Sunnybrook

SAVING LIVES, ONE INNOVATION AT A TIME

Do you see what we see?

How the eyes of Lauren and other youth are providing clues about mental health

TELEMEDICINE BRIDGES THE DISTANCE FOR SUNNYBROOK PATIENTS

A MEASURED APPROACH BRINGS HIGH-RISK PREGNANCIES TO FULL TERM

NEW ADVANCES FOR SURGERY PATIENTS

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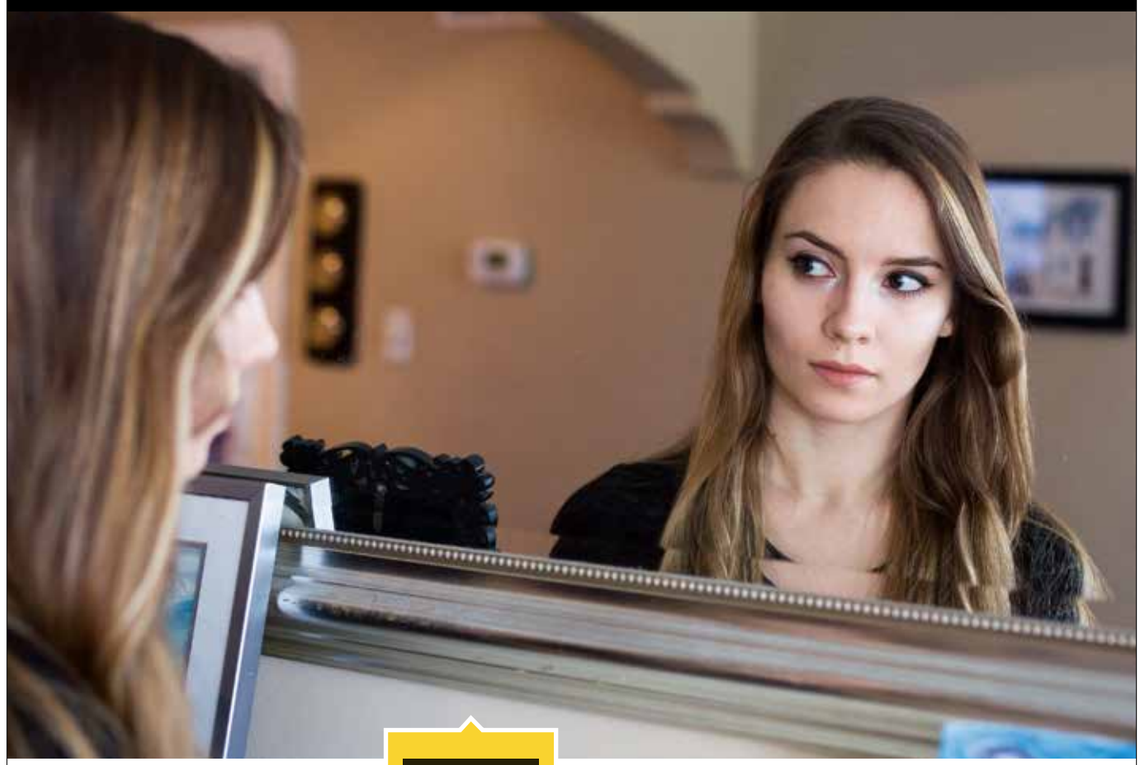

COVER STORY

FEATURES

ON THE COVER
Lauren, 21, participated in a groundbreaking youth-focused study linking eye health with mental health.
See story on page 18.
PHOTOGRAPH BY KEVIN VAN PAASSEN

Sunnybrook

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We are SUNNYBROOK

Following her heart

Even at the tender age of 5, Dr. Hillit Cohen was thinking of the human heart as "the most interesting and beautiful organ."

After becoming a staff surgeon at the Chaim Sheba Medical Center at Tel HaShomer Hospital in Tel Aviv and being hailed as the country's first female cardiac surgeon, Dr. Cohen set her sights across the seas to complete a clinical fellowship at Sunnybrook's Schulich Heart Centre, under the supervision of Dr. Stephen Fremes.

And, like the heart in all its extraordinary capacity, Dr. Cohen is also a busy single mother raising two toddlers. "My job is to do well and to make a person better," she says.

Statistically, fewer women choose the surgical profession, which is demanding. Dr. Cohen takes it all in stride.

"I think you have to have a kind of inner resilience," she says. "You never stop learning, and you work to see and best understand the challenges of each case. Sometimes there are unexpected things and you always have to look for the answer. It's what drives us to grow and improve."

She is assisting Dr. Fremes and other cardiac surgeons at Sunnybrook with bypass procedures and valve and aorta surgeries.

A perfect day on the job is a perfect surgery, notes Dr. Cohen, who holds a clinical fellowship at Sunnybrook. "Everything goes well, from the start right through to when the patient goes home."

– Natalie Chung-Sayers

Doing things differently

Growing up in Hong Kong, Henry Sinn attended a school that was unlike any other in his country. Rather than focusing solely on academics, the school encouraged extracurricular activities.

"We didn't just study hard to get results, we'd play hard," says Henry, who used his extracurricular time to be a Boy Scout. "We learned how to be team players, how to be leaders."

Those values guided Henry through a 10-year radiography career in Hong Kong and continued to do so when he came to Canada in 1993 and started working at Sunnybrook.

As a radiographer, Henry provided diagnostic imaging support to clinical teams.

He recalls fussing with a computed tomography (CT) scanner that, at that time, had very limited range.

"We'd scan the patient's head, and then we'd need five or six people to help pivot a patient so we could scan the other parts of the body," he says. "We needed to find a different way."

And they did. Instead of rotating the patient on the scan table, they slid the patient up and down – a small change that made a big difference in patient and staff safety.

Twenty-three years later, Henry is now the medical imaging department leader who encourages his team to do things differently to improve patient outcomes.

"There's always a risk with being a trailblazer," says Henry, "but it comes with the reward of improving care."

– Katherine Nazimek

Parental guidance

As a teen, when faced with trials or tribulations, Tracey Addison would look to her parents for empathy but was disappointed by her father's response: "But that's life."

A Danish immigrant who had lived through the war, Tracey's father had faced many hardships in life. "Now I get it. The most important thing my dad taught me was to be resilient," says Tracey. "Life is full of ups and downs."

Fast-forward 30 years. Tracey's contract as director of admissions at a girls' school was expiring and she questioned what was next. Ironically, a friend sent her a posting for a new role with the Family Navigation Project (FNP) at Sunnybrook. Not only was it perfect timing, but the FNP had just helped her and her family through a difficult time, finding resources for them and their youngest child with mental-health and addiction issues.

"I e-mailed the job posting to my husband with the subject line 'God's plan for me,' " says Tracey.

The role – Parent Advocate with Lived Experience (PAL) – was a perfect fit for her. Tracey provides knowledge and peer support to families from the perspective of someone who has "been there."

"I'm amazed how often, after a call, I feel I've received as much as I've given. It's like speaking to kindred spirits every day. Situations may be different, but I understand a mom's broken heart. Today may be dark, but I know there's light at the end of the tunnel. Seeing signs of recovery is joyful."

How are things at home now? "Things are good at the moment. We still face our challenges," says Tracey. "But that's life."

– Nadia Radovini

Caring for war veterans

They say that people in careers that suit them are happier, healthier and much more satisfied not just with their jobs, but with their life overall. True to form, Nancy Smokler has found her niche.

In 1998 Nancy took a three-month placement in Sunnybrook's Patient Relations Department. That placement lasted until 2004. Little did she know that her skills in quality improvement and her talent in risk management would eventually lead her back to head a new department – Office of the Resident & Family Experience and Safety, Sunnybrook Veterans Centre.

"After being away from the hospital for a few years, I landed in just the right place," she says.

At Sunnybrook's Veterans Centre, the country's largest care facility for war veterans, Nancy works to ensure that the expectations of the 475 residents and their families are met. They are often exceeded.

"I find it rewarding to work with veterans and their families," says Nancy. "And it is very satisfying to improve the system for those who come to me with an issue."

Nancy's extensive qualifications hold her in good stead for her position, which covers a lot of territory. She has a bachelor's degree from the University of Toronto and Certified Professional in Healthcare Quality (CPHQ) accreditation. She also has certification in risk management and safety in health services, as well as training in health law, privacy in health care, consent and capacity and other related health-care legislation.

"Much of what I do involves listening and working creatively with residents, their family members, and the interprofessional care teams to find appropriate solutions," says Nancy.

Finding a creative outlet of another sort is also of great importance to her.

"I perform with fellow staff in the Sunnybrook band, sing jazz and do theatre in my local community. I even sing a couple of times a month for the veterans at Warrior's Hall."

– Sally Fur

The gift of giving

Jay Davis's journey to triple bypass surgery in 2014 began with, of all things, a sore Adam's apple.

Suspecting an underlying heart issue, Jay's family physician sent him for a stress test, which he promptly failed. After a subsequent angiogram revealed nine blockages in his coronary arteries, he was scheduled for bypass surgery at Sunnybrook.

"I was 52 years old, and I had no idea this was coming," Jay says.

Two years later after his successful surgery, Jay still comes to Sunnybrook every Friday – this time, as a volunteer with the Heartpals program, where he shares his experiences with patients who are scheduled for heart surgery.

"The health-care team prepares you for what to expect clinically. But just being able to sit and talk to someone who's walked the same path, and who truly understands how you're feeling, is incredibly meaningful and reassuring," Jay says.

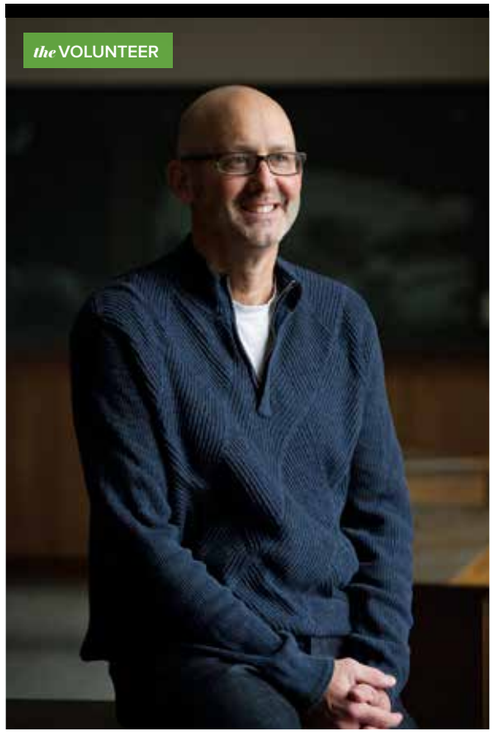
He feels a connection with every patient and staff member he meets on the cardiac surgery unit.

"I thought I'd volunteer for a few months and then move on, but I'm just drawn to this place and these people. The staff here saved my life, and I want to give back however I can," he says.

Every November 6, the date of Jay's surgery, he reflects on all the things he would have missed over the past two years, including spending time with his wife and three daughters and becoming a grandfather.

"I have a new lease on life, and I no longer take anything for granted."

– Sybil Millar



Pass it on

Rain or snow, hot or cold, Tabor Kidane has spent 10 years braving the weather to stand outside the hospital's main entrance and guide the thousands of people who come through the doors every day. And he does it with a smile.

"This is not a club. This is a hospital," says Tabor. "Everyone who comes through those doors is dealing with pain, even if you can't see it."

For weeks when he started the job, Tabor studied the traffic – the routes of the taxis, buses and pedestrians. "People were yelling at each other because they couldn't get to where they needed to go. I thought, I can help."

The idea of helping others was engrained into his mind as a young child in Ethiopia. Every Sunday, on the way home from church, he and his father would pass by an elderly blind woman in need and his father would hand him one dollar to give to her.

"Everyone in our community knew that if they needed help, they could go to my father," says Tabor. "I wanted to be like him. I wanted to help."

And so he does. Tabor has helped people with mobility issues cross the busy street; directed visitors to parking and answered their questions; been a friend to the patients who don't have visitors; and even helped a man who had a seizure on the street.

"I don't do it for me. If someone sees what I do and is inspired by it or grateful, I tell them to do the same for others," says Tabor. "A table is heavy for one person to lift by themselves, but with the help of others, the table is light."

– Katherine Nazimek

Constable Paul Breeze is part of a program that educates police on Emergency Department procedures.

WORKING TOGETHER: POLICE AND THE E.D.

There are some cases that stick with you when you're a police officer.

For Constable Paul Breeze, it was the horrific collision last summer involving a young woman who was in the passenger seat of an SUV. Unconscious, she was rushed to the Tory Regional Trauma Centre at Sunnybrook and Constable Breeze was there to share important details with the team.

Paramedics were able to identify the woman quickly, allowing Constable Breeze to contact her family right away and then bring in Victim Services Toronto, a community-based agency that works with the Toronto Police Service (TPS) to provide free immediate response and support for families of victims in crisis situations.

Discharged from Sunnybrook in December, the young woman is now well on her way to recovery.

Constable Breeze, who works in the Traffic Services division of the TPS, recalls how well the two teams worked together that day, something that he and Sunnybrook have been working on to make their collaboration even better.

"So many things went right that day," he recalls. "Everyone worked together perfectly."

A former combat medic with the British Armed Forces, Constable Breeze is familiar with Emergency Department (ED) and trauma bay terminology and procedures – vital experience that has made him the division's go-to guy for crisis scenarios.

He has been working with Sharon Ramagnano, manager of Trauma Services at Sunnybrook, on an orientation program that shares his trauma knowledge and know-how with police officers, so they will know what to do and how to behave in a trauma setting.

"Often, younger officers have never been in a hospital trauma unit before. They don't know who's who and what their role is, and it can be overwhelming," Ramagnano points out. "The program guides them to the right people in the trauma unit."

Called "A Police Officer's Guide to the Trauma Room," the program offers an in-class session with videos featuring trauma protocol and procedure. It clarifies the role of the police, hospital policies and appropriate conduct in the trauma area.

The program was a collaboration between Constable Breeze and Ramagnano, alongside Agnes Ryzynski, manager of simulation and curriculum development at Sunnybrook's Canadian Simulation Centre and was based on trauma bay experiences and case studies. Last September it was presented for the first time at the Toronto Police College.

"[For the videos], we filmed scenarios the right way and then the wrong way, showing, [for example], a police officer standing too close to the patient care area and not getting names right for paperwork," says Ramagnano.

Educating police on trauma bay policies has had a side benefit of enlightening the hospital's trauma team, too. When an abbreviated version of the police presentation was shared with Sunnybrook, team members gained a better understanding of why visiting police officers are in the Emergency Department's trauma unit and what they might need from hospital staff.

"The videos showed missed opportunities for evidence," says Ramagnano, "such as staff throwing out an article of clothing that may seem insignificant to them but has importance to the police investigation."

The program has helped both sides understand the role each plays in the care of the patient and in support of the patient's family, resulting in improved communication and collaboration between police and the trauma team.

The program has been so successful that Sunnybrook received a community award from Toronto Police Traffic Services. "It's an award for community partners working together with us, and recognizes the teamwork that went into the development of this program, between Traffic Services, the Trauma Centre and the Simulation Centre. We felt it was important to recognize these efforts," says Constable Breeze.

"Now that we've started delivering this [program to the TPS], officers are trained on what to expect – and the trauma team staff knows what we need to do our job," says Constable Breeze. "It benefits all concerned."

– Catalina Margulis

WORDS *matter*

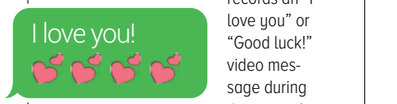
Anxiety before surgery is common among patients who are not with their loved ones and nervous about the procedure ahead.

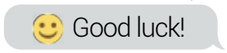
Such pre-op jitters can be associated with post-op complications, including increased wound infections, slower recovery rates or even higher mortality in cardiac procedures.

"Surgery is not a small thing; it's a nerve-wracking experience," says Dr. Fahad Alam, an anesthesiologist and medical education researcher at Sunnybrook, noting too that hospitals try to allay patients' worries through the implementation of the pre-anesthetic clinic, medications, calming music or hypnotic talk piped into the sound systems in operating rooms.

Dr. Alam is the head of a 150-patient pilot study underway at Sunnybrook to determine if soothing words or a rousing pep talk from a loved one before surgery might help.

In the pilot program, called Humanizing the Perioperative Experience, a close friend or relative records an "I love you" or "Good luck!" video message during the patient's visit to the hospital's pre-operative clinic. "Anything to reduce anxiety," says Dr. Alam.





The sentiments are loaded onto an iPad and played continuously for the patient during the wait for surgery. Doctors then test if there is an impact on heart rate, blood pressure and cortisol levels, all of which are related to stress.

If the video messages prove effective, Dr. Alam hopes a more extensive study will investigate whether calming messages reduce surgical complications and improve outcomes.

– Mary Gooderham

Please see "*Waking up to the Complexities of Anesthesia,*" page 28, for more information about Dr. Fahad Alam's work.

PHOTOGRAPH BY KEVIN VAN PAASSEN

PHOTOGRAPH BY DOUG NICHOLSON

DECREASING ANTIBIOTIC USE FOR PREEMIES

The team behind a new program in the Neonatal Intensive Care Unit (NICU) is reporting a big drop in antibiotic use for premature babies.

The program is called the neonatal antimicrobial stewardship program and its aim is to ensure that antibiotics are used the right way at the right time. The program started in April 2016 at an information session for staff and parents of the hospital's frailest patients.

"The problem of antibiotic resistance is a global one, and we can do our part in health care to address it," says Julie Choudhury, the clinical pharmacist who leads the program.

It has been standard practice for antibiotics to be used in preemies if they're at all at risk of getting an infection (for instance, if they're showing respiratory distress) because they can easily acquire one before, during or after birth. An infection in underdeveloped babies can easily become life-threatening.

Part of the reason for this approach is because such young babies "can't tell us when they're sick," and their symptoms can be "non-specific," Choudhury says.

The team behind the program includes physicians, nursing and pharmacy staff, as well as the parent of a past patient. During their daily rounds, team members share information on the antibiotic each baby is receiving and the overall plan for its use.

Oftentimes, says Choudhury, the antibiotics are discontinued after the team conducts a thorough discussion – focusing on what has been reported about the antibiotic each baby is receiving, the intended plan for the medication, and other possible ways to determine if the baby is under threat of infection.

An analysis, completed in November, found the use of antimicrobial medications in the NICU had declined by 19 per cent. In the long term, the team is aiming for a 55-per-cent reduction in antibiotic use.

– Marlene Habib

TAILORING CARE WITH MYTEAMAPP

The MyTeamApp gives patients access to a personalized medical and caregiving team through the touch of a screen.

For Stephen, a customized app made just for him has made a world of difference to his health. After six visits to the emergency room (ER) in 2015, he made just one trip there in 2016.

"This app and the ability to link with my health-care team is amazing," Stephen says. "And it's what needs to happen for the future of health care."

Stephen is one of a growing number of people who are living with multiple complex chronic conditions. Traditionally, these patients have many visits with multiple health-care providers who often don't communicate with each other. Sometimes the big picture is lost, and patients don't know which health-care provider to speak to or how to manage their health at home. Often, they end up in the ER.

Enter a totally individualized health-care management tool: MyTeamApp.

By working with patients to determine their needs and goals, Dr. Jocelyn Charles and a team with partners from a Community Care Access Centre, the Toronto-based health-care software company Think Research, and University Health Network's HumanEra, developed MyTeamApp to support self-monitoring in the home for better overall health and wellness.

The team asks: "What's important to you?" Then a personalized dashboard is generated and the patients keep track of those measures at home. The data is then shared with their health-care team. Right now, Dr. Charles is working with a small number of patients and will expand to more patient participants later this year.

– Alexis Dobranowksi

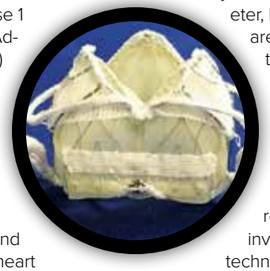
BREATHING EASY

A man in his mid-70s is now doing everyday tasks without experiencing shortness of breath after becoming the first person in Canada to undergo a groundbreaking heart-valve replacement procedure – without open-heart surgery.

The patient underwent a transcatheter mitral valve implantation (TMVI), a minimally invasive procedure that involves inserting a catheter into an artery in the leg.

"He's now able to walk more than before, and he's even climbing stairs and driving," says Dr. Eric Cohen, deputy head of the Division of Cardiology at Sunnybrook's Schulich Heart Centre.

Sunnybrook received approval to conduct the July 2016 procedure on a high-risk patient through Health Canada's Special Access Programme. In the U.S., the first TMVIs involved three patients at NYU Langone Medical Center for a Phase 1 Food and Drug Administration (FDA) clinical trial.



The procedure has the potential to help a significant number of other patients unable to withstand traditional open-heart surgery, says Dr. Cohen. A problem mitral valve can cause life-threatening mitral valve regurgitation, which occurs when the valve doesn't close tightly, allowing blood to flow backward and possibly leading to heart failure.

The TMVI system – developed by Caisson Interventional, which is based in Maple Grove, Minn. – consists of a prosthetic valve that sits inside an anchor with a frame made of nitinol, a nickel-titanium alloy. Through the catheter, both parts are delivered to the patient's heart, and the new valve is then threaded to it.

A larger research study involving this technology is just beginning in the U.S., Canada and Europe. According to Dr. Cohen, Sunnybrook will be participating in this study with up to five patients eligible for valve implantation in 2017.

– Marlene Habib

SUNNYBROOK *by the numbers*

1,200,000

Number of patient visits annually

3,000

Daily number of meals prepared in-house for patients

62,193

Emergency visits at the Sunnybrook campus (2015-2016)

700,000

Number of cups of coffee and tea served to in-patients annually

MYTEAMAPP PHOTOGRAPH BY KEVIN VAN PAASSEN; TMVI PHOTO COURTESY OF CAISSON INTERVENTIONAL

BRIDGING *the* DISTANCE *for* REMOTE PATIENTS

Thanks to telemedicine, Sunnybrook is connecting patients to their care team in new ways

BY MARJO JOHNE

It's been almost two years since Everett Mullen's legs were burned from ankle to groin as he was burning leaves in the yard of his Sudbury home. That day in April 2015, Everett was flown by air ambulance to Sunnybrook, where doctors performed two operations – one to repair his legs and another to graft skin from his back onto his singed limbs. He was in hospital for about one month. Everett has never returned to Sunnybrook.

All his follow-up appointments with Dr. Marc Jeschke, director of Sunnybrook's Ross Tilley Burn Centre, have happened via a secure mobile phone app at his local hospital, which is only 15 minutes away from his home. During these appointments, Everett puts on a hospital gown and sits in a room equipped with a big-screen television and small video camera.

Dr. Jeschke examines him through the camera, which a nurse holds and moves over his legs and back.

This form of videoconferencing is known as telemedicine and allows for virtual screen-to-screen interactions between patients and their health-care providers.

PHOTOGRAPH BY GINO DONATO

Burn patient Everett Mullen, 78, of Sudbury, Ont., is being treated by Dr. Marc Jeschke, director of Sunnybrook's Ross Tilley Burn Centre in Toronto, 400 kilometres away, via a secure mobile-phone app.

"It's an 800-kilometre round trip between here and Toronto. It's a lot of driving and if I had to fly, it would be costly," says Everett, a 78-year-old snow plow operator who returned to work just a few months after his injury.

"At the start especially, it would have been really hard for me to travel because [the doctors] took the skin off my back, from the top of my shoulders to my waist, to graft onto my legs."

Dr. Jeschke says telemedicine enables close and continuous follow-up without the necessity of travelling. "It's independent of the weather, saves huge amounts of time and can be done at all times of the day. Everett had access to specialized care 24-7 without being at the burn centre."

Telemedicine's roots in Ontario can be traced back to Sunnybrook, one of the four sites where telemedicine was launched in the province in April 1998. This virtual private network – set up to protect patient confidentiality – is operated by the Ontario Telemedicine Network (OTN), a not-for-profit organization funded by the Ontario Ministry of Health and Long-Term Care. OTN now works with about 1,300 health-care organizations and more than 8,000 health-care providers in nearly 1,750 sites across Ontario.

Telemedicine is making a significant difference in health care, where patients who need access to medical specialists often have to travel long distances for diagnosis, treatment and follow-ups.

According to the OTN, more than 637,000 patients in the province received care and health education through telemedicine in 2016. This has saved patients almost 260 million kilometres in travel and significantly reduced appointment wait times, emergency room visits and hospital admissions.

"When I started in telemedicine in October of 2001, there were less than 20 communities with telemedicine in their local hospitals under the NORTH [Northern Ontario Remote Telehealth] Network telemedicine program, which had a home at Sunnybrook," says Valerie Sutherland, Sunnybrook's telemedicine clinical coordinator.

"At that time, there were two other telemedicine programs in the province providing health-care services to patients in the southwest and eastern areas. In 2006, the three programs came together to become OTN."

"Looking at telemedicine today, more health-care professionals in many disciplines and programs have adopted it as a means to provide health-care services to patients," she says. These professionals include specialists and other practitioners, such as family physicians, speech-language pathologists, occupational therapists, physiotherapists, nurses, communicative-device assistants, pressure garment therapists and social workers.

"On average each month, about 35 health-care professionals at Sunnybrook consult with

'I have a large screen that allows me to see the patient easily. I can see if their hands are trembling when they're doing the various tests or even if their hands are just resting on the desk.'

Dr. Michael Schwartz, neurosurgeon at Sunnybrook

From diagnosis to treatment, telemedicine allowed Dr. Michael Schwartz, right, a neurosurgon at Sunnybrook, to provide health care to Ottawa resident James Heap, left.

PHOTOGRAPH BY KEVIN VAN PAASSEN

PHOTOGRAPH BY KEVIN VAN PAASSEN

Cancer patient Olive Climo of Port Hope, Ont., (seated, at right) used to leave home at 5 a.m. to get to appointments at Sunnybrook with surgical oncologist Dr. Natalie Coburn. Now, through telemedicine, her progress can be monitored from her local hospital with nurse Patricia Ley (at left) and Dr. Coburn (on screen), saving time, money and stress.

patients through telemedicine," says Sutherland. These professionals come from a wide range of programs at Sunnybrook, from cardiology and endocrinology to dermatology, urology and psychiatry, to name a few. "Telemedicine has allowed Sunnybrook's specialists to help patients not only in Ontario but in other provinces as well," she adds.

"From time to time, we provide very specialized health-care services to patients who live in other provinces in Canada, thanks to a national adoption of this medium for delivering care." says Sutherland.

James Heap was one of those patients who needed specialized care for his essential tremor disorder. Sunnybrook was the first site in Canada to offer MRI-guided focused ultrasound – a non-invasive surgical treatment that uses heat to burn away the area of the brain that causes abnormal movements of the hands and arms.

James' hands shook so badly that everyday tasks such as eating and drinking became difficult.

"I was dropping everything and couldn't do simple things like cut my food," says the 84-year-old Ottawa resident. "My local doctor gave me pills to control the shaking, but it didn't really help."

Everything changed last year after James was referred to Dr. Michael Schwartz, a neurosurgeon at Sunnybrook and principal investigator on the MRI-guided focused ultrasound trial to treat tremors.

James had his first consultation with Dr. Schwartz through telemedicine. Under the supervision of a nurse, he went through a series of tests that included drawing spirals, drinking water from a glass and pouring water from one glass to another.

"I have a large screen that allows me to see the patient easily," says Dr. Schwartz, who does all his initial consultations with potential MRI-guided focused ultrasound patients through telemedicine for those who cannot easily travel to Sunnybrook. "I can see if their hands are trembling when they're doing the various tests or even if their hands are just resting on the desk."

Based on the telemedicine consultation, Dr. Schwartz concluded that James was a good candidate. Last September, James underwent the procedure to treat the tremors in his right hand. He now reports that he goes to restaurants, shaves with a blade and plays golf.

Thanks to telemedicine, James had to come to Sunnybrook only twice – for MRIs – before his procedure.

"Technology is at a point where the communication and tests via TV monitors are the same as if I had been in Dr. Schwartz's office," he says. "And in my mind, these tests were as important as the operation."

The field of telemedicine is also opening up new avenues for cancer patients like Olive Climo. The first time she drove to Toronto to meet Dr. Natalie Coburn, a surgical oncologist at Sunnybrook, she left her home in Port Hope at 5 a.m.

'It's been a gift because everything happens close to home.'

Olive Climo, patient

"It's easy to be anxious on the highway," says Olive, who was diagnosed last year, at the age of 69, with gallbladder cancer. "There's all this construction and traffic, and when you're worried about your health the drive is even more stressful."

Thankfully, she hasn't had to make that long drive very often since last August. Her initial consultation with Dr. Coburn and the operation that followed called for two trips to Sunnybrook. Since then, all other appointments with Dr. Coburn, including follow-up appointments to monitor the progress of her chemotherapy, have been through telemedicine.

"I go to a local hospital for chemo, and after 18 weeks of chemo, I'll get a CAT scan there and then have a telemedicine appointment with Dr. Coburn to discuss results," says Olive. "It's been a gift because everything happens close to home."

Dr. Coburn, who started using telemedicine about three years ago, says her "aha" moment came one snowy day in February when a patient who had come in for a 2 p.m. appointment told her that she had driven in from Temiskaming in northeastern Ontario, and the journey to Sunnybrook had started at 5 a.m.

"And I said to myself, 'There's got to be a better way to do this,' " Dr. Coburn recalls. "Often, people are coming in, feeling unwell, or just after a surgery, so the trip is really quite a burden."

Telemedicine also keeps her schedule on track, notes Dr. Coburn. Given the complex web of sites involved, she may be seeing patients located in Timmins, Oshawa, Wiarton, Lindsay and Midland within the same hour. As each site has an assigned time to be linked with Sunnybrook, it is important to start appointments as scheduled.

"There are so many benefits to telemedicine," says Dr. Coburn. "But in the end, it's about offering better care for patients."

HOW DOES TELEMEDICINE WORK?

Telemedicine uses videoconferencing technology – including TV screens and webcams at each end – to connect patients with health-care professionals through a secure virtual private network. Technologies such as digital stethoscopes, which allow doctors to hear a patient's heartbeat across distances, and high-resolution patient examination cameras – for close-up images of conditions like rashes and burns – make it easier to gather and share information.

In Ontario, telemedicine can happen in one of several ways, including the following:

- Instead of travelling to see a specialist in another city, patients simply go to a telemedicine studio, usually in a hospital or a medical clinic, in or near their home community. In the studio, a health-care professional guides the patient through the telemedicine session.
- Mobile applications, such as those developed and used by Sunnybrook's Ross Tilley Burn Centre, enable secure communication and information sharing through an iPhone or iPad. In addition to patient follow-up appointments, the Ross Tilley Burn Centre is using this technology for initial assessment of a patient's injuries at other hospitals to determine whether a transfer to Sunnybrook is needed.
- In the future, the hope is to offer telemedicine to more patients at home through a software plug-in installed on their computers. •

From the age of 16 to 20, Lauren participated in several studies at Sunnybrook investigating youth bipolar disorder.

PHOTOGRAPH BY DOUG NICHOLSON

What do the EYES *tell us about* MENTAL HEALTH?

A unique Sunnybrook project puts youth bipolar disorder and vascular health into focus

BY MARLENE HABIB

Our eyes, it has long been said, are windows to the soul. Now, new research is hoping they can also provide some insight into the link between the health of our brains and our bodies.

This is the aim of a groundbreaking study at Sunnybrook focusing on the eyes of Lauren and dozens of other youth, ages 13 to 20.

The hope is that images of the tiny blood vessels of the retina, at the back of the eye, may unlock part of the mystery about why people with bipolar disorder have a higher and earlier risk of heart disease and cognition problems. Could it be that atypical blood flow also impacts mood and brain function?

The multidisciplinary study is unique in several ways.

It involves using a special camera to photograph the inside of the eyes of Lauren and other participants with bipolar disorder, as well as a control group without major mental illness.

It also marks the first time retinal photography has been used to capture images of the blood vessels in the eyes of young people with bipolar disorder. The researchers are also looking at factors that may predict small-vessel problems, such as inflammation, exercise, diet and use of medications.

The objective is to examine the blood vessels of the retina, which are "a close relative of the blood vessels in the brain," notes youth psychiatrist Dr. Benjamin Goldstein, who is the director of Sunnybrook's Centre for Youth Bipolar Disorder, the driving force behind the ongoing research.

Retinal photography has long been used in studying conditions related to aging, such as Alzheimer's disease, atherosclerosis (hardening of the arteries) and diabetes.

"The retina offers the only way of directly visualizing central nervous system blood vessels," explains Dr. Goldstein, who is also director of research in Sunnybrook's Department of Psychiatry.

"Blood-vessel problems may be one of the core causes of bipolar disorder, and [retinal photography] is a very inexpensive, non-invasive way of understanding this link."

According to Dr. Peter Kertes – Sunnybrook's chief of ophthalmology and a member of the youth bipolar retinal photography research team – the retina, which is "essentially an extension of the brain," works like the film in a camera. It's responsible for interpreting what is out there in the world and sending that back to the brain as vision.

The project illustrates a unique collaboration between different specialists within Sunnybrook's Hurvitz Brain Sciences Program, one that includes Dr. Goldstein, Dr. Kertes, Dr. Sandra Black, a senior scientist and neurologist, and Dr. Victor Yang, a neurosurgeon and medical biophysics expert.

"This study has brought together researchers who otherwise don't cross paths, which is highly atypical – and inspiring from my perspective," Dr. Goldstein adds.

"It's been the fastest-recruited study we've ever had in our research program, and I think that speaks to the appeal of taking a picture of the eye to understand mental illness.

"These are not typically two things you pair with each other."

Study recruitment is ongoing; the goal is to include a total of 300 subjects.

In Lauren's family, another member has been diagnosed with bipolar disorder, her 24-year-old brother, James. Their mother, Gen, has always encouraged them to participate in research and not to feel they have to hide their diagnoses.

"I eventually told my friends [about the diagnosis]," recalls Lauren, who was 16 when she was referred to Dr. Goldstein after experiencing symptoms of bipolar disorder.

"I'm comfortable expressing myself because it's no different than telling people you have diabetes or some other health issue."

'For our teens with bipolar disorder, there's a "coolness factor" to taking photos of the retina to understand mental illness.'

Dr. Benjamin Goldstein, team leader of Sunnybrook's multidisciplinary research on the links between bipolar disorder and vascular health.

And she participated in several youth bipolar studies before turning 21 in the fall.

"I'm hoping that for future generations – and possibly even any children I may have – this research will really benefit them," says Lauren, who has a graduate diploma in early childhood education and recently started her career.

The primary tool being used in the project to photograph retinas is a Topcon TRC-50DX Type IA camera in Sunnybrook's Department of Ophthalmology.

To start, drops are administered in the eyes of each study subject, so the pupils are dilated widely enough for the camera to see into them properly.

Next, the ophthalmic photographer positions the subject to sit facing the camera lens, with their chin in a chin rest and their forehead against a bar that's part of the apparatus.

The photographer then adjusts the exposure to the proper intensity to photograph the retinas. Lauren says the whole process took about half an hour (with the photography component taking less than a minute).

Dr. Black says one of the obstacles the researchers were working to overcome was to figure out how to actually measure the blood flow in the retina.

However, that's where Dr. Yang's expertise has proved important. He uses optical coherence tomography (OCT), a revolutionary medical imaging technique that captures high-resolution 3D images showing a cross-section of the retina and all of its layers.

"It allows us to see into the body without injecting any dyes," says Dr. Yang.

"Our lab has been developing OCT technology for the past two decades and is opening up a whole new understanding of the effects of blood flow in the brain and retina."

Notes Dr. Black, Brill Chair of Neurology, "From this melting pot of different specialties working together, new ideas can spring forth."

For his part, Dr. Kertes says, "I have learned a great deal about dementia [from another study with Dr. Black] and bipolar disease in particular, and feel confident that this insight and knowledge have made me a more caring and better doctor.

"The work that [ophthalmologists] do in restoring and preserving vision has been fantastically gratifying, but the potential of contributing to the diagnosis and monitoring of neurological and psychiatric diseases is tremendously exciting."

Early results of the study have uncovered some interesting findings about teens with bipolar disorder, specifically the following:

PHOTOGRAPH BY KEVIN VAN PAASSEN

From left: Drs. Victor Yang, Benjamin Goldstein, Sandra Black and Peter Kertes are part of a cross-departmental team involved in work linking retinal-vascular systems and bipolar disorder.

- Those with high blood pressure had poorer retinal blood-vessel health.
- Healthy blood vessels in the body are linked to healthier blood vessels in the eyes.
- Teens that did well in a series of specialized online games aimed at measuring their ability to problem-solve had healthier blood vessels in their eyes.

The researchers hope their work will lead to new approaches to diagnosing, monitoring and treating mental-health issues, with a focus on prevention.

For instance, they foresee a future in which blood-vessel health is considered in the diagnosis, monitoring and early treatment of bipolar disorder, and prevention and treatment approaches may include everything from prescribing exercise (to help improve blood flow in the brain and body), to using different counselling methods and medication that may not have been standard practice before.

Knowing that bipolar disorder isn't just a mental illness can be "empowering," notes Dr. Black, and can "motivate kids to do the right thing, which is to exercise [and] take it seriously, because you can change your outcome, and you can change your life by dealing with that biology."

OTHER SUNNYBROOK-LED STUDIES GET TO THE HEART OF YOUTH BIPOLAR DISORDER

Sunnybrook's groundbreaking retinal photography project is just the latest of a wealth of research examining the link between youth bipolar disorder and blood-vessel and heart health.

Dr. Goldstein – director of research for the hospital's Department of Psychiatry, as well as director of its Centre for Youth Bipolar Disorder – was also the lead author of a 2015 scientific statement published in *Circulation*, the American Heart Association's journal. The paper determined that depression and bipolar disorder increase the risk that young people will develop atherosclerosis (hardening of the arteries) and heart disease.

In late 2016, Dr. Goldstein led another study, the first to examine the link between cardiovascular health and mental flexibility in adolescents, ages 13 to 20, with bipolar disorder.

The results of his research found that elevated blood levels of triglycerides (a type of fat that can be measured in the blood), which are known to increase the risk of heart disease, are also associated with decreased "executive function," determined based on mental flexibility during a computerized task.

Earlier studies had already concluded that adults with bipolar disorder had greater cardiovascular risk factors, such as obesity, high blood pressure and high levels of blood sugar and triglycerides, compared to adults without bipolar disorder.

In Dr. Goldstein's research findings, the adolescent subjects with bipolar disorder also had greater cardiovascular risk factors and didn't do as well on a computerized test measuring mental flexibility and impulsive risk-taking, compared to the control group.

So what's happening with the vascular systems of teens with bipolar disorder?

"There are multiple things going on," Dr. Goldstein points out. "These teens are similar to adults with bipolar disorder – they're more likely to smoke, less likely to exercise, and their nutrition is not as good [as individuals without bipolar disorder].

"But it's also stressful to live with bipolar disorder, so [the strain] impacts their risk for heart disease. And then there's another piece – some of the medicines used [to treat and manage mental health conditions] increase weight. All these factors are part of the story."

"We know that the reality for middle-aged adults with bipolar disorder includes excessive heart disease which can shorten their life by 10-15 years. That's the status quo and we're not happy with the status quo," Dr. Goldstein continues. "The goal is to prevent these kids from developing heart disease in the first place."

RETHINKING *the* BRAIN *and* GLIOBLASTOMA

Advances in research, medical technology and precision surgery at Sunnybrook are improving the treatment of glioblastoma, a virulent and erratic brain cancer

BY JUDITH GERSTEL

Four years ago, Christina Turner, like most Canadians, had never heard of glioblastoma. In March 2013, her husband Adam was diagnosed with this devastating cancer, which originates in the brain and is considered unbeatable.

The family was packing for a March break vacation, recalls Christina, "and suddenly Adam could barely walk. His whole left side wouldn't function."

She called 911 and accompanied him to a local hospital. "Within an hour, the CT scan was done and the ER physician told me he had a lesion on the brain," she says. "I know now that 'lesion' sometimes means 'tumour.'"

Then Adam had an MRI. "At midnight," says Christina, "I was told, 'He's got glioblastoma and he's going to die from this. You need to know. Your husband is going to die.'"

A biopsy had confirmed glioblastoma. "It was quite advanced by the time he was diagnosed," she says. "At the time, they estimated he would have 18 to 24 months."

Glioblastoma invades the brain quickly and lethally, striking about 1,000 Canadians every year. It's the most common and most aggressive of malignant tumours that originate in the brain.

Most patients survive less than two years following diagnosis, and the median survival rate is generally 15 months. The average five-year survival rate is 10 per cent.

"The minute they told me, I just burst into tears," Christina remembers. "I'd lost an aunt and uncle to different types of brain tumours. I knew what the path was going to be."

At the same time, she couldn't believe what was happening.

"Adam was so vibrant and healthy. He was the guy who never got sick. He was a picture of health. He ate well, he worked out."

So far, researchers have found that hereditary factors may be implicated in a very small

Christina Turner (pictured with her children) lost her husband, Adam, to glioblastoma in 2013.

PHOTO SUPPLIED BY CHRISTINA TURNER

number of patients with glioblastoma. But for most cases, there is no explanation for the cause.

What is known is that the tumour originates in the brain's supportive tissue, or glia – a tentacled network with its own rich blood supply, making it a prime environment for a rapidly growing and highly invasive malignant tumour.

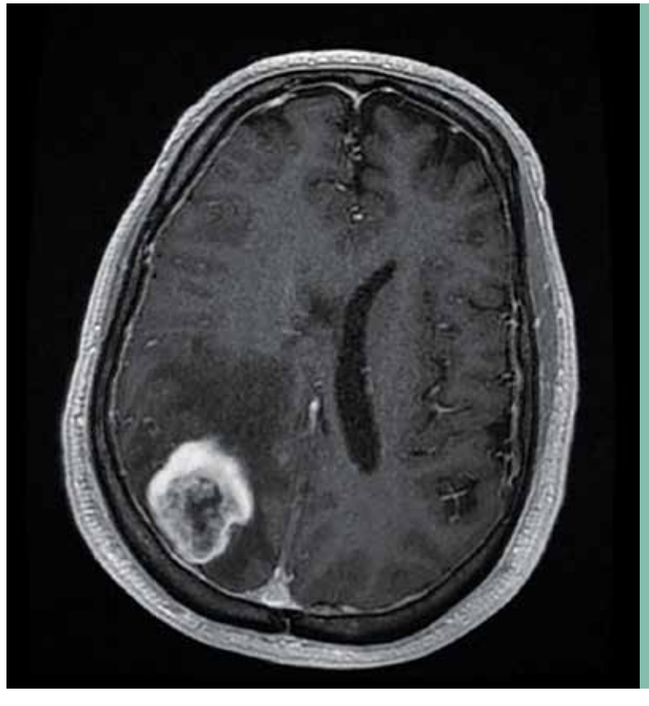
After being diagnosed with glioblastoma, Adam was transferred to Sunnybrook and into the care of internationally recognized glioblastoma specialists, neuro-oncologist Dr. James Perry and radiation oncologist Dr. Arjun Sahgal and their teams at the Odette Cancer Centre.

Currently, glioblastoma is treated with some combination of surgery to remove accessible tumours, with radiation therapy and with chemotherapy. But this cancer is a devious, elusive and deadly shape-shifter, making treatment difficult and outcomes poor.

Adam Turner died just nine months after his diagnosis, exactly one month after his 46th birthday, leaving his wife Christina and their three children, and a close-knit circle of family and friends.

UNDERSTANDING THE UNSTABLE GLIOBLASTOMA

Unlike some other cancers where the cells are clones of each other, when one glioblastoma cell becomes two, the offspring cells don't look like the parent.



A scan of the brain reveals a large enhancing mass in the brain, which causes pressure leading to headaches, nausea and vomiting and an inability to walk properly. After surgery the diagnosis was a glioblastoma.

PHOTOGRAPH BY KEVIN VAN PAASSEN

"Glioblastoma is highly genetically unstable, more so than most cancers," Dr. Perry points out. "Tumour cells in glioblastoma bear no resemblance to each other. We call this tumour heterogeneity, and this poses one of the biggest obstacles to successful treatment because the cells have different DNA mutations."

The offspring of an entire family of glioblastoma tumour cells are all different, with different DNA machinery and different switches.

"Some of these cells respond to treatment, but some don't, and begin to take over the tumour," Dr. Perry explains.

That's what makes treating glioblastoma such a challenge.

As one of North America's most extensive practices dealing with glioblastoma and other brain cancers, Sunnybrook's Odette Cancer Centre is, notes Dr. Perry, involved in "research embedded in care."

The complex, challenging care provided at Sunnybrook for people with glioblastoma combines cutting-edge research and technology, clinical trials and innovative therapies and advances in precision medicine.

The goal, says Dr. Perry, is "to deliver an effective therapy without collateral damage."

Researchers like radiation oncologist Dr. Stanley Liu (above, right) are studying biomarkers to provide information about how well tumours will respond to radiation.

GETTING INSIDE THE BRAIN

There's the problem of where glioblastoma is located in the brain.

Researchers have mapped areas of the brain, for example, locations linked to vision and speech. "But with glioblastoma," says Dr. Sahgal, "everything shifts around to accommodate the tumour and there is only so much you can see with a traditional MRI."

The neurosurgeon may think she's cutting into a safe area, but without guided imaging that provides a map of the brain, she may be damaging critical normal tissue.

HOW CANADIANS SUPPORT BRAIN CANCER AWARENESS

When Torontonian Christina Turner learned in May that The Tragically Hip's Gord Downie was diagnosed with glioblastoma she knew the disease would soon have a much higher profile.

And she was right.

By the end of summer, when The Tragically Hip had completed its cross-country tour, people were talking about glioblastoma. Almost $300,000 had been donated to the Gord Downie Fund for Brain Cancer Research at Sunnybrook, set up to raise funds for the disease that had ended Christina's husband's life. That total now sits at more than $1.2 million.

Across the country, Canadians came together on August 20 – The Hip's final concert of their summer tour — to raise money and awareness. Here are just a few of their stories.

On that warm August evening, Debra and Will Prescott set up a big screen and a sophisticated sound system on the front porch of their lakeside cottage in the Kawarthas.

They invited friends and neighbours over to watch the broadcast and raised $510 for the fund.

"We're definitely fans of The Hip," says Debra, "and we recently had some news of people dealing with a health concern that's much like Gord's. So we wanted to do what we could to support the cause."

"Deb had breast cancer so we're aware of the struggle when cancer impacts a family," Will adds. "Breast cancer has a huge awareness, so we see the value in fundraising for good causes and for diseases we need to find a cure for."

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More than 4,500 kilometres away in Whistler, B.C., Chandra Eyton and Chris Hodkinson also put up a big screen in their large backyard, borrowed a sound system and asked friends and neighbours to come and enjoy the concert broadcast, a barbecue and a keg of beer donated by a local brewery. And they let everybody know it was a fundraiser.

"The Hip played here in the '90s in an old hangout called The Boot, just before it got demolished and turned into condos," recalls Chandra. "That's when I got hooked. Chris went to school in Kingston and saw them perform when he was at university."

The night of Aug. 20 was "gorgeous," says Chandra. "It was almost too bright to see the screen but it was plenty loud. Everybody came in shorts and T-Shirts. There was a lot of dancing and crying. We raised $805 which, I think, for a little event is pretty good."

•••

In Winnipeg, Hip fans gathered at The Cube in Old Market Square to watch the broadcast and raised $15,200 for the fund. Organizers Mike Del Buono and Nick Van Seggelen reported that they ran out of beer four times and the beer store was sold out by 10 p.m.

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Robin Turack, whose husband Fred died of brain cancer, and her daughter, Sydney, hosted around 1,000 Hip fans packed into 150 cars at the Muskoka Drive-In to watch a live feed of the concert.

"William Alexander, owner of the Drive-In, and his staff donated their services and earnings to the fund," reports Robin, "while Hip fans and those touched by cancer donated generously [$6,000]. It was a spectacular night for a really important cause and for a man whose music touches the hearts of so many Canadians."

•••

Aug. 20 was the last night of "Courage for Gord" pre-concert parties in cities across Canada during the summer tour. Rob Ferreira, a member of The Hip's active fan forum, helped organize the events.

Fans were shattered when the news broke in May about Gord's diagnosis, says Rob. "They wanted to know, 'How do we give back and organize fundraising for brain cancer?' We had the tour schedule. Could we organize pre-concert fundraisers? I did three in Toronto. We had silent auctions, raffles." Even the specially designed menus commemorating the tour were sold. "We raised $45,600," says Rob.

PHOTO SUPPLIED BY CHANDYRA EYTON

In September, he and other fans launched a "Courage for Gord" website community. In one day, 1,000 key chains were sold at $25 each, raising another $25,000 for the fund.

"You don't need to be a Tragically Hip fan," explains Rob. "It's beyond that. It's about Gord. He's touched people in so many different ways."

Two of those people are Toronto sisters Clover and Avalon, whose father is also being treated for brain cancer at Sunnybrook's Odette Cancer Centre. They brought in a cheque for the Gord Downie Fund for the $275 they raised from their lemonade stand. •

Doctors need new and better ways to see the tumour in the brain.

New technology – such as Sunnybrook's new MR-Linac, which gives visual access to the tumour during radiation treatment and provides more advanced monitoring of the tumour as well as normal tissue during those treatments – is improving understanding of the "biomarkers of response" according to Dr. Sahgal.

"In other words, detecting and understanding the unique signals through the MR images during treatment may provide for treatments that are personalized to the patient's unique tumour biology," says Dr. Sahgal.

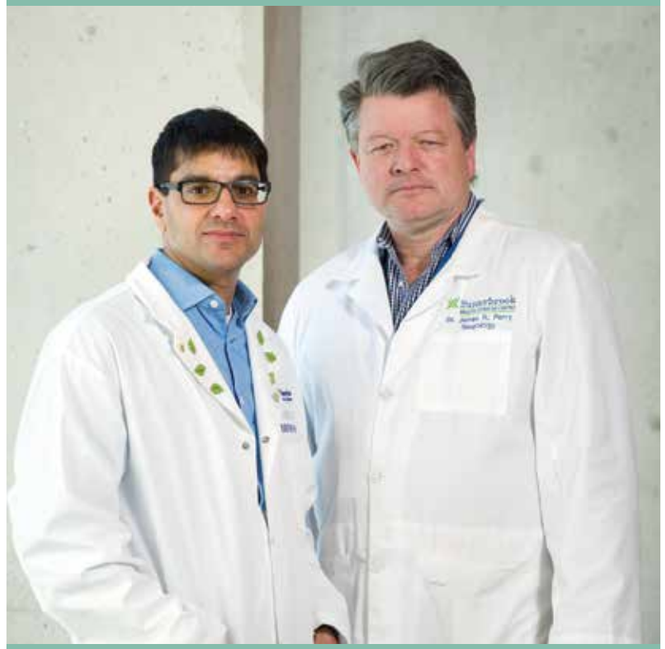
"The MR-Linac has major potential to advance the entire field of radiation response for these tumours and a new field of research," he adds.

Meanwhile, drug therapies directed at the brain must get past the blood-brain barrier – the membrane that prevents many substances in the blood from passing into the brain and nervous system.

However, Dr. Perry is excited about an innovative new ultrasound technique – transcranial focused ultrasound – that's making holes in the brain's fortress.

Ultrasound energy at low intensity can temporarily loosen the barrier to allow drugs through to attack the glioblastoma tumour.

"We're in early days of a clinical trial," says Dr. Perry, "but low intensity focused ultrasound works beautifully and it appears to be safe."



Radiation oncologist Dr. Arjun Sahgal, left, and neuro-oncologist Dr. James Perry.

GETTING TO THE BOTTOM OF THE GENES

Researchers have been exploring genetic mutations and biomarkers – signs of biological properties or molecules – associated with glioblastoma.

These advances in genomics are also making a difference in the treatment of glioblastoma, providing more information about which tissue and tumours will be more sensitive to radiation therapy.

That has led to the new field of radiogenomics, says Dr. Sahgal, which correlates cancer imaging features and genetic information.

Also, genomic research has made it possible, Dr. Perry continues, "to break down the vast majority of glioblastoma [cases] into four major types and to focus drug development and strategies on each of those four types" – instead of on an infinite number.

"Despite the lack of obvious new medications and therapies, there are things happening now that are so much safer that the quality of life is better for patients," he adds. "And we're able to be more aggressive, which is why we're getting the gains in survival."

While research continues into the molecular makeup of glioblastoma and how it can be targeted by using the body's own immune system (immunotherapy) and other new approaches to bring about long-term remission and possibly a cure, the current goal is to prolong both the length and quality of life for patients.

'There are things that are happening now that are so much safer that the quality of life is better for patients.'

Dr. James Perry, neuro-oncologist at Sunnybrook

"When we're talking about glioblastoma," says Dr. Perry, "it's incurable. But the survival time is getting longer. Now 10 to 20 per cent of our patients survive for five years. Until the [oral chemotherapy] drug temozolomide came along, almost no one survived that long.

"We even have a patient who's a 20-year survivor. Why did she get lucky? What is it about her tumour that's not like the others? They appear identical. It's all in the molecular profiling – the pathways that control the tumour. [It's] just as random as that.

"Those of us who have been around a long time recognize that the effects of our treatment pale in comparison to the effects of the genetic lottery."

As the research and innovation continue at Sunnybrook's Odette Cancer Centre, Dr. Perry is hopeful about the future for glioblastoma patients.

"I think the two-to-five-year survival will continue to go up."

Adds Dr. Sahgal, "There are very few places in the world that can do all of this."

PHOTOGRAPH BY DOUG NICHOLSON

Waking up to the COMPLEXITIES *of* ANESTHESIA

Today's role of the anesthesiologist goes far beyond the operating room with pre- and post-op patient care

BY SHANNON MONEO

PHOTOGRAPH BY KEVIN VAN PAASSEN

Elizabeth Cesar was given a peripheral nerve block, a local anesthetic that relieves pain by interrupting pain signals to the brain.

For the 15,000 patients who undergo surgery at Sunnybrook every year, pain control is always top of mind. And that's where most people think about the role of the anesthesiologist. It's true they seek to find the perfect level of sedatives and painkilling drugs for each procedure they oversee.

However, that traditional approach is expanding with the creation of The Centre for Perioperative Brain Health at Sunnybrook.

Anesthesiologists are now venturing far beyond the operating room, helping ease the anxiety and discomfort many patients feel before surgery, delivering highly specific pain control, cutting down on the side effects of narcotics, and taking aim at the confusion and memory problems many patients face long after they leave the hospital.

BEFORE
FINDING THE CALM BEFORE SURGERY

Laura Perez had never undergone surgery. Scheduled for an obstetric surgical procedure, the 40-year-old Toronto resident was understandably nervous.

Although she has uncles who are physicians and she knew she'd be in good hands, the unknown represented by the surgical ward left her uneasy. "I knew this would be something different," says Laura. But one week before her operation, she visited Sunnybrook's interactive lab where the unknown became known.

"I was given a special pair of goggles by the research assistant and told to press Play," she says. Laura then watched a six-minute virtual reality video that would take her from the first moments in the surgical ward right into the brightly lit operating room, amid comforting words from nurses and physicians.

"If I turned my head, I could see all around the room," Laura says of the video, filmed with

six 360-degree cameras. "It was very informative and very calming to know what would happen." And on the day of her surgery, her angst had been dialed down by that virtual reality pre-op tour, courtesy of Dr. Fahad Alam.

Dr. Alam, an assistant professor at the University of Toronto's Department of Anesthesia, is well aware of the apprehension surgical patients feel, which can cause symptoms like high blood pressure and an elevated heart rate. This can affect as many as 80 per cent of patients, he says.

Research has also shown that heightened anxiety results in slower healing, a greater need for medications after surgery, as well as higher death rates. This prompted Dr. Alam to align his interest in education, expertise in anesthesia and knowledge of technology to create Sunnybrook's virtual reality lab where, with a dose of creativity, his virtual reality movie was born.

To view it, patients don virtual reality goggles and circuit through the pre-op experience. They're made to feel they're on a stretcher, with nurses and physicians speaking to them, and then wheeled into the operating room, where monitors are attached, beeping begins and anesthesiologists explain what will happen. The video ends as the oxygen mask is placed on the patient's face.

"I hear 'cool' and 'ah' all the time," Dr. Alam reports. "Some say they now know what [surgery] feels like." Notes Laura, "The video would be a good experience, especially for the young or someone who's never had surgery."

Dr. Alam's team is in the process of studying a diversity of patients to measure their before-and-after anxiety levels with the hope that the six-minute chunk of virtual reality will erase weeks of pre-op jitters and lead to better post-op outcomes.

"The potential for using virtual reality is just at its start. There are so many possibilities," says Dr. Alam. "We have also started creating videos for patients to view before getting epidurals, seeing a radiologist or getting a nerve block, just to name a few examples."

'The potential for using virtual reality is just at its start.'

Dr. Fahad Alam, anesthesiologist at Sunnybrook

DURING
REGIONAL VERSUS GENERAL

All forms of anesthesia provide pain control, but in different ways. Regional anesthesia numbs just a small part of the body, and is most commonly used for minor surgeries. In contrast, general anesthesia causes the patient to become unconscious for a period of time, affecting the brain and whole body in various ways.

"Once the patient is under the intense lights of the operating room, they are administered a combination of drugs which can suppress brain function, relax muscles or facilitate mechanical breathing," says Dr. Stephen Choi, a staff anesthesiologist at Sunnybrook. "The more medications you give, the deeper the effect. It's like a light dimmer switch, but you don't want to turn things down excessively."

But these drugs, important as they are, come with possible side effects. All anesthetics can lower the heart rate and reduce blood pressure, sometimes to dangerous levels. The challenge is to give the least amount possible to facilitate surgery and keep the patient safe. After surgery, exposure to anesthetics can result in confusion and potentially long-term memory loss. That's why giving the least amount necessary is so critical, says Dr. Choi.

Along with Dr. Beverley Orser, the Department of Anesthesia's director of research, Dr. Choi, who is also an assistant professor in the University of Toronto's Department of Anesthesia, has developed ways for patients, like Elizabeth Cesar, to recover faster, use fewer painkillers and experience less pain overall.

After Elizabeth awoke from surgery for her right shoulder in 2014, she almost skipped to her car.

"I felt so good," recalls the 58-year-old Hamilton resident. "By the end of the first week, I was off pain medications."

Contrast that with her first shoulder surgery in January 2013. For eight weeks following the operation, she was taking a heavy dose of painkillers, and 10 months after surgery, she said to her doctor, "Fix my shoulder or cut it off."

Her suffering eventually led her to Sunnybrook's Holland Orthopaedic and Arthritic Centre and surgeon Dr. Patrick Henry for her most recent surgery, where an anesthesiologist applied a carefully managed nerve block to reduce pain.

Elizabeth was given a peripheral nerve block, which involves injecting a local anesthetic onto or near specific nerves for temporary pain control, to relieve pain by interrupting how pain signals are relayed to the brain.

"With the nerve block, I was able to get ahead of the pain before it became overpowering," says Elizabeth.

Dr. Choi says that orthopaedic surgery, such as Elizabeth's, is well suited to regional anesthesia. When the nerve block is administered, the patient can have no feeling in the area for up to 24 hours.

As well, when ultrasound-guided regional anesthesia (UGRA) is used, as it was in Elizabeth's case, less anesthetic, if any at all, is required so the patient's mental capacity is affected as little as possible.

With general anesthesia, mental functions can be compromised, triggering the following questions from Dr. Choi: "Does intense exposure to anesthesia induce permanent change? Are there long-lasting effects to memory? People wake up and seem normal, but are they?" As with many valuable discoveries, Dr. Choi's curiosity has been the motivation for his work with UGRA.

With UGRA, the physician can locate more accurately the specific nerve that requires anesthesia. The success rate is about 95 per cent, compared to the 85-per-cent success rate using "landmark-based" techniques, which means the nerve is in a general area and needs to be found based on physiology and past practice.

Another advantage of using regional anesthesia is its superior form of pain control. And given the growing concern about opioids – including the risks of overdose and addiction – UGRA may be better for long-term recovery, Dr. Choi points out.

The goal now, says Dr. Choi, is to train more physicians to use UGRA, which, in smaller settings such as rural hospitals, would be a significant advantage.

PHOTOGRAPHY BY DOUG NICHOLSON

Laura Perez watched a 360° virtual reality video to prepare for surgery.

AFTER
EFFECTS ON MEMORY, NOT FORGOTTEN

Back at Sunnybrook's Centre for Perioperative Brain Health, Dr. Orser and her team are conducting preclinical laboratory research, trying to determine what causes brain problems after surgery, like memory loss. "We have to begin by quantifying the problem," says Dr. Orser. "Patients look okay and ready to go home after surgery, but about 30 per cent may still be struggling with memory problems."

Seniors and those who have had repeated surgeries are at higher risk. Laboratory research shows that some of the drugs commonly used by anesthesiologists trigger what's known as memory-blocking receptors in the brain, notes Dr. Orser. When the receptors are activated by exposure to the anesthetic drugs or by inflammation, long-term memory loss may occur. "Such changes may contribute to the problems we see in patients after surgery. We know of people who came in for knee surgery but developed post-op deficits, such as delirium or memory loss," she says.

So far, Dr. Orser's preclinical research work has shown that when anesthesia is used and it interacts with receptors in the brain's hippocampus – considered to be the centre for emotion, memory and the autonomic nervous system – the memory-loss properties of the drugs are heightened.

"For the longest time, we assumed these drugs were eliminated and the brain goes back to the baseline," Dr. Orser says. "But that's not the case. The effects of these drugs can linger for a long time."

In order to understand the frequency and severity of the deficits in humans, Dr. Orser and her team have started a study with patients undergoing hip and knee surgery. The hope is to have more information by next year.

It's another way anesthesiologists at Sunnybrook, are venturing beyond their traditional operating-room roles to examine the interplay between surgery, medications and brain function.

"It's a change in focus for anesthesiologists," Dr. Orser points out. "We are stepping outside the operating room because we want to make the whole surgical journey better for our patients."

Being stronger for it

One patient's journey through post-traumatic growth and finding inner strength after a life-threatening experience

BY MARY GOODERHAM

Recovering from a horrific collision, Nazreth Libab had plenty of reasons to sink into the depths of despair.

She was on a bus travelling in rural Ghana when it blew a tire and careened off the road. She sustained life-threatening injuries that included nearly two dozen fractures and a serious risk of paralysis.

As she recovered, Nazreth experienced excruciating pain as well as intense feelings of fear, distress, frustration and anger.

"There was every negative human emotion imaginable," recalls Nazreth, 32, whose job in international development had taken her to the West African nation last spring.

above:
Nazreth Libab experienced post-traumatic growth after a near-death bus crash. "I couldn't help but feel how fortunate and how blessed I was," she says. "The more I paid attention to those positive things, the more I could be at peace with my situation."

Following the bus crash, which occurred in a village three hours away from the capital city of Accra, she was cared for at three hospitals across two continents, before returning to Canada, and then received treatment at Sunnybrook's St. John's Rehab.

Throughout the whole ordeal, Nazreth came to realize that the collision had broken her body, but not her spirit. Indeed she felt "blessed to be alive," experiencing a phenomenon known as post-traumatic growth.

"There was a moment of clarity and a new world opened up. It changed my outlook on life," Nazreth says. "I couldn't help but feel how fortunate and how blessed I was. The more I paid attention to those positive things, the more I could be at peace with my situation."

According to Dr. Paula Gardner, a clinical psychologist at St. John's Rehab, post-traumatic growth – which she describes as "a positive change or transformation following the struggle of a major life crisis" – is increasingly being researched.

Post-traumatic growth appears to affect about half of all trauma survivors, Dr. Gardner notes. The contributing factors include whether the traumatic event opens up new opportunities, makes relationships more meaningful, helps a person tap into inner strength, triggers new perspectives on what really matters and brings about a deepening of spirituality or faith.

"Some people can't even conceive of anything positive coming out of what's happened to them, but others feel there are ways to find meaning and live a quality life, even given their losses and limitations," says Dr. Gardner, pointing out that it's critical to have a support system, which can involve family, friends, medical therapists and spiritual guidance.

PHOTOGRAPH BY: KEVIN VAN PAASSEN

Dr. Matthew Boyle, a psychiatrist at Sunnybrook who treats patients in rehab care, reports that the general tendency after a life-threatening experience for most people is resiliency. "Because a trauma is such a significant event, it gives people an opportunity to re-evaluate their life, to experience interpersonal growth."

He also notes the importance of identifying which recovering patients are struggling with mental-health difficulties following a trauma, as they can often benefit from increased supports such as psychotherapy, social support, and, sometimes, medications.

Sunnybrook is starting to offer peer support from others with lived experience, such as those who have survived strokes themselves and can help stroke patients and their families understand the challenges and triumphs ahead on their road to recovery.

Dr. Ed Hanada, a physiatrist who specializes in trauma rehab, monitors the progress of patients' mobility and their ability to regain their functional independence.

People come to realize, he says, that "in an instant, their lives and those around them are shattered, metaphorically as well as physically."

Those who have gone through adversity also realize, he adds, that "life means more to them" and they can often then achieve a higher level of functioning.

The rehab team at Sunnybrook helps patients who have lived through a traumatic experience to see that their journey can be "transformational," making them stronger, he says. "Everyone has an important role in trying to instil that in the patient; it's really a team effort."

For her part, Nazreth was especially affected by the kindness of strangers and the help she received from friends and family, as well as the support of the wide range of rehab specialists at Sunnybrook who, she says, were "emotionally available" to her and became "cheerleaders" for even the smallest of her accomplishments.

"The first time I was able to put weight on my legs, it was like I had won at the Olympics," she remembers, noting that Sunnybrook cultivates a positive environment. "You really feel like you have a community that is rooting for you, that truly thinks you're going to get better. That kind of support is a lifeline. It helps set the stage for what you envision for yourself, and then you start to believe it."

Nazreth says that it's normal to revert to "extreme negativity" following a loss or catastrophe, but that can be overcome. "I was physically, emotionally and mentally causing myself more trauma through the thoughts I entertained. I remember being hooked to blood pressure machines and heart monitors that showed me in real time how the thoughts in my mind manifested in my physical body."

"When a negative thought had my attention, I could see quite literally that my body was in crisis mode. That insight is something I will carry with me forever. We may not be hooked to machines in everyday life, but we can certainly remember that we play the key role in our well-being."

She continues to get stronger and remains vigilant not to let negative thoughts return. "Allow yourself to go through the emotions of what you've been through, but don't dwell [on them]. Feel it, then move forward," she advises.

"We are so much more powerful than we give ourselves credit for. Nothing is impossible," Nazreth says. "Life is miraculous and we forget that.

"I don't ever want to lose sight of that again."

GREATER PSYCHIATRIC SUPPORT FOR PATIENTS IN REHAB

In-patients at Sunnybrook's St. John's Rehab can now benefit from more mental-health support services.

Dr. Matthew Boyle, psychiatrist, Hurvitz Brain Sciences Program, has recently begun collaborating with the specialized rehab teams at St. John's Rehab to provide both psychiatry consultations and follow-up care.

Patients in rehabilitation, says Dr. Boyle, may experience mental-health conditions such as depression, adjustment disorder, anxiety, dementia and delirium.

Dr. Boyle works directly with the multidisciplinary in-patient teams to provide collaborative psychiatric care. He also helps to enhance the teams' skills in engaging patients from a mental-health perspective.

"This collaborative model allows us to consult with the patient more effectively," says Dr. Larry Robinson, chief, St. John's Rehab Program. "Length of stay in rehab tends to be a bit longer. Dr. Boyle and our teams can get to know and gain a better understanding of the patient. This helps provide more holistic care for the patient in an integrated way." •

Seniors at the controls

Dr. Jacques Lee leads research exploring video games as a way to reduce delirium in seniors

BY STEPHEN KNIGHT

A game based on whack-a-mole helps seniors control delirium.

Seniors may not be known as gamers, but researchers at Sunnybrook are hoping to change that with an app that will allow them to achieve something more important than a high score – reducing the incidence of delirium.

Using a digital version of the popular whack-a-mole carnival game, participants are measured on how fast they use their fingers to tap certain furry critters – and avoid tapping others – on a tablet screen.

"In the current prototype, we have a 'go or no-go' task, where the player tries to hit targets that pop up – for example, raccoons, but not the butterflies," says Dr. Jacques Lee, a scientist at Sunnybrook Research Institute and a physician in the hospital's Emergency Department.

According to Dr. Lee, measuring changes in patients' reaction times to the game-based activities could be a potential predictor of delirium onset.

"We want to find out how long it takes people to do this, if they find it easy to complete and how many errors are made."

Delirium, characterized by acute confusion and inability to concentrate, is a common occurrence in seniors, especially in an emergency department setting and regardless of the reason that sent them there.

Delirium is a serious condition that may persist for weeks or months and is associated with several negative outcomes, including risk of death, complications after surgery, and problems with memory.

"The key is prevention," according to Dr. Lee. "Once an older person becomes delirious, it's difficult to treat or reverse."

Working with Mark Chignell, a professor of mechanical and industrial engineering at the University of Toronto, Dr. Lee is conducting two innovative studies aimed at better predicting the onset of delirium in seniors in the emergency room, so healthcare teams can prevent it.

They're using video-game-like technology in both research projects.

"The primary objective," explains Dr. Lee, "is that by better understanding the early course of delirium, we hope to design targeted interventions to prevent it and the many life-altering complications that can follow an episode."

Informed consent is obtained from elderly patients who fit the profile of someone who might be susceptible to delirium, and then they are asked if they would like to participate in the studies, which use tablet-based apps that measure reaction time and act as potential delirium-screening tools.

Many more versions of the game could be created – say, a timed bingo game – but Dr. Lee also notes that this is just another tool to spot the early signs of delirium. "A lot of clinical experience, judgment and training [are] required to make the diagnosis, [which uses] the standard Confusion Assessment Method (CAM) test."

The CAM test is a brief, standardized and evidence-based clinical tool that allows healthcare professionals who are not trained in psychiatry to quickly diagnose the presence or absence of delirium. The test is considered by many to be the gold standard of delirium detection in both clinical and research settings.

The research is funded by the Canadian Frailty Network (CFN) – a cross-Canada alliance of 45 universities, hospitals and research institutes. CFN supports original research and trains the next generation of health-care professionals and scientists to improve health outcomes for older Canadians across all settings of care.

Delirium can be challenging for health-care providers to diagnose, says Dr. Barbara Liu, executive director of Sunnybrook's Regional Geriatric Program of Toronto, as well as director of the geriatric medicine postgraduate program at the University of Toronto. A proper diagnosis of delirium requires knowledge of the patient's baseline or usual cognitive status and there may not be a person available who can provide that background information when the patient is admitted to hospital.

"When delirium occurs in the context of underlying dementia, it can sometimes be challenging for clinicians to tease out whether the patient's level of confusion is different from their baseline," Dr. Liu explains.

"Delirium can also present in different ways – the hypoactive [less than normally active] form of delirium may be missed by clinicians when the patient is drowsy and quiet. And delirium, by definition, is fluctuating, so the diagnosis needs to reflect the patient's symptoms over a period of time. [The patient] may seem fine at one point during the day, but later be more confused."

So if you see a senior playing a video game at the hospital, it may not be just for fun, it could be part of research to improve future health outcomes for an aging population.

DELIRIUM VS. DEMENTIA: WHAT'S THE DIFFERENCE?

ONSET
The onset of delirium occurs within a short time, while dementia usually begins with relatively minor symptoms that gradually worsen over time.

ATTENTION
The ability to stay focused or maintain attention is significantly impaired with delirium. A person in the early stages of dementia remains generally alert.

FLUCTUATION
The appearance of delirium symptoms can fluctuate significantly and frequently throughout the day. While people with dementia have better and worse times of day, their memory and thinking skills stay at a fairly constant level during the course of a day.

Delirium is frequently overlooked or underdiagnosed. •

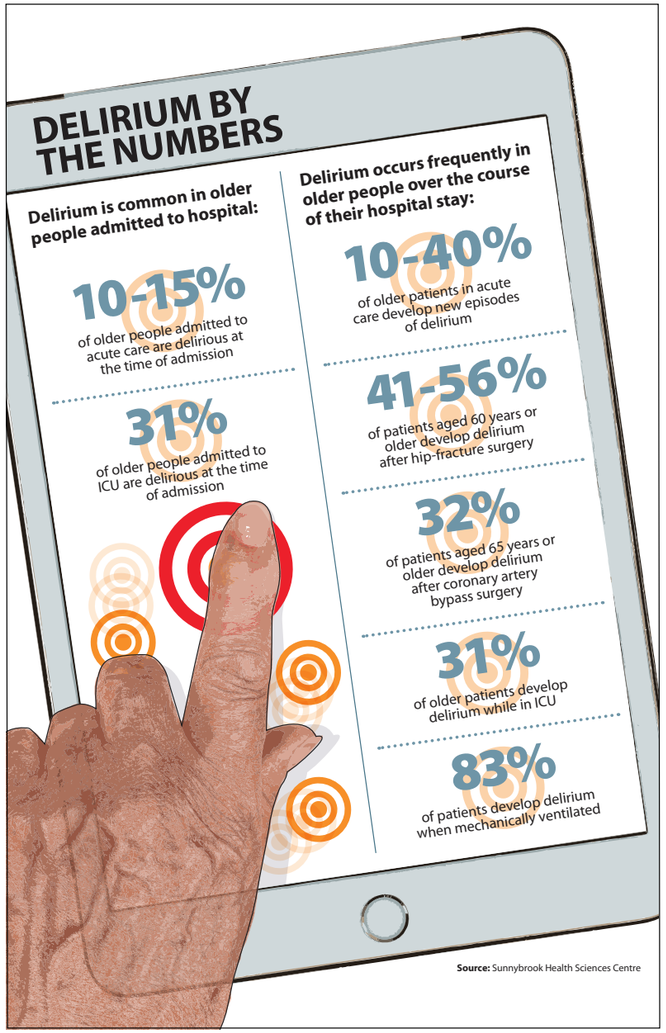


ILLUSTRATION BY KEVIN HAND

The kidney centre

Take a tour of Sunnybrook's ultramodern kidney facility

BY STEPHEN KNIGHT

The reality of dialysis means patients spend a lot of time indoors. Each treatment can last as long as four hours, typically three times a week.

Sunnybrook's new Kidney Care Centre has the capacity to treat 144 hemodialysis patients, while bringing a little of the outdoors into patients' lives.

The hemodialysis unit (shown in three photos, clockwise from top) was designed with natural wood and plenty of light spilling in.

For patients and their families who now have the space to accompany them, the environment is open and airy.

"I've observed the energy level of patients changing. They are happier," says Dr. Michelle Hladunewich, head of the division of nephrology, who notes that the Centre, which opened in January 2017, has greatly increased Sunnybrook's capacity to treat patients with kidney disease.

Home dialysis (shown in photo at lower left) features bright space where patients and family members who receive treatment at home get education and support.

PHOTOGRAPHY BY DOUG NICHOLSON

PHOTOGRAPH BY KEVIN VAN PAASSEN

Managing multiples

A new technique at Sunnybrook is helping to prevent premature births

BY DONNA YAWCHING

Adetoun Oyenubi had just about given up hope.

She wanted, more than anything else, to have a baby, but trying to get pregnant was proving to be extremely difficult and frustrating. Unsuccessful in her attempts to conceive naturally, she turned to in vitro fertilization (IVF). Finally, in 2012, Adetoun, at age 36, became pregnant.

"I was overjoyed," recalls Adetoun, a business analyst who lives in Oakville.

But then, 23 weeks into the pregnancy, she started feeling "strange." She was diagnosed as having an "incompetent cervix," a condition in which the lower portion of the uterus begins opening too soon in pregnancy.

Labour was induced and the baby – a boy born four months too soon – died shortly after birth, in her husband's arms.

above: Adetoun Oyenubi gave birth to twins – Chidinma (right) and Chinasa – at full-term, thanks to a new surgical procedure through Sunnybrook's clinic for multiple births.

She remembers the experience as "quite traumatic."

It was last year, when Adetoun found the courage to begin again. There was a second attempt at IVF at a clinic, which was also unsuccessful, but the third try produced twin embryos.

Adetoun's age and medical history made carrying twins a risk. The doctor at the IVF clinic recommended selective reduction – limiting the pregnancy to one child, who'd then have a better chance of survival. "I was in tears," she says. "I had prayed for twins. I didn't want to lose one of them."

So Adetoun consulted with Dr. Jon Barrett, head of Sunnybrook's specialized clinic for multiple births.

Instead of selective reduction, Dr. Barrett performed a cervical cerclage – stitching the cervix to hold it closed and prevent pregnancy loss or premature birth.

"He's the guy to go to if you're having twins or triplets," she enthuses. "I felt like I had won the lottery!"

The doctor at the IVF clinic had warned Adetoun that mothers carrying twins are not good candidates for cervical cerclage, but according to Dr. Barrett, the procedure could work, with close monitoring.

"That's why this is a miracle," says Adetoun. "It was very risky, really scary, but I knew I had the best care."

She had the surgical procedure done 16 weeks into her pregnancy. Overcoming a few ups and downs, her twins remained snugly in utero until the scheduled C-section, at 37 weeks, a healthy length of pregnancy.

Chinasa and Chidinma,

who were born last August, are healthy and thriving, according to their mother.

"Multiple pregnancies have a very high risk of preterm birth, compared to single basics and we're working on more ways to prevent preterm birth when we can," notes Dr. Barrett, who holds Sunnybrook's Waks Family Chair in Maternal Fetal Medicine Research.

His work on cervical length as a predictor of premature labour offers the possibility of targeted intervention to reduce the numbers of babies born too early.

"Preterm babies lead to almost 80 per cent of adverse outcomes in our newborn population – death and disability, [such as] cerebral palsy, blindness, deafness, and learning disabilities. There's also evidence of longer-term childhood diseases among these infants, respiratory or gastrointestinal."

Not only is this difficult for both the children and their families; it's also extremely costly to society, as a range of supports must be provided at every stage of the lives of these babies, who are at increased risk of developing cardiovascular disease and diabetes in later life.

High-risk obstetrics has engrossed Dr. Barrett since 1995. As director of Sunnybrook Research Institute's Women and Babies Research Program, he leads a team that is exploring every aspect of preterm birth in Ontario, from pregnancy and delivery to support systems after hospital discharge. Prevention of early birth is his main priority.

"There's the ability to predict who's at risk for preterm birth and the ability to prevent it," he explains. "But what we lack is the mechanism in the health-care system to get to that population and engage them in preventative measures early enough. We have proven ways to do it. It's just going to take money and a system change."

It is Dr. Barrett's hope to create the Alliance for the Prevention of Preterm Birth and Stillbirth in Ontario. Families, maternal and newborn care providers, hospitals and researchers would come together to reduce preventable preterm births and stillbirths in Ontario, improving infant health outcomes and quality of care for families.

"It's this kind of network that can improve system coordination in the future," Dr. Barrett predicts. "For the first time, hospitals [in Ontario] would start to say, 'Instead of working in isolation on research projects, let's start working together.'"

Database integration would be a big part of the story. "Ontario already has a fantastic system that can connect data and reach patients," he says. "But no one has closed the loop to make sure the best screening and treatments reach patients. That's what this initiative could do."

That's very good news for families across the province. And it's comforting for Adetoun to know her experience will help identify and treat women at higher risk for preterm birth, saving families from the immense stress of having a premature baby.

'That's why this is a miracle. It was very risky, really scary, but I knew I had the best care.'

Adetoun Oyenubi, patient

Dr. Jon Barrett

PHOTOGRAPH BY KEVIN VAN PAASSEN

PHOTOGRAPH BY JENNIFER ROBERTS

Lake effect

When the Telfords sold their cottage by the lake, they donated the proceeds towards Sunnybrook research

BY JUNE ROGERS

After spending 33 wonderful years going to their cottage near Gravenhurst, Ont., Ian and Carol Telford realized it was time to sell their home away from home.

"We were on the water constantly – swimming, canoeing and kayaking," says Ian. "But when my arthritis grew so bad, I couldn't keep up the maintenance. We decided to put the cottage on the market."

Over those three decades, the cottage had appreciated in value, and the Telfords, both retired Toronto high-school teachers, decided to use that windfall to benefit the critical research being conducted at Sunnybrook.

The Telfords specified that the funds go to two Sunnybrook researchers who improved Ian's quality of life through the successful treatment of his prostate cancer and ongoing care for his Parkinson's disease.

Ian wanted to recognize the significance of the life-saving research being done at Sunnybrook. "I know first-hand how important research is," he says. "I'd like to see others benefit from it, too. It just felt right to make the donation when we did."

Diagnosed with prostate cancer in 2007, he was treated by Dr. Andrew Loblaw, whose pioneering research has greatly improved the outcomes for Sunnybrook's cancer patients. Ian underwent a variation on standard radiation treatment and participated in Dr. Loblaw's clinical trial. "Instead of two sessions of high-dose internal radioactive procedures and five weeks of external beam radiotherapy, " says Dr. Loblaw, "we were able to reduce Ian's treatment to one internal procedure and three weeks of external radiotherapy."

Not only did Ian benefit from less exposure to radiation, the new approach also left him with none of its typical side effects, such as fatigue and skin irritation. Five years on, his cancer is in remission.

Dr. Loblaw has since improved on the procedure. "We've been able to reduce the number of external radiation treatments from the standard five weeks now to one," says Dr. Loblaw, "with an 80-per-cent to 95-per-cent success rate."

The Telfords' donation will go to the next phase of Dr. Loblaw's research – a new MRI-guided, high-precision, non-invasive radiotherapy technique that requires no anesthetic, is less expensive and has faster recovery rates. "It's a triple win," notes Dr. Loblaw, "for the patient, for the hospital and for medical advancement."

A few years after his successful treatment for prostate cancer, Ian began experiencing short-term memory loss and tremors in his hand and foot. In 2010, he was diagnosed with Parkinson's disease. Again, Ian received excellent care, this time from Dr. Mario Masellis, a clinician-scientist at Sunnybrook.

Ian volunteered to be part of Dr. Masellis's clinical study examining why Parkinson's patients sometimes develop problems with their memory and thinking.

Opposite page: Carol and Ian Telford donated funds to be used for research in the areas of prostate cancer and Parkinson's disease.

Examples of thinking problems common in Parkinson's disease include troubles with focusing, multitasking and navigating the environment.

Dr. Masellis's team suspected that the culprit might be sudden drops in blood pressure suffered by these patients, when they went from a lying or sitting position to standing. This line of study has yielded promising results. "We found a strong association between the drop in blood pressure, blood flow to certain areas of the brain and thinking problems in these patients," says Dr. Masellis. This is the first study suggesting a link between low blood pressure in Parkinson's patients and severity of thinking problems.

The Telfords' donation will go toward Dr. Masellis's continuing research of cognitive impairment in Parkinson's. Both Dr. Loblaw and Dr. Masellis are very grateful to the Telfords for their important contribution to research. "We have a moral imperative," says Dr. Loblaw, "to march up the field, if you will, to get closer to the goal line, which is a 100-per-cent cure with no side effects."

Both researchers also believe they are achieving better results, and the only way to continue to do that is to run clinical trials, which require substantial funding. "That's why we rely on people like the Telfords," says Dr. Loblaw, " to move the goalposts forward."

The Telfords will continue to make their annual donations and have also gifted part of their estate to Sunnybrook.

SEARCHING FOR CANCER

It's an emotional process that affects patients every day – after screening or surgery, they wait to hear if they have cancer.

Specimens, or tissue samples, are taken for further testing. So what happens to that specimen behind the scenes? And who are the experts at Sunnybrook tasked with determining what microscopic discoveries will mean for a patient moving forward?

The Department of Anatomic Pathology is where it all happens.

It's comprised of a multidisciplinary team of 19 pathologists – medical doctors trained to make diagnoses based on microscopic examination of tissue – alongside 50 technical and administrative staff, including medical laboratory technologists and assistants, pathologist assistants, clerical staff and management. Every year, this team transforms 30,000 surgical and 20,000 cytology (cell) specimens into glass slides that are scrutinized, one by one, by experts trained in various cancers.

"This is not just a lab," notes Dr. Nadia Ismil, chief of anatomic pathology. "Our highly trained staff give diagnostic opinions that will help guide treatment [for patients] and their future. Every report is unique and individualized, and we take great pride in being an important part of each patient's journey."

Here's a closer look at the steps each specimen undergoes.

A


B


C

Each patient's specimen is logged into the laboratory information system. The tissues are then fixed in formalin – a colourless solution of formaldehyde in water – and examined visually by pathologist assistants **(A)**. Abnormal-appearing areas are selected for further processing. These areas of tissue are embedded in paraffin wax **(B)**, so they may be cut into four-micrometre-thick sections **(C)**, mounted on glass slides and stained **(D)** by medical laboratory technologists.

The staining process takes about one hour and helps the cells to be seen more clearly. The mounted, stained tissue is then examined under a microscope **(E)** by pathologists. Several sections from each sample need to be examined at various depths, when looking for possible cancer cells. Pathologists may request additional studies to be performed on the tissue when needed. With all this information, the pathologist can then issue a personalized report on a patient's cancer.

PHOTOGRAPHY BY DOUG NICHOLSON

D


E

Grandparents Marion and Mark Frankel, who attended the Babycare for Grandparents Workshop at Sunnybrook, are pictured above with their daughter Julia Trainor, her husband Simon Trainor and their twin grandsons, Elie (grey top) and Levi (blue top) Trainor.

Refresher class for grandparents

With two grown daughters, Marion Frankel and her husband, Mark, anticipated becoming grandparents in the near future – just not three times over in the span of five months.

"Our daughter Julia gave birth to twin boys on December 8, and our other daughter, Dara, is expecting a baby in May," Marion says.

While attending a prenatal class at Sunnybrook, one of the Frankels' daughters heard about a different class on offer – one specifically aimed at grandparents.

"With three babies on the way," Marion says, "we wanted to make sure we were ready."

The Baby Care for Grandparents Workshop, the first of its kind in Canada, runs once a month at Sunnybrook. "The class is for anyone who will be helping to care for a newborn," says Kerry Grier, a patient education specialist at Sunnybrook who leads the program.

"We cover all the newest recommendations, so everything that's taught in the class is evidence-based."

Apart from brushing up on baby-care skills, Marion and Mark found that the class gave them valuable insight into their new role as grandparents.

"It made us think about what our part would be once the babies were born, like how to be better communicators with our daughters, and an understanding of when to be supportive and when to step back," Marion says. "It's really helped us enjoy this new experience to the fullest."

– Sybil Millar

PHOTOGRAPH BY DOUG NICHOLSON

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