfulness and cognitive-behavioural therapy. It was an

intense experience, but Harlan says that virtual treatment for his OCD was even more beneficial because he was being treated while in his home, where the majority of his triggers are.

“It’s where my OCD attacks me the hardest, and the virtual program was amazing – the most effective treatment I’ve ever had,” he says.

Dr. Peggy Richter, head of the Frederick W. Thompson Anxiety Disorders Centre and director of the Clinic for OCD and Related Disorders at Sunnybrook, says that coaching people in their home environment has, for many, been advantageous over typical live treatment on-site.

The success of the virtual program has prompted Dr. Richter and her colleagues to plan for a hybrid model of care in the future, based on the positive experience of patients like Harlan. Patients would have shorter residential stays, then migrate to a virtual environment to take advantage of coaching in their home environment.

“We see all the advantages in terms of access, what can be done and how much easier it is

above:
Harlan Kirschenbaum says that engaging in virtual treatment for his OCD from his home has been beneficial.

for patients to attend our program,” Dr. Richter says. “We don’t want to lose those wonderful improvements.”

COVIDO: A LIFELINE FOR PATIENTS

For infectious disease physician Dr. Nisha Andany, developing a virtual care model for COVID-19 was an important part of keeping patients informed about a new and unknown disease.

“Early on, it became clear that most people with COVID-19 would not need to be admitted to hospital and could be managed at home,” Dr. Andany says. “But they might be feeling alone or uncertain in terms of what to expect, what they should do or when they should seek medical attention.”

Alongside members of the infectious diseases team at Sunnybrook, Dr. Andany developed the COVIDO program to conduct phone and video assessments of outpatients with COVID-19.

“We [also] give patients our email address and pager number and inform them there’s a doctor on call 24 hours a day for any emergencies,” she adds. “We’re



BRINGING THE ED TO THE COMMUNITY

When Sunnybrook physician Dr. Justin Hall saw patients avoiding the Emergency Department (ED) due to fears around contracting COVID-19, he saw the need to provide another option.

“People delayed their care and were more unwell when they eventually came in,” Dr. Hall explains. “In some cases, there was permanent or irreversible damage because of this delay.”

Along with members of ED leadership, Dr. Hall developed Sunnybrook’s Virtual ED. Focused on addressing acute but non-life-threatening issues, it launched thanks to provincial funding as a six-month pilot in December 2020, and it has since been extended with ongoing provincial and hospital support. Patients can book a same-day appointment to see a physician through video conferencing app Zoom if they’re unable to visit their regular family doctor.

“It’s not a replacement for the in-person ED,” Dr. Hall notes, as emergency departments are still open and are safe to visit. People experiencing life-threatening issues like a heart attack or stroke should still go to the hospital. But issues such as skin conditions, some mental health concerns or sprains and strains can now be assessed through a video appointment.

As with many departments at Sunnybrook, there are plans to incorporate a hybrid model of virtual and in-person care in the ED post-pandemic, says Dr. Hall, making it easier for patients to access treatment in an integrated manner.

“We estimate that 30 per cent of in-person visits could be seen virtually,” he says. “There’s an increasing recognition of the value of virtual care and that patients like it and are willing to use it.”

above:

Staff members of the Virtual Emergency Department Team (from left): Toni Alevantis, patient administrative associate; Steffanye Michaelson, patient care manager; Dr. Aikta Verma, chief of emergency medicine; Dr. Justin Hall, emergency room physician and virtual emergency department lead.

often able to reassure most patients that they can stay home and guide them in managing their symptoms.”

As the COVIDEO program was rolling out, the team also began to send out blood oxygen monitors to higher-risk patients. That way, the COVIDEO team could obtain a more objective assessment of someone’s condition from home.

“Now, patients will call us and say ‘my oxygen level is at a certain level,’” Dr. Andany says. “It allows us to more reliably determine how sick someone is. If a patient has a normal oxygen level, we will typically reassure and advise them to remain home and keep monitoring. However, for those with low oxygen levels, even if they say they feel okay, we know they actually need to come into the hospital for treatment.”

VIRTUAL POST-OPERATIVE PHYSIOTHERAPY

For patients recovering from hip or knee replacement surgery, virtual post-operative physiotherapy offered by the Holland Centre has given patients all over the province greater choice, says

Amy Wainwright, manager of the Holland Bone and Joint Program.

“For some patients, the possibility of virtual care removes some barriers to receiving care at the hospital such as arranging transportation, long travel times, paying for parking, as well as family members to accompany them,” Wainwright says.

Throughout the pandemic, physiotherapists have been hosting rehab sessions by video to safely guide patients in their post-surgical recovery.

Going forward, the Holland Bone and Joint Program will continue to offer virtual care for outpatient physiotherapy, as well as virtual options in other areas of the program such as pre-admission and post-operative follow-up clinics. Wainwright says the expansion of virtual care has been something of a silver lining among the challenges caused by COVID-19.

“We now have a virtual care model that would have taken years to get to and may have been challenging to implement if it wasn’t for the pandemic pushing us all into a new arena,” she says.

Sunnybrook community steps up to support critical COVID-19 research

BY JOEL SCHLESINGER

As well as being on the front line of fighting COVID-19, Sunnybrook has been on the leading edge of novel coronavirus research.

“Since the onset of the COVID-19 pandemic, Sunnybrook researchers have been quick to rise to the challenge, initiating more than 100 research studies related to COVID-19 that seek to make a substantive impact in better understanding the virus or proposing solutions to the many questions posed by the pandemic,” says Dr. Kullervo Hynnen, PhD, vice-president

of research and innovation at Sunnybrook.

These studies were launched thanks in large part to donor support. Close to 11,500 donors from the community stepped up to help Sunnybrook’s COVID-19 response, contributing more than \$7-million.

While insights into the virus are still evolving, it appears that although COVID-19 is best known as a respiratory disease, it also has repercussions elsewhere in the body.

Here is a look at some of the research projects ongoing at Sunnybrook:



WHAT IMPACT DOES COVID-19 HAVE ON MENTAL HEALTH?

Having seen the effects of the pandemic on mental health first-hand, Dr. Anthony Levitt, chief of the Hurlvitz Brain Sciences Program and medical director of the Family Navigation Project (FNP), was spurred to lead a formal study into its wide-ranging impact, with the FNP team.

“I do not think we yet fully understand the tremendous negative, and even positive, impact of the pandemic on the mental health of our society,” Dr. Levitt says. “Our study is designed to explore this and the specific effects of having contracted COVID on mental illness and addiction.”

At the end of the project, around 7,500 Ontarians will have been surveyed over a period of a year and a half. Early findings have revealed that people who have contracted COVID-19 are at a greater risk of having depression, anxiety and substance misuse, compared to those who have not. As well, the data shows that several factors are associated with higher risk of suicidal ideation during the pandemic, including younger age, COVID-19 exposure and reduced socio-economic status.

The study has revealed that greater long-term social support is potentially protective of people experiencing these kinds of challenges, says Dr. Levitt. He hopes the study’s results will assist the province in creating better supports for people experiencing mental health challenges not only from the COVID-19 pandemic, but also for future pandemics.



ILLUSTRATION BY ISTOCK (WOMAN IN MASK)



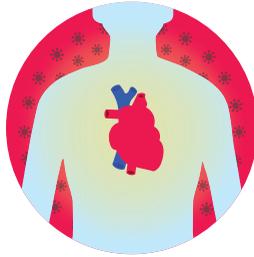
WHAT IS THE IMPACT OF COVID-19 ON THE BRAIN?

Neuroscientist Dr. Simon Graham, PhD, is leading a team looking at the longer-term cognitive effects of infection. “The brain effects of COVID-19 are somewhat under-appreciated, and we don’t know the full extent to which they’re occurring,” he says.

Using magnetic resonance imaging (MRI) and behavioural assessments, Dr. Graham’s study has already shown some patients who were on a ventilator before recovering suffered from brain micro-bleeds or mini-hemorrhagic strokes. Some recovered patients have also been found to have evidence of inflammation in the brain.

These discoveries are particularly important given the growing number of “long haulers,” patients who experience lingering problems from the virus like brain fog and poor memory, Dr. Graham adds.

“Even if their persistent symptoms have to do with shortness of breath or abnormal heart rate, those things are actually controlled by the brain, so it could be COVID-19’s impact on the brain is causing those problems, too.”



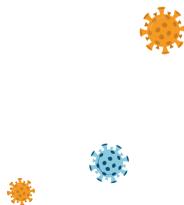
WHAT IS THE RELATIONSHIP BETWEEN COVID-19 AND THE HEART?

Cardiologist Dr. Idan Roifman in the Schulich Heart Research Program at Sunnybrook is leading research examining how COVID-19 may lead to inflammation of the heart muscle or cause damage to the heart similar to a heart attack.

The study is building on considerable research globally showing COVID-19 increases the risk of blood clots.

Using magnetic resonance imaging (MRI), Dr. Roifman’s work seeks to find evidence of heart damage in patients who have recovered from COVID-19 and determine the type of damage that has occurred. The study is also investigating how risk factors like diabetes and high blood pressure may elevate the risk of developing cardiac complications like heart failure.

Already, the research has revealed heart function abnormalities in some patients in recovery. “That alerted us to follow them closely and led to a potential change in their long-term management,” Dr. Roifman says.



WHY DO COVID-19 SYMPTOMS PERSIST IN SOME PEOPLE?

Sunnybrook’s Dr. Hubert Tsui, head of hematopathology, and clinical microbiologist Dr. Robert Kozak, PhD, are poring over blood tests and nasal swabs from patients with COVID-19 to understand why some individuals become so-called long haulers. “The research literature states as much as 50 per cent of people could have some long-term COVID symptoms,” says Dr. Tsui.

The researchers have been looking at early diagnostics from patients who became long haulers, while comparing them with other patients who have fully recovered to see if they have a different initial immune system response. “Some of our preliminary data is indeed showing that something very early on, even at the diagnostic point, is different – providing a clue in terms of risk to developing long COVID,” he adds.

Understanding the basic science regarding immune response to COVID-19 could lead to identifying patients who are likely to experience long-term problems early on, Dr. Kozak notes. Research could even lead to therapeutics to prevent and treat long-hauler symptoms.

“The more we can help people now, the more they will benefit down the road,” he says. 🍀

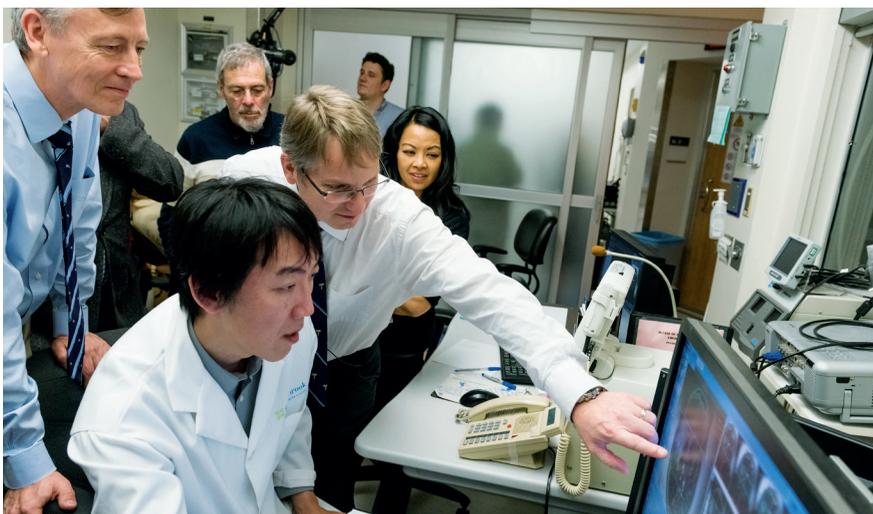


▲ **TRUE TO ITS ROOTS:** On September 26, 1946, the first patients from a group of 100 were transferred to the newly established Sunnybrook Military Hospital. They lived in a wing known as Lancaster, named for the iconic bomber aircraft. Sunnybrook's expertise has grown to care for 1.3 million patients annually across three campuses, yet its mission – to be there when it matters most – stays true to its roots as Canada's largest Veterans hospital.

THEN & NOW

75 years of innovation

Sunnybrook's bold vision to invent the future of health care draws its inspiration from a proud tradition of pioneering medical breakthroughs and defining new possibilities in patient care. Here, we take a look at Sunnybrook's evolution from its celebrated beginnings as a Veterans hospital to the renowned academic health sciences centre it is today



◀ **AN ENDURING SPIRIT OF INNOVATION:** On November 6, 2015, the excitement in the room was palpable the moment Sunnybrook's Hurvitz Brain Sciences Research Program made history. The team was the first in the world to use focused ultrasound to noninvasively and temporarily breach the blood-brain barrier to investigate a more effective way of delivering chemotherapy into the brain tumour of a patient. This breakthrough has opened up a new frontier in researching the treatment of many brain disorders, with a number of clinical trials now underway.



PROUD PHILANTHROPIC TRADITION:

In 1928, Alice M. Kilgour donated Sunnybrook Farm and its lands to the City of Toronto in memory of her husband for use as a public park. Several years later, with the consent of the Kilgour heirs, part of the parkland was transferred to the Government of Canada to build a hospital for Veterans of the Second World War. In the years since, the spirit of this generous act continues with philanthropic investment playing a critical role in the evolution of patient care and treatment at Sunnybrook.



CLINICAL AND RESEARCH EXPERTISE:

In 1990, the hospital was officially named Sunnybrook Health Sciences Centre. This change is an acknowledgment of the important work taking place in teaching, research and health promotion within a multi-disciplinary environment. The hospital continues to expand. The Bayview Campus is currently undergoing renovations to welcome the Garry Hurvitz Brain Sciences Centre, which will bring together Sunnybrook's top clinical and research minds to develop the next generation of treatments for mental health conditions, dementia, stroke, neurological and other brain disorders.



HONOURING SERVICE AND SACRIFICE:

In this photo from the 1950s, ceremonial wreaths are being prepared for Remembrance Day at Sunnybrook. Today, Sunnybrook's Veterans Centre is home to more than 300 Veterans of the Second World War, the Korean War and the Cold War.



THE COMMEMORATION CONTINUES:

November 11 is a day that holds special meaning at Sunnybrook. As part of Remembrance Day ceremonies each year, dignitaries join many Veterans and their families in laying memorial wreaths at the historic Sunnybrook Cenotaph. This act acknowledges the many sacrifices made by Veterans to protect our freedoms.



▼ **REACHING NEW HEIGHTS:** Sunnybrook's rooftop helipad started receiving air ambulances in January 2020. This new location provides even faster access to care for critically ill and severely injured patients across Ontario. Patients are an elevator ride away from the John A. Tory Regional Trauma Centre, Ross Tilley Burn Centre, operating rooms, critical care unit and Neonatal Intensive Care Unit in the DAN Women & Babies Program.



▲ **READY FOR TAKEOFF:** Canada's first regional trauma unit was established at Sunnybrook in 1976 to care for the most critically ill and severely injured patients. Here, onlookers take in the sight of an air ambulance on the original helipad, located at the back of the Bayview Campus. This helipad is still maintained as a secondary landing site and backup to the new rooftop helipad.



▼ **REGAINING FUNCTION AND INDEPENDENCE:** Sunnybrook's prosthetics service opened in 1949. With demonstrated success over the following three decades, the federal government transferred its prosthetics unit to Sunnybrook in 1982 to provide prosthetics to war amputees.



▲ **NEXT-GENERATION PROSTHETICS:** Today, the experts at the Sunnybrook Centre for Independent Living and St. John's Rehab provide leading care and prosthetic options for Veterans and other patients with limb loss. Sunnybrook was one of the first centres in Canada to use pattern recognition technology to help patients with prosthetics on both sides of the upper body better regain varied and more precise movements of the elbows, hands and wrists.



▲ **TESTING THE LIMITS:** Early labs at Sunnybrook provided a range of services, including pathology, biochemistry, hematology and microbiology. At that time, the sophistication of tests required were limited in scope, with little demand for after-hours testing.

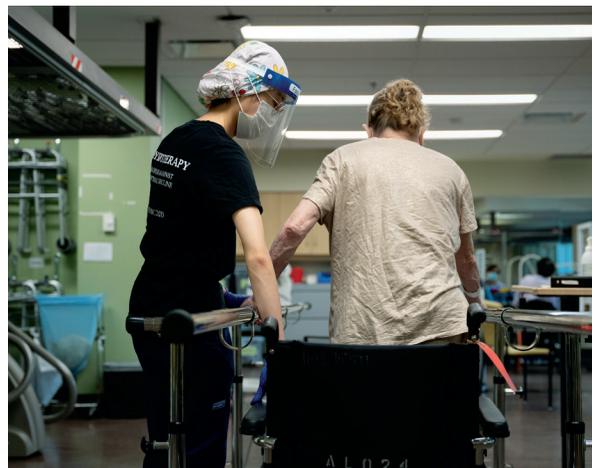
► **EXPANDING EXPERTISE:** The increase in demand and complexity of laboratory medicine over recent decades has required huge growth in technological capacity and professional skills. Now, 24-7 availability supports a wide spectrum of testing at Sunnybrook, including cutting-edge molecular diagnostic tests.



▼ **ADDRESSING COMPLEX NEEDS:** St. John's Rehab and Sunnybrook Health Sciences Centre merged on July 1, 2012, to become a single health-care provider from acute care to recovery. Today, St. John's Rehab offers leading-edge care for the most complex rehabilitation needs, including recovery from amputations, burns, heart surgery, traumatic injuries, strokes, neurological conditions and major orthopaedic conditions.



▲ **ROAD TO RECOVERY:** St. John's Convalescent Hospital (now St. John's Rehab) opened its doors on May 22, 1937. The hospital was the first Toronto-area facility to offer rehabilitative care, treating pre-operative and post-operative patients, as well as those recovering from pneumonia or fatigued by stressful times.





DEDICATED CARE: Co-founded by Dr. Charles S. Wright, who had a dream of a hospital dedicated to the care of patients with orthopaedic conditions, the Orthopaedic and Arthritic Hospital officially opened in 1955 with 14 beds ready for patients. It would later merge with Sunnybrook to become one of the finest programs of its kind in North America. Three generations of Wright orthopaedic surgeons have cared for patients here. The hospital relocated to its current location on Wellesley Street in 1964, with an east wing added in 1974.

NORTH AMERICAN LEADER: The facility is now known as the Holland Centre, a part of Sunnybrook's Holland Bone and Joint Program. The Holland Centre represents the largest centre of excellence in Canada for hip and knee replacement surgery and is a North American leader in bone and joint care, education and research. Its surgeons are pioneering a new generation of joint preservation surgery to improve mobility – just one example of the innovative care offered here.



A CLOSER LOOK: This photo shows an early X-ray machine at Sunnybrook, circa 1948. Today, the hospital uses various forms of imaging technologies to investigate disease.

UNPRECEDENTED PRECISION: Imaging across the care spectrum has advanced to provide patients with state-of-the-art technology. One example is the Eleka Unity MR-Linac, the first machine in the world to combine radiation and high-resolution magnetic resonance imaging. Sunnybrook's Odette Cancer Program was the first Canadian site to install an MR-Linac, which allows clinical teams to precisely target tumours and monitor their response to radiation in real time.

36 weeks pregnant
with twins.
A blood clot in her brain.
No chance of surviving.
Until she was sent
to Sunnybrook.
Where a team of 14
saved all three lives.
Myla and her daughters
survived, thanks to
research and life-saving
innovation made possible
through donor support.

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to Sunnybrook
can help save the lives
of generations to come.

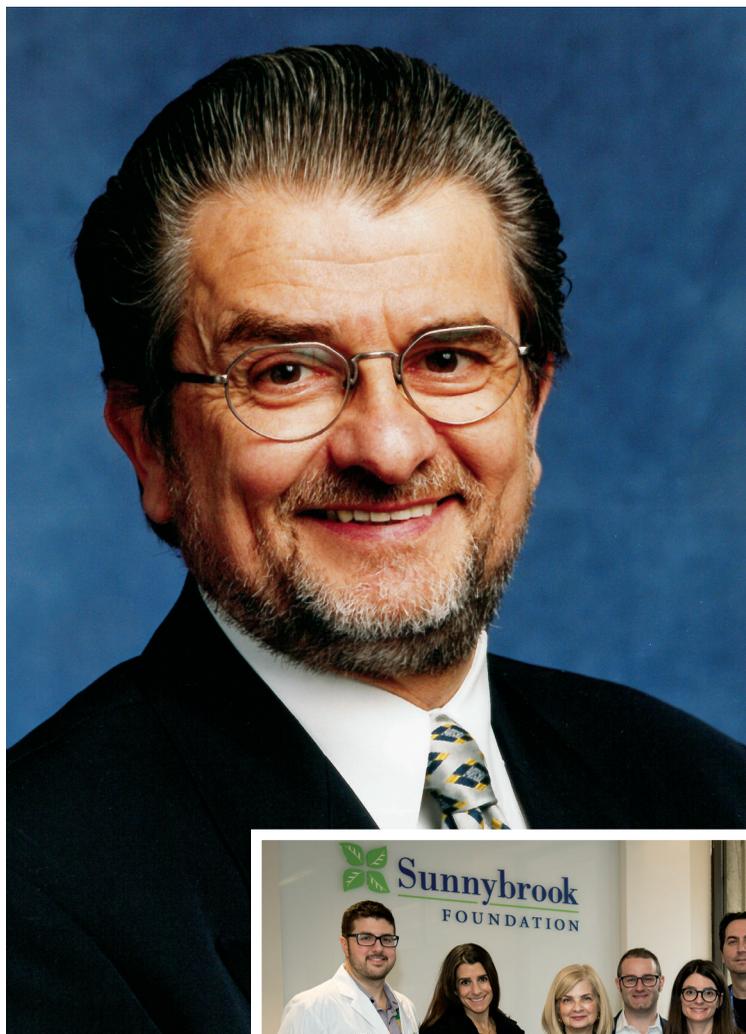


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A lasting legacy of generosity

When Sidney Valo was diagnosed with ALS, he dedicated the remainder of his life to helping others with the disease. Through the charitable fund he established, Sidney raised hundreds of thousands of dollars to enhance ALS care and drive research for new treatments. His wife Felicia and family have continued these efforts in his memory

BY JANE LANGILLE

It takes a special kind of generosity to advocate for others, while knowing that a debilitating illness will end your life in a few short years.

Soon after Sidney Valo was diagnosed with amyotrophic lateral sclerosis (ALS) in 2005, he began working tirelessly to raise awareness and funds to improve clinical care and drive research forward.

“Sid was realistic about his disease, but he never gave up,” remembers his wife Felicia. “He worked through pain to make a difference as long as he could.”

Sidney was no stranger to getting important things accomplished. He started his career as a lawyer, co-founding the firm Pallett Valo LLP. Later, he was recruited to be incorporating director of the Greater Toronto Airports Authority (GTAA), and as interim president and CEO, he led negotiations with the Government of Canada to transfer Pearson Airport to the GTAA.

A few years after returning to the private sector, Sidney was diagnosed with ALS and that’s when his advocacy work began. He established the Valo Fund for ALS Research at Sunnybrook and launched an ambitious fund-raising effort. Sidney served as a board member for the ALS Society of Canada, and despite having no science background gave an impressive talk to scientists about the importance of collaboration to advance research.

“I’ve attended hundreds of talks about ALS,” says Dr. Lorne Zinman, director of the ALS Clinic at Sunnybrook. “That I still recall Sid’s talk from over 10 years ago underscores the impact he has had on the ALS community.”

Committed to helping scientists find new insights and treatments, Sidney and Felicia travelled frequently to NewYork-Presbyterian Columbia University Irving Medical Center. There, he volunteered in two clinical trials, as there weren’t any taking place in Canada at the time.

Sidney passed away in 2008, just days before his 60th birthday, leaving behind Felicia and children Ilana, Shana and Michael.

“After he passed, I was determined to preserve his legacy. I felt his presence compelling me to continue,” Felicia says.

MORE FUNDING FOR ESSENTIAL CARE

ALS is a progressive neurological disease that affects an estimated 3,000 Canadians. It gradually paralyzes the body as the brain loses the ability to communicate with the body’s muscles. Over time, people with ALS can no longer walk, talk, eat or breathe. About 80 per cent of people with ALS die within two to five years of diagnosis.

There is no cure for ALS, and there is a desperate need for effective treatments. Of the two available treatment options, one may extend survival by a few months; the other may slow disease progression in people with early stage ALS.

Neurologists at Sunnybrook diagnose approximately 300 new people with ALS and care for up to 700 patients living with the disease annually. With philanthropic support, they are able to sustain a robust research program, while providing the best in care.

“Support from the Valo family over the years has also allowed us to enrol more patients in the most promising ALS trials,” Dr. Zinman says.

To date, the Valo Fund for ALS Research has donated a total of \$410,000, enabling Sunnybrook to provide compassionate care to patients at Canada’s largest ALS Clinic. This funding has helped to support the research infrastructure that makes Sunnybrook one of the leading ALS centres in the world.

A more recent gift by Felicia in Sidney’s honour established the Sidney Valo Fellowship. Inaugural fellow Dr. Matthew Gladman recalls with pride the white coat embroidered with “Sidney Valo Fellowship for ALS Research”

opposite:

top:
Advocate and philanthropist, the late Sidney Valo.
bottom:
Inaugural Valo Fund fellow Dr. Matthew Gladman (left) and Dr. Lorne Zinman (second from right) meet with the Valo family.

that he wore during his time at Sunnybrook.

“It was an honour to take Sid’s presence into the clinic,” he says. “My grandfather died from ALS, so the fellowship meant a lot to me.”

Dr. Gladman spent the year-long fellowship honing his skills in neuromuscular neurology. He worked with patients and families across the entire spectrum of the disease and had the unique experience of helping Sunnybrook’s ALS Clinic begin to offer virtual ALS care amid the pandemic.

As an essential member of the research team, Dr. Gladman was involved in testing two revolutionary gene therapies for ALS in groundbreaking clinical trials. He has since accepted a position at McMaster University, where he will grow its ALS research program and remain closely connected to the Sunnybrook team to foster collaboration.

This year, Felicia has committed funding for a second Valo Fellow. Dr. Denizart Santos Neto will participate in work involving a Phase 2 clinical trial using focused ultrasound.

ALL IN THE FAMILY

Throughout the years, Felicia has felt Sidney’s spirit, encouraging her to continue making a difference for people living with ALS. Just prior to the declaration of the pandemic, Felicia brought her oldest grandchildren to Sunnybrook to meet Dr. Zinman and Dr. Gladman.

“I wanted them to learn about ALS, the important work their grandfather did and to understand how essential it is to give back to people in need,” Felicia says.

Dr. Zinman says that many people, after watching a loved one suffer through ALS and pass away, feel the need to get away from it. “The last thing they want is to be reminded of difficult experiences,” he says.

“For Felicia to honour Sid’s legacy by continuing to support ALS care and research – that speaks volumes about her generous character.”

NEW INSIGHTS INTO GENE THERAPIES

Support from the Valo Fund for ALS Research has allowed Dr. Zinman and other ALS specialists to collaborate and discover new insights about the disease.

Scientists have discovered gene mutations that are associated with inherited forms of ALS, which in total account for about 10 per cent of ALS cases. The gene mutations result in the production of abnormal proteins that become toxic to motor neurons.

The first ALS-associated gene, called SOD1, was discovered in 1993. Over the years, Dr. Zinman and other researchers at Sunnybrook have found a number of new ALS genes in collaboration with colleagues in Canada and around the world. For example, in 2011, they discovered a gene called C9ORF72, the most common genetic defect found in both inherited and sporadic forms of ALS.

Today, there are two clinical trials taking place at Sunnybrook testing cutting-edge gene therapies specifically engineered to address these two genes. The treatments contain segments of DNA that bind to the abnormal genes and suppress the instructions for making abnormal proteins. The goal is to reduce the levels of toxic proteins to slow or halt disease progression.

“It’s very hopeful to see this research underway at Sunnybrook,” says Felicia. “Sid fought tirelessly for this work until he couldn’t talk anymore, and even then he never rested. He would be honoured to see the promising developments now emerging because of his early efforts.”

WHERE THE MAGIC HAPPENS

Ever wondered where doctors get the tools they need to perform imaging procedures like endoscopies, angiograms and other medical interventions?

In Canada, many of these devices begin in Sunnybrook Research Institute's (SRI) Advanced Machine Shop (AMS) and Device Development Lab (DDL), housed in the Centre for Research in Image-Guided Therapeutics. These two facilities include specialized tools for precise cutting, 3-D printers, a catheter-testing lab and a "cleanroom" – a controlled environment with low levels of airborne pollutants.

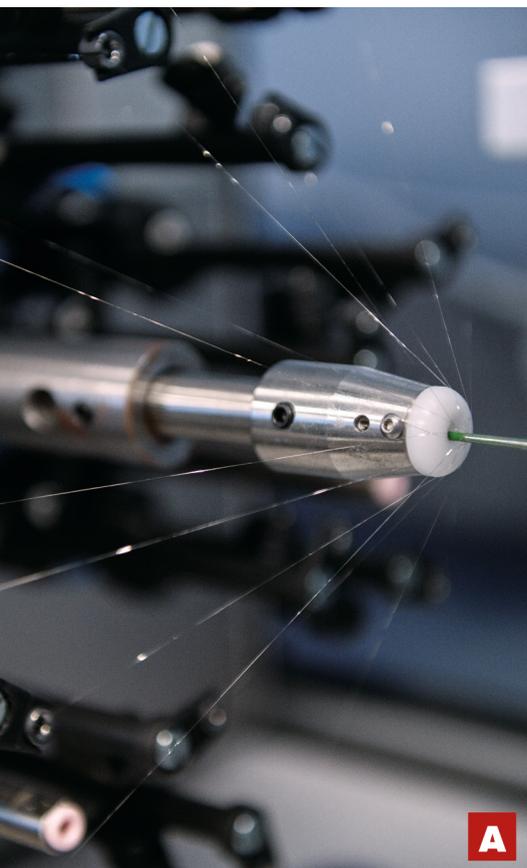
The entire process of device creation, from design to prototype production, happens here for both Sunnybrook staff and external companies that pay to access the equipment, says Dr. Meaghan O'Reilly, PhD, a senior scientist at Sunnybrook Research Institute and academic director of the AMS. Combined with design

services offered by Michael Pozzobon, manager of the AMS, and the fabrication process expertise offered by Aaron Boyes, manager of the DDL, these two facilities allow ideas to be taken from concept to working parts and prototypes.

Dr. O'Reilly notes that the AMS and DDL are particularly special because they are fully operational labs located within a medical centre. Having both clinicians and facilities in one place means a faster development process, which benefits everyone.

"The idea is to enable the production of devices with sufficient quality to be used in first-in-human studies," says Dr. Christine Demore, PhD, also a scientist at SRI and the academic director of the DDL. "It is a unique resource unlike any other in Canada and probably in North America."

Renee Sylvestre-Williams



A

[A] BRAIDING FOR STRENGTH

A catheter is an essential device that is used in a multitude of medical procedures. These long, thin tubes can be used to transmit fluid in and out of the body, or to access areas deep within the brain or heart without open surgery. When this catheter braider is in motion, hair-thin strands of metal or polymer are braided together to create a catheter with flexibility and strength.

[B] CONTROLLED ENVIRONMENT

The cleanroom in the Device Development Lab has very low levels of environmental contaminants such as airborne dust and lint. The well-ventilated room, lit in orange light to protect projects sensitive to ultraviolet light, allows scientists and engineers to build and package very small devices in an environment free from contamination.

[C] PRECISE MEASUREMENTS

The lapping machine, which applies abrasive slurries to thin down materials, is used to make components of ultrasound transducers. "Lapping makes sure all the transducer elements inside an ultrasound probe are the exact same thickness to ensure they send out the

same frequency of sound waves during imaging or treatment," says Dr. Christine Demore (right), while demonstrating the machine.

[D] REPLICATION STATION

Michael Pozzobon preps a design for printing on one of three industrial state-of-the-art 3-D printers in the shop. These machines can print parts as small as .075 millimetres thick and are used to make everything from custom parts to clear models of organs from CT scans.

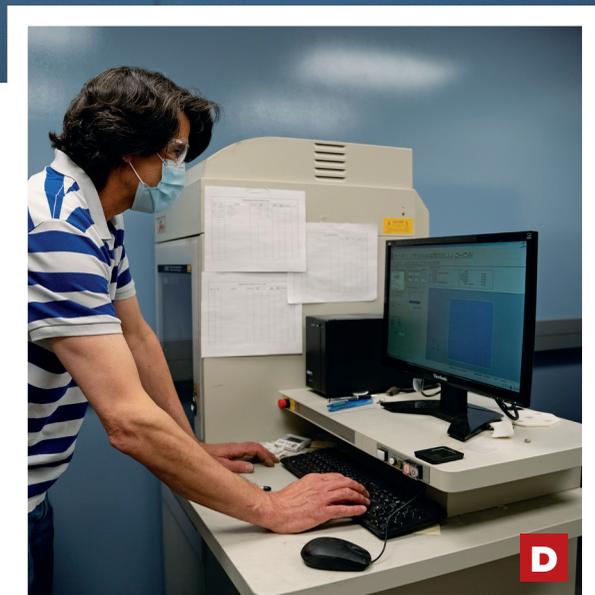
[E] DIGITAL DICTATION

The machine shop is home to both a computer numerical controlled mill and lathe that allow technicians to fabricate custom parts with preprogrammed computer software.

[F] CUTTING UNDER PRESSURE

The five-axis waterjet cutter in the Advanced Machine Shop can cut nearly any material using a focused, ultra-high-speed stream of water. Sunnybrook is the first Canadian hospital-based research institute with a waterjet cutter, which has been used during the pandemic to make guards, face shields and headbands for masks.

B





Akeem and Danielle Richards with their twins, David and Elise.

Special delivery

Danielle Richards knows all of the nurses in the High Risk Obstetrics Unit of Sunnybrook's DAN Women & Babies Program. They were her family during the first wave of the pandemic, holding her hand when she went into preterm labour and had to be hospitalized, while her husband Akeem waited anxiously at home due to necessary visiting restrictions.

"I remember every single staff person by name," Danielle says. That includes the care team in the neonatal intensive care unit, where her twins, born at 27 weeks of pregnancy, spent the first 34 days of their lives.

Elise and David weighed just 980 grams and 1,088 grams, respectively, when they were born in July 2020.

Like her children's early arrival, Danielle's pregnancy was anything but typical. She became pregnant with Elise and David after

the couple's first son, Josiah, was stillborn in 2019. Twenty-one weeks into her second pregnancy, Danielle began experiencing signs of early labour. She spent the next six weeks in and out of Sunnybrook's 23-bed high-risk pregnancy unit. During that time, she developed a serious brain condition that required her to have fluid drained from her spine.

Maternal fetal specialist Dr. Amir Aviram and his team supported her through it all.

"Dr. Aviram understood how difficult it was experiencing a pregnancy after loss and during a pandemic," Danielle says. "It still brings me to tears remembering how we felt supported, so well-informed and cared for."

But she's also smiling through those tears as she regards the end result: one-year-old Elise and David, healthy, happy and at home with their family. — *Christine Ward*



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