A WORLD FIRST

Why Bonny is number one

Meet the patient who helped Sunnybrook researchers make medical history
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SPRING 2016

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Research & Innovation

IN EVERY ISSUE

ON THE COVER Photograph by Doug Nicholson captured cancer patient Bonny Hall as she prepared for the world’s first procedure that allowed a Sunnybrook team to deliver chemotherapy drugs through her blood-brain barrier.

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THE VETERANS’ PHYSICIAN

FROM PERISCOPE TO STETHOSCOPE

As a son, of a son, of a son of a sailor and with more than 100 years of naval service combined, it was a fairly good bet that he would pursue a military career, too. But Dr. David Shergold was also charting another course – his lifelong dream of becoming a doctor.

His vision was realized after nearly 20 years of dedication. After completing medical school, he worked as a military doctor and went on to serve in the Royal Canadian Navy. As a submariner, he participated in naval operations and reconnaissance on Canadian coasts and crossed the Atlantic to Norway, patrolling and monitoring Russian submarines during the Cold War in the 1980s.

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WE ARE SUNNYBROOK

THE PARKING ATTENDANT

IN THE RIGHT SPACE

“I live by the golden rule: ‘Do unto others as you would have them do unto you.’” This credo guides Edith Augustin every day as a member of the Sunnybrook parking services team.

Whether it’s assisting rehabilitation patients at the St. John’s Rehab site with parking passes, parking enforcement duties or speaking with a visitor or patient who has just received bad news and is distraught, her work is customer-focused and about helping people. “I envision a parking attendant, free as though I’m part of the health care team here,” says Edith.

Born in St. Lucia, Edith came to Canada in 2000 to further her studies and obtained a BA in English from York University. Education has always been close to her heart. At the age of 16, her first job was teaching at a kindergarten to Grade 4 combined school. After completing high school, she attained a teaching certificate from Sir Arthur Lewis Community College in St. Lucia.

Edith decided to further her learning last year. With the support of a grant from Sunnybrook’s Continuing Education Support Fund, she is currently studying accounting at Seneca College through an online program that suits her schedule. “To be at an institution that promotes and supports continuing education means a lot to me,” she says.

Together with her 25-year-old daughter, Edith values and appreciates life to the fullest. Both are avid readers and have formed their own book club. A nature enthusiast, Edith has climbed Gros Piton, a volcanic mountain in St. Lucia, and on a recent trip took her to the Grand Canyon, where she experienced panoramic views and sunsets that were beyond description. “I will always choose experiences over material things,” says Edith.

“One day, I would like to volunteer at a women’s shelter to give others the hope to realize their full potential. Working at Sunnybrook has allowed me to advance myself and also make a difference in the lives of others.”

Sally Fur

THE ART THERAPIST

‘ART CAN CHANGE YOUR LIFE’

Perched on a stool in the woodshop at Sunnybrook’s Veterans Centre, it’s hard to imagine Susanne Watson-Bongard anywhere else. The art therapist radiates confidence and enthusiasm, surrounded by residents’ birdfeeders, tables and model airplanes and with the fragrances of cedar and poplar in the air.

But it wasn’t a direct path to Susanne’s career choice and passion. “In my last year of high school, I was diagnosed with OCD and major depression,” says Susanne. She spent a short and unhappy time studying kinesiology and knew she needed to make a change. She transferred to fine arts at York University, then received a postgraduate degree in art therapy at Western University in London, Ont. Now she spends her days with residents in the woodshop, art studio, machines and a happy jumble of projects that are being sanded, finished and painted.

Some residents, in their earlier days, built their own houses. Others enter the woodshop and find less confidence. “I often hear, ‘Oh, I haven’t done that since high school. I can’t draw myself out of a paper bag.’ I think of my past, when I was dealing with depression, and I encourage residents to try and get past the self-doubt as amazing things can happen.”

Susanne recalls her first day on the job, when a veteran in palliative care announced that he wanted to make a rocking horse. “Together, they came up with a unique design. He passed away shortly after, but not before Susanne could show him the piece. His wife brought the rocking horse to the funeral home to share with family and friends. Another resident had a passion for making birdhouses. ‘He was so confident, at ease in his knowledge, and he said, ‘I will teach you.’ Now I am passing that skill down to other residents and seeing the joy it brings.”

Joy is obvious in the woodshop as Susanne proudly displays the residents’ work. “Art keeps you balanced. It can change your life.”

Marie Sanderson

BORN IN ST. LUCIA, EDITH CAME TO CANADA IN 2000 TO FURTHER HER STUDIES AND OBTAINED A BA IN ENGLISH FROM YORK UNIVERSITY. EDUCATION HAS ALWAYS BEEN CLOSE TO HER HEART. AT THE AGE OF 16, HER FIRST JOB WAS TEACHING AT A KINDERGARTEN TO GRADE 4 COMBINED SCHOOL. AFTER COMPLETING HIGH SCHOOL, SHE ATTAINED A TEACHING CERTIFICATE FROM SIR ARTHUR LEWIS COMMUNITY COLLEGE IN ST. LUCIA.

EDITH DECIDED TO FURTHER HER LEARNING LAST YEAR. WITH THE SUPPORT OF A GRANT FROM SUNNYBROOK’S CONTINUING EDUCATION SUPPORT FUND, SHE IS CURRENTLY STUDYING ACCOUNTING AT SENeca COLLEGE THROUGH AN ONLINE PROGRAM THAT SUITS HER SCHEDULE. “TO BE AT AN INSTITUTION THAT PROMOTES AND SUPPORTS CONTINUING EDUCATION MEANS A LOT TO ME,” SHE SAYS.


“ONE DAY, I WOULD LIKE TO VOLUNTEER AT A WOMEN’S SHELTER TO GIVE OTHERS THE HOPE TO REALIZE THEIR FULL POTENTIAL. WORKING AT SUNNYBROOK HAS ALLOWED ME TO ADVANCE MYSELF AND ALSO MAKE A DIFFERENCE IN THE LIVES OF OTHERS.”
Kathy Blair

MOTIVATED TO SAVE LIVES

Dr Gabby Elbaz-Greener is nothing if not determined. It’s a trait that may have saved her life once, and it’s served her well ever since.

Twenty years ago, she was taking a bus to school in Jerusalem, where she was studying to be an occupational therapist. Her life changed forever that day, when a suicide bomber blew himself up aboard the bus. Lying on the ground, bleeding profusely with two severed arteries, she remembers thinking that she didn’t want to die alone.

“I wanted an hour to say goodbye to my family. I was begging with my eyes for someone to save my life,” remembers Dr Elbaz-Greener. “A man took me from the bus and put his T-shirt around my neck. He told me after, ‘Looking at your eyes, I couldn’t leave you.’” The surgeon who performed 10 hours of surgery to save her life told her he was surprised she survived. Afterwards, it was a long, difficult road to recover her physical and mental abilities.

Dr Elbaz-Greener completed her bachelor of arts in occupational therapy, then immediately began studying to be a physician. “Knowing that every day I can save a life was my motivation,” she says. “I realized that it’s really a good program.”

Surviving the blast irrevocably altered her two-year interventional cardiology fellowship at Sunnybrook, not-for-profit and clinical research institute, which ultimately led to her career.

“Nothing will change the rarity for a woman. “People told me, ‘There’s a lot of stress, a lot of hours. It’s a physical job,’ I said, ‘I don’t see a problem with any of that.’” Dr Elbaz-Greener laughs, “Nothing will stop me.”

The mother of three is enjoying the best even better.

The Interventional Cardiologist

Sunnybrook Magazine  |  Spring 2016

BUILDING A LEGACY

A mandatory co-op requirement in his civil engineering degree from the University of Waterloo led Anton Rabindran to health care, and he never looked back.

He began his career at Sunnybrook as a project co-ordinator, and just a few years later he became a project manager.

“With large-scale construction projects, it helps to remember that it’s a systematic process from beginning to end. You break it down into bite-sized pieces. That perspective helps prevent you from becoming overwhelmed.”

Anton equates his role to that of a quarterback on a football team. “I create the common ground with all members of the project team, from contractors to consultants to the hospital staff. I make sure that everyone is on the same page in order to reach the overall vision. A strong team makes for a strong and result.”

Anton is always building and engineering, even in his downtime. “I give watches, but I wasn’t finding styles that appealed to me. So I design my own watches, as well as rugs and furniture. I have the bigger picture in mind and work with artisans who do the craftsmanship.”

One of the projects at Sunnybrook that remains a proud accomplishment for Anton is the Imaging Research Centre for Cardiac Intervention (IRCCI). It was one of the first facilities of its kind in Toronto and also one of his first Sunnybrook projects. “The Cyclotron Facility was also a real achievement for me. The machine makes radio isotopes used in cancer treatment, so it was a technically challenging job from a safety perspective,” he says.

The next major project on his list is the Hurvitz Brain Sciences Centre, not a small undertaking by any means. However, Anton takes it in stride with his trademark optimism. “Working on the physical space at Sunnybrook is very fulfilling,” says Anton. “I get to make the best even better.”

The Project Manager

Sunnybrook Magazine  |  Spring 2016

Laura Bratow
‘I FELT I COULD MAKE A DIFFERENCE’

Dr. Marty Eisenberg, a family physician and hospitalist at St. John’s Rehab for more than 35 years, always preferred the variety family medicine offered. “It’s personable, and there’s a whole spectrum of issues that one deals with,” he says. “I wasn’t interested in becoming a specialist in any one area until I ran into wound care.

Twenty-nine years into his career, this self-proclaimed non-academic chose to go back to school. “Here I’m in my mid-50s, and some colleagues are concerned they’re developing signs of early dementia, and I’m saying, ‘I can do this.’”

Dr. Eisenberg completed a master’s degree in wound care – one of only a few such programs in Canada – at the University of Toronto, where he is now the program’s co-director. “This is a branch of medicine that’s poorly understood by health professionals everywhere, and that has a huge impact on patient quality of life and our healthcare system. I felt I could really make a difference.”

People with chronic wounds – like pressure ulcers, venous leg ulcers or diabetic foot ulcers – frequently lose self-esteem. They may lose limbs, frequently lose self-esteem. They may lose limbs, frequently lose self-esteem. They may lose limbs, frequently lose self-esteem. They may lose limbs, and, in the most severe cases, they can lose their lives. In many instances, this is preventable.

“For the average person with a wound, it doesn’t matter how you treat it, it’s going to heal. But for someone with a chronic wound, you need to know the cause,” he says. “A pressure ulcer won’t heal, no matter what fancy dressings you apply, if you don’t take the pressure off,” he says.

“A man came to me with a two-year-old leg wound that refused to heal despite regularly applying sophisticated dressings,” recalls Dr. Eisenberg. “He was at his wit’s end because he needed to have his knees replaced, and the orthopaedic surgeon refused to do the surgery – rightly so. After he was properly diagnosed with a venous ulcer, we arranged for home care to apply compression bandages, and in six weeks the wound closed. He was then able to undergo his knee surgery.”

Dr. Eisenberg also recounts wound specialists preventing diabetics from losing their legs, discovering six-year-old wounds that turned out to be cancer and helping people cope with wounds that aren’t healable. “We are making a difference,” he says. “Educating health professionals and patients about the prevention and management of wounds is now my passion.”

Katherine Nazmok
Breaking through the toughest barrier of all

With a world-first procedure pioneered at Sunnybrook, the blood-brain barrier is no longer an impassable fortress, and cures for the deadliest diseases of our time could be at hand.

By Gabrielle Bauer

THE TIME HAD COME. Fifteen years of research, down to this moment. Dr. Todd Mainprize, the Sunnybrook neurosurgeon leading the charge, watched intently from the control booth of the magnetic resonance imaging (MRI) suite, where the experiment was unfolding. His patient, Bonny Hall, lay alone in an MRI machine, a head frame equipped with electrodes hugging her shaved head.

As an ultrasound beam shot through the electrodes and into Bonny’s brain, the network of capillaries known as the blood-brain barrier began to vibrate, loosen and break open. The drugs coursing through her bloodstream could now cross the barrier and reach their intended target: the malignant tumour in her brain. The video monitor facing Dr. Mainprize confirmed it: the barrier had been broken.
The blood-brain barrier coats the brain’s blood vessels like plastic wrap, preventing harmful substances from passing into the brain. (See sidebar below.) As it turns out, the structure’s greatest asset—the tight seal around the blood vessels—can pose a serious obstacle to the delivery of drugs into the brain, especially the large molecules typically used in chemotherapy. It’s a challenge that has frustrated brain cancer scientists and oncologists for decades.

“In theory, our knowledge of what causes brain cancer has exploded,” says Dr. Mainprize. “Every day, we’re learning more about which biochemical pathways go awry.” Unfortunately, treatment outcomes have not kept pace with these advances. “A lot of the drugs developed to treat brain cancer do just fine in a Petri dish, but the blood-brain barrier limits their effectiveness in actual patients”—patients like Bonny, who had been living with a brain tumour for the past eight of her 57 years.

At first Bonny’s tumour grew slowly, causing almost imperceptible seizures that medication kept in check. And then, as if controlled by an invisible switch, the tumour turned aggressive. “I knew something was up, because the seizures I was starting to have were different,” recalls the Tiny, Ont., resident.

The changes in Bonny’s tumour coincided with the launch of the first human trial of a new ultrasound procedure, led by Dr. Mainprize. He asked Bonny if she would consider being the trial’s first subject—and the first person in the world to undergo the procedure. Though she knew this was science, not treatment, and would not change her prognosis, she didn’t hesitate. “Someone has to go first,” she said. From Dr. Mainprize’s perspective, Bonny’s selfless act was significant. “Medical research would never advance to treatment without people like Bonny to take that first step,” he says.

**MAKING WAVES** For Bonny, the day began with an injection of a chemotherapy drug, along with a contrast dye that would show up on an MRI scan. Next, she was fitted with the head frame and gas microbubbles were injected into her bloodstream. With a diameter of just three to five micrometres—smaller than red blood cells—the bubbles percolated through her blood vessels, some of them MAKING WAVES For Bonny, the day began with an injection of a chemotherapy drug, along with a contrast dye that would show up on an MRI scan. Next, she was fitted with the head frame and gas microbubbles were injected into her bloodstream. With a diameter of just three to five micrometres—smaller than red blood cells—the bubbles percolated through her blood vessels, some of them

continued on page 16
reaching the blood-brain barrier. For the next two hours, Bonny lay still in the MRI machine while ultrasound waves caused the bubbles to vibrate and pry open the junctions holding the barrier together, making it possible for the chemotherapy molecules to reach her brain. “We knew the procedure had worked because we could see the dye, which normally doesn’t get into the brain, in various locations in Bonny’s brain tissue,” says Dr. Mainprize.

The idea of using ultrasound to treat brain disorders took hold in the 1970s. In the early days, Dr. Mainprize recalls, “doctors would drill a hole through the skull and use ultrasound to ‘cook’ certain parts of the brain, such as cancerous areas remaining after surgery.” It worked – to a point – but was invasive and had side effects.

What distinguishes the Sunnybrook technique from earlier efforts is that “we can aim the beam at specific points in the brain,” says Dr. Mainprize. “That’s why we call it focused ultrasound.” What’s more, the technique weakens the barrier only temporarily: within 12 hours, the tight junctions seal up again. A further bonus: “Without the vibration of the bubbles to pry open the barrier, we would need a much stronger power of ultrasound, which could cause tissue damage. The bubbles make the process much safer and more efficient.”

LOOKING AHEAD | Bonny’s landmark procedure generated a flurry of media attention throughout the world. A barrier had been broken, both literally and figuratively, and the technique offered an array of therapeutic possibilities. For Dr. Mainprize, the attention has proven to be a mixed blessing. “Media reports feed off each other, and the next thing you know, I’m reading an article stating that I’ve cured brain cancer.”

Over the past few months, he has responded to more than 2,000 e-mails from people asking for help for themselves or for their loved ones – a testament to his commitment to patients. While gratified that the world has been watching and confident the new technique will find its way into brain cancer treatment, he hesitates to predict when that day might come. “Bonny’s procedure was part of a phase 1 study, which looks at safety and proof of concept,” he says. “We’ll be repeating the procedure in other patients, and if we can confirm that it’s safe, we’ll start designing studies that use the technique as part of treatment. We’re taking years.”

Dr. Kullervo Hynynen, director of physical sciences at Sunnybrook Research Institute, led the development of the technology required for the technique in collaboration with industry partner Insightec. He’s accustomed to waiting years, if not decades, before seeing his ideas bear fruit. Indeed, he and his team started their first experiments with microbubble-assisted ultrasound 15 years ago and have been refining the technology ever since, varying the amplitude, frequency and pulse length of the ultrasound waves to tweak results.

By the time Bonny stepped up to the plate, the researchers had every reason to believe the procedure would work – and he safe. Indeed, “Bonny appears to have tolerated it without any problem,” says Dr. Mainprize. The following day, she had surgery to remove her tumour and is now convalescing at home. Over the next few months, she will likely get radiation and more chemotherapy. For the time being, she is enjoying spending quality time with her family – which is as much as she’s ever wanted from life. “I just want to be normal,” she says. “A normal mom, grandma, wife. That’s all I really want to be.”

As for Dr. Hynynen, he has no plans to rest on his laurels. “We’re looking at ways to make the procedure easier to use and applicable to different diseases,” he says. These efforts involve a lot of physics experiments, such as “using more complex ultrasound wave forms to target tissues more uniformly.”

Does the long, slow arc of medical discovery ever discourage him? “Not really,” he says. “It’s a challenge to work with such long timelines, but as a scientist I’m used to it.” It’s just the science that drives him, though. “We’re offering hope to many patients,” he says. “It’s very exciting.” Bonny puts it another way. “Cancer is becoming a word like the cold or a flu,” she says. “I’d like it to stop.” If all goes as planned, the technique will not only become part of brain cancer treatment, but also extend its reach to myriad other diseases. Focused ultrasound to the brain is currently being studied as treatment for essential tremor disorders, and Dr. Mainprize envisions the technique playing a role in conditions as disparate as epilepsy, stroke, Alzheimer’s disease, and depression. “The great majority of molecules that are used for brain treatment can’t get through the blood-brain barrier,” he says. “This means the new technique “could help with just about all neurological disorders that are treatable with drugs.”

How the barrier was breached

Sunnybrook researchers have found a way to use ultrasound waves to get medication through the previously-impenetrable barrier that separates the blood stream from the brain. Here’s how they did it:
FOCUS ON PROSTATE CANCER

The physicians and researchers at Sunnybrook’s Odette Cancer Centre are on a mission. From genetic research through to high-tech targeted radiation, they are working to provide the most advanced cancer therapies, individualized for each patient according to the progression of the disease at each stage of their journey.

Stories by Judith Gerstel

New strategies, new victories

State-of-the-art targeted radiation for prostate tumours and metastases is bringing uncommon results to the most common male cancer.

Rodney Witz had been cancer free for seven years since his treatment at Sunnybrook for prostate cancer. But a semi-annual follow-up blood test last year showed his PSA (prostate specific antigen) level was rising. Then came the troubling news: An imaging scan revealed that cancer cells had spread to the bone.

“The first time, you worry because you have cancer,” says the 72-year old retired hairdresser. “The second time, when it’s in the bone, it’s getting a little bit on the scary side.”

But regular follow-up by Sunnybrook paid off. “They told me it was just one spot,” he recalls, “very, very small, almost undetectable since it was so small, really early stage.”

Cancer that has spread to only a few spots is known as oligometastases. It meant that Rodney could opt for a technique called stereotactic body radiotherapy (SBRT) for oligometastases.

“The conventional thinking about any solid cancer that has spread,” explains Dr. Patrick Cheung, a radiation oncologist with the genitourinary and lung cancer care teams at the Odette Cancer Centre, “is that it has spread microscopically everywhere, and therefore there would be no point to try to eradicate each spot of cancer that we could see on the scans. Usually, the main treatment for a few metastases is the same as if there were 100 metastases, which would be some type of drug therapy (like hormone therapy for prostate cancer) to slow down progression. Eventually it stops working after a certain period of time.”

At Sunnybrook, “based on promising results, our interest is to be a little more aggressive,” says Dr. Cheung. “In addition to the standard hormone therapy, we’re delivering very high-dose, very focused radiotherapy to eradicate the tumour we see on the scans. We’ve learned with this SBRT technique to treat tumours in any organ safely.”

It was used originally for stage one lung cancer. “The cure rates are very good for early stage lung cancer, with results comparable to surgery, for patients who, for one reason or another, cannot undergo traditional surgery,” he says.

Rodney was one of the first patients with oligometastatic prostate cancer to be treated with SBRT at Sunnybrook. Dr. Cheung is leading a clinical trial called CROP that will determine the effectiveness of this targeted radiotherapy approach in improving outcomes for men with oligometastatic prostate cancer. SBRT could be described as a non-invasive knife. “It’s trying to mimic surgery,” he says, “which is rarely performed when cancer has spread.”

The biggest challenge for the radiation oncologist is avoiding organs adjacent to the area targeted by radiation. The oncologist’s new strategies, new victories

continued on page 20
He was having a problem with prostate hyperplasia (enlarged prostate), a common condition in men as they age. This condition can hide underlying tumours. After 45 years as a family doctor, he’d examined hundreds of enlarged prostates in his patients. He’d referred men for regular PSA tests, then sent them to urologists when the results were suspicious.

He knew that one in eight Canadian men would be diagnosed with prostate cancer, most likely after the age of 60. “It’s the most common tumour men get,” he says. “Every male is facing this problem as he ages.”

Hunting down the most advanced tumours

About 75 per cent of prostate cancers that require treatment will be cured by surgery or radiation. The remaining 25 per cent will recur and spread to other places in the body, a process called metastasis. At this stage, prostate cancers are typically treated with androgen deprivation therapy (ADT), also known as hormone therapy. Androgens (male hormones, including testosterone) help prostate cancer grow. Blocking androgen production slows progression of the disease. But usually, sometime after two years or so, the cancer no longer responds to ADT alone. While Sunnybrook’s Odette Cancer Centre provides care for patients across the spectrum of the disease, medical oncologist Dr. Urban Emmenegger (pictured), specializes in much-needed research and treatments for prostate cancer at advanced stages when hormone therapy no longer works on its own.

Conventional hormone therapy impacts the production of androgens in the testicles, the major, but not only, source of male hormones. One of the newest andandrogen-deprivation drugs used at Sunnybrook blocks production of male hormones everywhere in the body and even inhibits the prostate cancer cells from producing their own hormones.

“When combining this drug with conventional hormone therapy, most patients will respond at first — only for the cancer to again become resistant after a while. However, in some patients, not all of the metastases become resistant,” says Dr. Emmenegger. He looks for ways to strategically tailor novel treatments for men who have a combination of both resistant and treatable metastases.

In collaboration with radiation oncologist Dr. Patrick Cheung, Dr. Emmenegger is conducting a clinical trial on the effectiveness of stereotactic body radiotherapy to stop the growth of such resistant, “rogue” metastases. The high-dose radiation finely targets up to five rogue tumours or progressing tumours, while the continued hormone therapy treats the stable tumours.

“This clinical trial was inspired by one man whose prostate cancer had spread to his spine after having been on an experimental treatment for a number of years. He was treated with radiation while continuing the study medication, and his PSA came down again,” says Dr. Emmenegger. “Now, 18 months later, his PSA is increasing again, and the cancer has further spread. But, in essence, we have gained a year and a half.”

“Can’t claim that we can cure all prostate cancers that have progressed elsewhere in the body, but even in those not cured, there’s evidence that progression is delayed.”

The studies show that 20 to 30 per cent of those with metastases treated in this way are long-term survivors.”

MicroRNA: Tiny molecules, big risk factor

The Odette Cancer Centre’s latest groundbreaking research in identifying prostate cancer risk and, most importantly, prognosis, goes by non-coding RNA (ribonucleic acid) molecules, known as microRNAs, that silence other genes. “Our aim,” says Dr. Arun Seth, director of Molecular Diagnostics at Sunnybrook and a senior scientist at Sunnybrook Research Institute, “has been to identify microRNA sequences which can distinguish more aggressive cancers from those that are indolent (slow-growing).”

The big issue in prostate cancer, he explains, “is identifying which tumours will have recurrence or spread.” Dr. Seth is collaborating with Dr. Robert Nam, a urological oncologist at the Odette Cancer Centre and a Sunnybrook Research Institute associate scientist.

MicroRNAs can’t be seen, even under a microscope, so the sequencing to determine the precise order of nucleotides (the building blocks of DNA/RNA) per molecule undertaken by Dr. Seth’s lab was no small feat. More than 2,000 microRNAs in the human genome were examined in tumour samples for associations with prostate cancer progression. The research discovered five microRNAs strongly associated with prostate cancer. These five can be used to determine a patient’s microRNA risk score. Patients with a high microRNA risk score have a significantly higher rate of metastasis and of recurrence compared to those with a low score. In other words, there’s hope that this microRNA research could lead to the establishment of another useful marker to detect a patient’s cancer risk and decide which course of treatment is best.

Dr. Seth explains: “We think these microRNAs could be used for prognosis, to better distinguish which cancer patients require immediate treatment and which can be monitored with active surveillance.” (Active surveillance is the continued monitoring of men with low risk of developing prostate cancer, with the option of treatment if risk increases.)

When Dr. Ihor Popadyshyn found out he had prostate cancer, he was only mildly surprised.
focus on prostate cancer

A new procedure currently in clinical trial at Sunnybrook is “smart biopsy” or “fusion biopsy” – so-called because it’s guided by an MRI (magnetic resonance imaging) scan fused with ultrasound imaging that puts a bull’s eye on prostate tumours.

Dr. Massimo Hadzi, radiation oncologist-in-chief at Sunnybrook, likens it to “a type of GPS navigation that gives a three-dimensional view.” A specialized MRI scan – superior to other imaging technologies for detecting and displaying tumours – is taken before the biopsy.

The MRI is then fused with ultrasound imaging during the procedure. Lesions seen on the MRI scans are projected onto the ultrasound images to guide the biopsy needle to the best spot to ensure the cancer is not missed by the biopsy.

“The biopsy with MRI is very good at finding the aggressive cancers,” explains Dr. Laurent Milot, clinical and co-lead research radiologist at Sunnybrook. “As part of the clinical trial and in the case of some other patients, Sunnybrook is already doing fusion biopsies. Dr. Milot explains that they are performed on patients where the presence of an aggressive prostate cancer is strongly suspected. Perhaps the cancer is hidden, having not been detected on previous conventional diagnostic tests, or perhaps the patient is on active surveillance and has a low-grade prostate cancer, but his PSA begins to increase inexplicably.

The immediate benefit of the fusion biopsy is significant. “We can see exactly where the cancer is,” Dr. Hadzi explains. “You can see the prostate very well with ultrasound, but it gives a limited view of tumour.” The fused MRI scans will help pinpoint the tumours, making the procedure potentially quicker and more efficient, with much less needle sampling required.

A short, high dose of radiation is given directly to the tumour, and a series of external-beam radiotherapy treatments (EBRT), which are directed at the pelvic area from outside the body to target any cancer cells that may lurk beyond the prostate gland.

“We do one treatment with HDR brachytherapy followed by a three-week course of EBRT treatments,” says Dr. Gerard Morton, a radiation oncologist with the genitourinary cancer team at the Odette Cancer Centre. “This treatment is particularly effective for men who have more aggressive cancers. We recently completed a clinical trial for men with medium- and high-risk prostate cancer. This treatment has been shown to reduce the risk of recurrence by half.”

He adds: “We’re following these patients carefully, and we now have patients followed up for 10 years. Over 60 per cent are cancer free after 10 years – and these are men who’ve had higher-risk prostate cancer. The results are equivalent to surgery.”

The prospect of achieving the same result without the need for invasive surgery was good news, and Ihor didn’t have to wait long to hear it. “They rushed the results to Sunnybrook, and Dr. Morton and his resident saw me within three or four days,” he recalls.

He also heard at that meeting exactly what the treatment would entail. “With the patient under general anesthesia, there’s a core, like a ball-point pen, that comes out to do a quick burn (radiotherapy dose) in and then it’s retracted again. It’s a matter of timing and intensity. And hopefully they get it all.”

The single HDR treatment is a newer form of brachytherapy. Originally, brachytherapy involved inserting low-dose rate radioactive implants, or “seeds,” which remained inside the prostate and introduce a radioactive source, which emits radiation over a prolonged fashion,” explains Dr. Morton. “It takes about 18 minutes and then we remove it. There’s no ongoing radiation.”

Ihor describes it as “multiple hollow prongs inserted into a grid near the treatment area. Inside the prostate there’s a core, like a ball-point pen, that comes out to do a quick burn (radiotherapy dose) in and then it’s retracted again. It’s a matter of timing and intensity. And hopefully they get it all.”

The single HDR treatment is a newer form of brachytherapy. Originally, brachytherapy involved inserting low-dose rate radioactive implants, or “seeds,” which remained inside the gland permanently.

“We do use both procedures,” explains Dr. Morton, “so the implant on its own and HDR combined with external beam for more aggressive prostate cancers.”

When Ihor woke up from the anesthesia, he felt no pain or discomfort, and there was no bleeding. I went home within two hours of the procedure; I never even spent a night in the hospital,” he says.

“It was a short, high dose of radiation internally into the prostate, and a series of external-beam radiotherapy treatments (EBRT), which are directed at the pelvic area from outside the body to target any cancer cells that may lurk beyond the prostate gland.”

“I told that I have the prostate of a 20-year-old,” says 58-year-old Martin S. “It was a great pickup line, except that I’m happily married.”

Martin’s prostate is the subject of more than a quip pickup line. Because he has a gene mutation associated with prostate cancer, Martin was invited to take part in the Male Oncology Research Program at Sunnybrook’s Odette Cancer Centre. He has BRCA2, which, along with BRCA1, is a gene mutation that can increase risk for prostate, breast and ovarian cancers. (For privacy, Martin asked that his full name not be used.)

The research program’s confidential registry, database and biobank for men with genetic predispositions for prostate cancer are a collaborative undertaking by several institutions that is led by Sunnybrook. “Among genetic history and known genetic predispositions such as BRCA mutations are important factors in a risk assessment for prostate cancer,” says Martin. “Men of West African/Caribbean ancestry are 10 times more likely to have a BRCA1 or BRCA2 gene mutation compared to men who are not of Ashkenazi Jewish ancestry.”

Men of West African/Caribbean ancestry are also known to have higher risks for prostate cancer with more aggressive disease, men with a family history of prostate cancer are known to have a part increased risk,” adds Lorentz.

“We are actively working to engage men of West African ancestry or men with strong family histories, to better understand how prostate cancer is inherited and how best to support these patients,” adds Dr. Danny Vesprini, a radiation oncologist and researcher at Sunnybrook with a specific interest in the genetic predispositions to develop prostate cancer.

“One of our challenges is to get guys into the clinic to participate in this kind of research,” says Martin.

Martin, however, was glad to get involved. So far, he’s in good health with the prostate of, well, a 20-year-old. And he knows that not all men with BRCA mutations will develop cancer. Nevertheless, he explains, “my maternal grandmother and grandfather died from breast cancer, my mother and an aunt died from breast cancer in their 40s. If I had genetic counseling at Sunnybrook, I hadn’t realized the mutation could be passed on to sons and then passed on by them.”

More recently, research such as that ongoing at Sunnybrook has found that men with BRCA mutations carry up to double the risk for prostate cancer and are more likely to be diagnosed at an earlier age; in addition, the cancer is likely to be more aggressive compared to men in the general population who develop the disease. “Prostate cancer is often slow-growing, though it can also be aggressive in men in the general population. In the case of men with BRCA2, or other known genetic predispositions, and those with strong family histories (given their higher risk), we really want to monitor these guys closely for early diagnosis and timely intervention,” says Dr. Vesprini.

Justin Lorentz (left) is looking at how genetic mutations such as BRCA1 lead to different ethnic groups, among other factors.

Justin Lorentz (left) is looking at how genetic mutations such as BRCA1 lead to different ethnic groups, among other factors.

Unlocking prostate cancer’s genetic secrets

Researchers are on the trail of risks lurking within DNA
FOCUS ON PROSTATE CANCER

Every year, 24,000 Canadian men are diagnosed with prostate cancer. How can we better identify which men are at higher risk for the disease and which men will develop more aggressive forms? How can we be more proactive in our treatment? Is it necessary to treat all forms of prostate cancer? Or is it best to employ an active monitoring strategy? There are no easy answers.

Enter Dr. Robert Nam, head of genitourinary cancer care at the Odette Cancer Centre. Predicting which men are at risk of prostate cancer, and whether that cancer is likely to be slow-growing or aggressive, is the focus of his research. The tool developed at Sunnybrook to calculate those risks has been shown to be remarkably effective. In fact, the Sunnybrook Prostate Risk Calculator, borne out of basic science and biomarker research, has greater accuracy than a similar tool used widely in the U.S., resulting in Dr. Nam’s team being recognized as a world leader in this area.

Now, the latest research on genetics, biopsy and treatment outcomes is being integrated into the Prostate Risk Calculator. Next Generation. Last year, Prostate Cancer UK awarded Dr. Nam a large grant to research and build on the existing screening tool. He headed an international consortium to develop the next iteration.

A risk calculator uses a statistical model called a nomogram. “This nomogram not only predicts an individual patient’s risk for prostate cancer, but it also gives his risk for the most aggressive forms of the disease,” he explains. “It’s going to say, ‘This patient needs a biopsy,’ meaning his calculated risk warrants further tests. Or it tells us that he doesn’t need any intervention at the moment, and careful monitoring through our Active Surveillance with Select Delayed Intervention program would be the best course of action.”

This program aims to reduce overtreatment of clinically insignificant prostate cancer while providing the option of treatment if, over time, the patient becomes higher risk.

Among the data being used in the current version are the patient’s age, digital examination results, family history, ethnicity and PSA-based results. The next-generation version could include results of a test for microRNAs, a new genetic marker for prostate cancer now under investigation by Dr. Nam and Sunnybrook Research Institute colleague Dr. Arun Seth (read more about microRNAs on page 22). 

Dedicated prostate centre gets green light

Sunnybrook is set to transform prostate cancer care by building a centre that offers cutting-edge treatments and is a catalyst for discoveries that make a difference in the lives of men worldwide.

The Soham & Shaila Ajmera Family Prostate Centre will harness advanced imaging technology that detects prostate cancer that previously could not be seen. It will ensure patients experience the highest quality of life by using precise, minimally-invasive treatments that keep side effects to a minimum. And it will produce breakthroughs in diagnostics and treatment by accelerating research.

“The centre really will be the forefront of its kind in Canada, unique for its comprehensive urological care and its concentration of expertise,” says Dr. Calvin Law, chief of Sunnybrook’s Odette Cancer Program.

The centre’s name recognizes the exceptional generosity of Soham and Shaila Ajmera and their sons Ojus and Tejus, whose lead donation has been the impetus behind the centre. Sunnybrook expects to begin construction of the approximately 13,000-square-foot centre in 2018 once additional support is secured.

By bringing Sunnybrook’s prostate cancer experts together, the Soham & Shaila Ajmera Family Prostate Centre will provide a dedicated and comfortable space for patients to meet with their multidisciplinary care teams. Led by Dr. Robert Nam, one of the country’s top prostate cancer experts, the centre will push the limits of diagnostics and treatment so that more men can be cured.

His Soham says his family is extraordinarily grateful for the extraordinary – at times life-saving – care they’ve received at Sunnybrook. “It’s the place where our entire family has been taken care of,” says Soham, who, with his sons, founded one of Canada’s leading commercial bakeries, T&T Brands.

No less important is their desire to fulfill a need in the community, says Soham, noting that prostate cancer is the most common cancer among men. “God has been gracious with us and given us the ability to give back to the community, so this is our way of saying thank you,” he says. •

Risk calculator to add genetic data

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Warming a tumour makes it more receptive to radiation or chemo treatment, and a Sunnybrook team is perfecting the technique with real-time monitoring.
After five years of treatment for colorectal cancer – a regimen that included chemotherapy, radiation and surgery to remove the cancerous tumour and numerous lymph nodes – Keith Binette seemed to be on the road to recovery.

But last year he received bad news from his doctor: His levels of carcinoembryonic antigen (a protein in the blood that indicates the presence of certain cancers) had shot up again.

“It was considered too high risk to do a proper biopsy, but they were 99 per cent sure it was colorectal cancer recurrence,” recalls Keith, a 35-year-old Toronto entrepreneur who runs a security services firm. “Because of the location of the tumour in my pelvis – it’s too close to the nerves – it was also too high risk to do surgery.”

Keith’s doctors at Sunnybrook suggested attacking the new growth with a combination of chemotherapy and radiotherapy. They also proposed something else: a new approach currently being studied at Sunnybrook that would bolster this treatment by heating the tumour with ultrasound, delivered with the guidance of real-time magnetic resonance (MR) mapping.

“The MR images also give a visual reading of the temperature at complete response to treatment than they would have without heat.”

Also known as hyperthermia, this practice of heating tumours to increase their responsiveness to therapies is being captured. By comparing MR image of the tumour site delivered while a high-definition ultrasound is applied to the skin and real-time MR guidance, ultrasound delivery system, we can monitor and deliver heat to targets at specific depths.”

“The MR images also give a visual reading of the temperature at tissue level. “With other studies to date, you did not have the doctors see what’s happening inside the body as the tumour responds to treatment,” says Dr. Chu.

“The MR-guided ultrasound technology is a non-invasive procedure – everything goes through the skin, nothing goes through the body,” says Hynynen. Dr Chu adds: “For patients, a non-invasive procedure is best, minimizing any risk.”

Dr. William Chu

Hyperthermia in action

Sunnybrook’s latest device against cancer is a magnetic resonance imaging (MRI) table with an integrated ultrasound sound source. This equipment – developed and built by Philips in the Netherlands – is a powerful machine that captures and renders images in high resolution.

During a hyperthermia procedure for recurrent rectal cancer, patients lie down on the MRI table with their buttocks supported by a donut-shaped cushion. This cushion is positioned over a glass surface. Underneath this glass is a transducer that concentrates sound waves and sends them into the patient’s body, right through the skin.

“With our high-definition MR partnered on the same platform as the ultrasound delivery system, we can monitor and deliver heat to targets at specific depths.”

Adding MR-guided heat could boost their chances of success, he adds. “We know that heat enhances tumour responses to chemotherapy and radiation. We hope to move this therapy to deeper tissues – it really makes sense for those patients who have no other option but chemotherapy and radiation. Adding MR-guided heat to the tumour would mean warm and blue areas are cooler, with variations in temperatures depicted by different colours: red areas are hottest, yellow means warm and blue areas are cool. “That’s the biggest advance from old hyperthermia treatments,” says Dr. William Chu, a radiation oncologist and clinician investigator at Sunnybrook. “This machine allows us to do true deep-tissue tumour heating, not just to a surface but to a three-dimensional mass in the body, with the ability to precisely monitor temperature and to regulate changes as we need to.”

The category was designed originally to treat uterine fibroids. In 2014, Health Canada approved the use of the table for clinical trials focused on rectal cancers. Sunnybrook treated its first patient in the study last November and plans to sign up a total of 10 patients over two years.

“We worked closely together with Philips on pre-clinical development and testing to get the equipment up to a level suitable for listing on rectal cancer patients,” says Dr. Chu. “It’s definitely unique. This combination of MRI and ultrasound.”

Dr. William Chu

Keith Binette

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The MR-guided hyperthermia study, which will initially involve 10 rectal cancer patients with recurring tumours, is expected to last about two years. If the trial yields good patient responses, then the next step will be to use the technology on patients with newly diagnosed rectal cancer, says Dr. Chu. Sunnybrook is also exploring other applications of the technology, for head, neck and bone tumours, he adds.

Keith is grateful to have been given the opportunity last November to try the MR-guided ultrasound to enhance treatment of his recurrent rectal cancer. Last December, he came in for an MRI and a CT scan. The images showed that his cancer had shrunk since his last treatment.

“The tumour is slowly but surely shrinking, which is kind of exactly what the doctors expected,” says Keith. “It’s a slow-growing cancer, so it will be a long drug cancer.”

While it’s too early to make definitive conclusions about the treatment, Keith says that it’s “so far, so good.” Today, he’s back to work at his company, just north of Toronto. He and his girlfriend got engaged just recently, and they’re both looking forward to his recovery.

“Let’s call it normal as I can be,” says Keith. “I’m really satisfied, and very grateful, for the work they’ve done on me at Sunnybrook.”
Six decades ago, a surgeon’s dream for a specialized orthopaedic hospital was set in motion. These pictures chart its path from modest beginnings to the world-leading facility that is today’s Holland Orthopaedic & Arthritic Centre.

**Dr. Charles Stewart Wright had big dreams.** As an orthopaedic surgeon, he saw the need for a hospital that would provide treatment and care for patients with orthopaedic conditions. He worked tirelessly throughout his career toward this goal, but died before seeing it happen.

**Dr. Wright’s son (left) of the same name and profession – continued to pursue his father’s dream with the assistance of orthopaedic surgeon Dr. James E. Bateman (right).**

**On April 13, 1955, their hard work was rewarded with the opening of the Toronto Orthopaedic Hospital, the first in Canada.** It treated adults and children for various rheumatic diseases and fracture injuries, laying groundwork for many leading therapies used today. Dr. Bateman was its first Chief of Surgery and developed an artificial hip replacement that is still used today.

**For years, the hospital was run in a former sanatorium on Wellesley Street. But with growing demand, Dr. Bateman led the charge to convert the building to full public hospital status.**

**Officials, including former Minister of Health Matthew Dymond, break ground on a full public hospital in 1962.**

**A building fund was established to replace the existing structure with a modern 100-bed facility, which was officially opened on September 22, 1964. An East Wing was added in 1974.**

**The following decades would see advances in the surgical, treatment and patient care techniques used to serve a growing population.**

**Advanced practice physiotherapist Suzanne Derus uses one of the many testing and training machines on patient Michael Schipper in the early 1990s. In 1998, the Orthopaedic & Arthritic Hospital merged with Sunnybrook.**

**In 2006, Sunnybrook’s Orthopaedic & Arthritic Institute was renamed the Holland Orthopaedic & Arthritic Centre to recognize Suzanne and William Holland’s $20-million investment in the Holland MSK Program and the centre.**

**Dr. Stewart Wright, the third generation of Wright orthopaedic surgeons, currently works at the centre and continues the legacy of his father and grandfather. He is pictured here with Suzanne Derus and current patient Judythe Schnarr.**

**Construction is now underway to create a new highly specialized operating suite, rebuild two existing operating suites and fully upgrade another two suites to provide patients with state-of-the-art surgical environments.**
Reconstructing Prince

More than three years after he nearly lost his life in a house fire, an actor has battled back through horrific injuries to return to the stage.

By Katie Rook

One of the first signs of trouble was an ominous “whoosh” sounding throughout the apartment, then the smell of smoke, then eye-searing heat. This is nearly all Prince Amponsah remembers about his survival of a devastating November 2012 apartment fire – one that scorched 68 per cent of his body, damanged his lungs and led to the amputation of his lower arms.

Prince focuses now on the support of family and friends, and his connection to the Sunnybrook team that saved his life, shepherding him through a three-week-long coma, more than 45 surgeries, two years of intensive rehabilitation and finally reintegration into a society built for people with four working limbs.

He is among the more than 250 people admitted each year to the Ross Tilley Burn Centre, and the many who continue their care at St. John’s Rehab – home to Ontario’s only burn rehab program – to rebuild their lives. Surgeons, nurses, physicians, physiotherapists, occupational therapists, respiratory therapists, speech language pathologists, dietitians, pharmacists and social workers form a dedicated team that guides patients through a recovery that can seem elusive to those who have lost most of their skin.

“The people around me are so strong. It gives me no excuse to give up,” Prince says. “Sunnybrook is very uplifting. It’s an interesting combination of seriousness and fun.”

Prince’s family moved from Ghana to Canada when he was a baby. Following the death of his father, when Prince was 12, his mother remarried. His mother and sister always joked with him as a child that he was too cheery.

They lived in Mississauga, Ont., where Prince became friends with Pawel Tosiek, who, years later, would be the roommate to drag him from the fire at their four-bedroom walk-up in Toronto’s west end.

In the months leading up to the blaze, he and Tosiek were enjoying living with two other friends close to downtown restaurants and the theatres where Prince dreamed of one day performing. He had already acted at the Shaw Festival and was looking for film roles.

The month before the fire, there was another blaze a few blocks away; it seemed like something that happened to other people. “It was close enough, but not close enough to be harmful,” Prince says. “When you see a fire truck, you don’t think who’s in harm’s way. Now when I see one, I want to high-five the firefighters: ‘Keep going, thank you for your work.’”

Then came that awful night in November. Prince had lost consciousness by the time he arrived at Sunnybrook. His sister took charge, waiting for a prognosis before alerting their mother and siblings who were in Ghana at the time. She gave consent to amputate – first to the wrist on the left arm, and next above the elbow, toward the shoulder on the right arm.

Tosiek, who had run back into the engulfed apartment to save Prince when he realized he was still inside, remembers his friend’s injuries in horrifying detail. Choking through the darkness and intense heat, he encountered Prince – alive, but trapped. “Prince had dragged himself to the top of the stairs,” he says. “His legs were on fire. He was stuck on a beam.”

He carried Prince’s limp body down several flights of stairs. The early morning light illuminated a gory sight: “His fingers were grey, like boiled sausages. It was like a nightmare we couldn’t wake up from.”

Sunnybrook doctors placed Prince in an induced coma. “Noticeably absent from the doctor’s prognosis was an assurance that Prince would live,” Tosiek says. When he regained consciousness three weeks later, they had to break the news of what the fire had done to his body.

“I kept asking for a pen and paper. I never really took in what they were saying [about his injuries]. I was trying to maintain a cloud of positivity,” Prince says. “One day, I was strong enough to lift my head. A shiver went through my body. I wondered where my hands had gone. Where did they go? They took part of me. There was definitely some grieving.”

Grieving limb loss and experiencing “phantom limb” sensations are some of the early and unique challenges amputees face, says Dr. Amanda Mayo, physiatrist and amputee specialist at Sunnybrook’s St. John’s Rehab and a member of Prince’s care team.

Prince’s injuries were especially complex, she says. In addition to the double amputation, much of the skin from his thighs was grafted to reconstruct his arms.
and more agile. He is now being fitted with another prosthesis that uses a simpler harness and hook design and is adaptable for different tools in hopes of optimizing function.

"Prince is a very adaptable individual," Dr. Mayo says. "He has been phenomenal with his spirit. Many patients would give up and isolate themselves. Prince has been the opposite of that. This could have gone in a totally different direction if he had a different attitude."

Prince smiles a lot. He encourages people to ask him about his injuries, and when people instinctive-ly reach to shake his hand, Prince chuckles: "I can only hug now."

"To the man on the street who once cried at his appearance, Prince says he is grateful and was comforted by the man’s empathy. He says losing so much of his skin has been phenomenal with his spirit. He has been a very positive individual," Dr. Mayo says. "He has been the opposite of that. This could have gone in a totally different direction if he had a different attitude."

Prince smiles a lot. He encourages people to ask him about his injuries, and when people instinctive-ly reach to shake his hand, Prince chuckles: "I can only hug now."
Cancer in its sights

Sunnybrook is part of an elite global team working with new image-guided radiation technology that raises the stakes in fighting the most hard-to-treat cancers

BY CATALINA MARGULIS

Soon, a revolutionary, six-tonne piece of machinery will be lowered through the roof of Sunnybrook’s Odette Cancer Centre and into a specially constructed radiation treatment bunker. It will be a huge undertaking – the equipment is so massive the roof is the only way in.

But the effort will be more than worth it. Bringing the new hardware, known as an MR-Linac, on stream will be a major leap forward in the treatment of cancer. The equipment will save more lives by precisely targeting cancer. The equipment will save more lives by precisely targeting cancer. The equipment will save more lives by precisely targeting cancer. The equipment will save more lives by precisely targeting cancer.

The MR-Linac is the world’s first machine to fuse a radiation delivery system (known as a linear accelerator) with a magnetic resonance imaging (MRI) machine. The Odette Cancer Centre will be the first Canadian site to have the technology.

Above: Dr. Calvin Law says the new MR-Linac equipment will “allow patients to have treatments faster, better and with resulting gains in quality of life.”

Sunnybrook is part of a seven-member international consortium hand-picked for their expertise by Elekta and Philips – the MR-Linac’s manufacturers – to refine, test and use the machine to treat patients.

The MR-Linac carries out high-definition imaging of tumours in real-time during radiation therapy. This will allow Odette Cancer Centre specialists to target tumours with extraordinary precision – even as a tumour moves inside the body – and to quickly see the radiation’s effect on the tumour.

With the technology, doctors will be able to more effectively treat a host of cancers that were previously hard to tackle. “It’s very exciting for pancreatic cancer, esophageal cancer and other cancers where we have been limited in the way we can treat them because of real-time imaging of tumours and the new MR-Linac, Sunnybrook will work with the other members of the consortium to prepare the machine for the first human clinical trials. “It’s a global consortium of medical physicists, research scientists, radiation oncologists, partnering together all across the world with the common goal of advancing the entire field of MRI-guided radiation,” says Dr. Sahgal.

Sunnybrook is developing the machine’s applications for brain cancer. “We are the lead site for the consortium to develop applications of the MR-Linac for glioblastoma, the most common malignant brain tumour in adults,” says Dr. Sahgal. “We have a protocol that’s looking at advanced imaging for primary cancers of the brain as a first step, and we’re going to have a clinical trial that’s geared toward adapting the radiation dose using the MR-Linac each day as we treat primary brain tumours.”

Dr. Calvin Law, chief of the Odette Cancer Program, says Sunnybrook’s “responsibility as an academic centre is not only to deliver the standard of care, but also to always ask the question: ‘How can we improve the system?’ We have already been making the most out of the technology we have. This next level will combine existing innovation with a new way of doing things and allow patients to have treatments faster, better and with resulting gains in quality of life.”

After the MR-Linac is installed, there will be testing and further treatment protocol development. The team hopes to be treating patients by 2017.

“It’s a paradigm shift. It’s not just a new machine for radiation therapy; it’s more than that,” says Dr. Brian Keller, a Sunnybrook medical physicist and physics lead for the MR-Linac project. “It has very good imaging so we can home in on where the tumour is, and because we can do that, we can deliver a higher dose, using fewer treatments, and perhaps eliminate surgery that some patients would need in the future.”

There’s great anticipation as a cancer treatment of the future arrives – and, with it, new hopes for patients at Sunnybrook and beyond.
S

Research at the front lines of health care

Who better to look into ways of improving patient health than the medical professionals with daily hands-on experience?

BY MARLENE HABIB

Scientists and physicians aren’t the only ones conducting important, life-changing research at Sunnybrook. Health-care professionals in myriad roles are involved in Sunnybrook’s program of practice-based research and innovation (PBRI) — drawing from their daily experiences on the job to conduct research into improving the patient experience.

Sunnybrook’s strategy for PBRI is driven by the belief that health-care providers may need breathing machines (ventilators) temporarily, while others may need breathing tubes (tracheostomy) permanently. Breathing tubes use a balloon cuff inflated. He says that since using the electrolarynx, “I’m enjoying talking again.” He hopes to get his own device for his move to long-term care.

Many patients and their loved ones are happy about the electrolarynx — one seriously injured patient was a “changed man” after learning to use it, says Rose, because he could once again communicate with his wife.

Still, it takes some getting used to, because it makes a buzzing noise, says Rose, who would like to collaborate with engineers to design a quieter and easier-to-use device.

Rose thrives on collaboration with professionals who have diverse skills. “Most of health care is a team — it’s not a single individual — so you have to include the perspectives of all those key members, both in applying things at the bedside and in doing research,” she says.

The U.K.-born Rose, who studied at Massey University in New Zealand and then earned her PhD at University of Melbourne in Australia, was lauded for her “wealth of experience” when she was named to the TD Nursing Professorship in Critical Care Research in 2014.

Now established in the role, Rose says: “I enjoy being here at Sunnybrook where I am close to the clinical environment. I can go up to the ICU (intensive-care unit) and be involved in data collection and screening, and talking to my research staff rather than just being in an office.”

Sabrina Rafaeli, registered nurse: ‘Silent induction’ and other ways to reduce patients’ anxiety

As a dedicated operating room nurse for more than a decade, Sabrina Rafaeli has come to realize that patients preparing for surgery respond best to the sound of silence.

The 32-year-old is a team leader on night shifts in the OR, which can be extremely busy with trauma patients. On her day shifts, much of her OR work involves patients undergoing ophthalmological and gynecological elective procedures. She does everything from verifying surgical counts to working to ensure patient safety, all while collaborating with anesthesiologists, surgeons and others.

Rafaeli says patients can become unsettled if exposed to noises in the OR right before their surgeries. These disquieting noises can be as simple as the clanging of surgical instruments or the idle chatter of the surgical team.

Rafaeli, who joined Sunnybrook in 2011 after moving to Toronto from Israel, says one particular event gave her the idea for her research work.

“A few months ago, I was circulating in the operating room when it struck me how noisy it can get. Everything from staff talking, the radio playing, monitors beeping, metallic instruments clanging and people coming and going,” says Rafaeli.

“As an operating room nurse, I notice extreme anxiety in patients. Sometimes patients don’t verbalize it, but you see their heart rate and blood pressure go up. They may ask to go to the washroom. They don’t have to tell you they’re scared, but we know those patients are anxious, and we are there to help them and make them feel better,” she adds.
As part of her research, Rafaeli created surveys for patients to evaluate their anxiety levels before and after each surgery, and to help her determine how certain interventions could decrease those feelings. “If we have patients who are anxious before surgery, they will wake up anxious and post-opera- tive anxiety affects post-operative pain, which means the patient may require more pain medica- tion for recovery,” she says. “And if they need more narcotics in recovery, that recovery may take longer.”

To that end, Rafaeli has devised some novel approaches to managing noise levels, including a “silent induction” plan. During the administering of the anesthetics, there should be no counting of instruments or discussions among staff, who would also be asked to avoid entering the room unnecessarily and to turn off their pages. She also aims to increase surgical teams’ awareness of the impact of noise on patients by holding educational sessions, hanging posters around the OR and engaging “noise champions” to oversee silent inductions in their practices.

Jonathan Russell, ICU nurse: Working to improve staff handovers in critical care

Communication is key in most jobs, but for a medical profes- sional, knowing everything that happened during a previous shift is vital.

“By that end, Jonathan Russell’s research involves in- troducing and evaluating a tool to help organize and detail the information that is transferred be- tween nurses as shifts change in Sunnybrook’s Critical Care Unit – known as the “handover” process. At its core, a better handover means better quality care. The idea is to change the way we think about handover by provid- ing a framework around which to organize it. Structured tools make handovers more accurate and by being specific about what in- formation needs to be shared. For our patients, it means they can be confident that the person coming on shift has all the information needed to take care of them,” says Russell.

He earned his masters of science in nursing in 2009 from McGill University and relocated to Toronto in 2010 to work in critical care at Sunnybrook. Russell, 33, is also currently a student in the nurse practitioner program at the University of Toronto.

As a change nurse, he says that effective handovers are necessary to improve the quality of care provided to patients and their families, particularly in intensive-care units (ICU). While hand- overs occur throughout the hospital – for reasons such as new admissions, change of shift or unit transfers – those that take place in the ICU differ in that the information tends to be of high volume and complexity.

“The trick is finding a way to provide a comprehensive handover while avoiding information overload,” he says.

Russell figures that improving the transfer of information pro- cess will mean safer transitions to patients’ homes or into the community, including during rehabilitation.

“It is Bowler’s hope that her work – focusing on improving the educational materials given to patients and families after discharge – will help patients better deal with their transition from hospital to home, and be more prepared to cope with their injuries,” says Russell.

Bowler’s discharge packages educate trauma patients about their problems to watch for and cautions to take and provide helpful tips and resources. That may mean, for instance, provid- ing information to help a patient with a concussion relearn how to leg learn how to shower with a cast, apply for Employment In- centive, or deal with headaches and fatigue. As trauma patients and their fami- lies have complex injuries and needs, it is essential that they are engaged and educated to improve their confidence and better deal with their physical and emotional recovery at home.

Bowler is driven by the people she helps. “Patients and families amaze me with their strength and resilience,” she says.

Jenn Bowler, social worker: Improving the discharge experience for trauma patients and families

Jenn Bowler’s years of social work experience at Sunnybrook’s Tory Regional Trauma Centre and Orthopaedic & Arthritic Centre have taught her that patients and their families need help in understanding the impact injury happens, through to when they are discharged and long after.

“Traumatic injury and hospitalization can be overwhelming and intimidating events,” she says. “Besides physical injuries, there are typically significant psychological and social impacts and stressors on the patient and family.”

Bowler has a master’s in social work from Wilfrid Laurier Uni- versity and joined Sunnybrook in 2007. Working in what is Canada’s largest regional trauma centre, she is among three social workers who get involved within the first day or two of a patient’s admission. She says, “We have a continuity-of-care model where we follow patients from admis- sion to point of discharge from hospital.”

Her work, she says, provides her the opportunity to work with trauma patients who have sus- tained injuries that involve many systems in the body, including the brain and spinal cord, from motor vehicle accidents or sometimes violence. She offers in-depth support and counselling to pa- tients and their families to help them adjust during times of cri- sis or while they are dealing with grief. This can involve aiding their transition out of the acute-care environment into their own homes or into the community, including during rehabilitation.

It is Bowler’s hope that her work – focusing on improving the educational materials given to patients and families after discharge – will help patients better deal with their transition from hospital to home, and be more prepared to cope with their injuries. Bowler’s discharge packages educate trauma patients about the problems to watch for and cautions to take and provide helpful tips and resources. That may mean, for instance, providing information to help a patient with a concussion relearn how to leg learn how to shower with a cast, apply for Employment Incentive, or deal with headaches and fatigue. As trauma patients and their families have complex injuries and needs, it is essential that they are engaged and educated to improve their confidence and better deal with their physical and emotional recovery at home.

Bowler is driven by the people she helps. “Patients and families amaze me with their strength and resilience,” she says.

Amy Wainwright, physical therapist: New approach to improving patient experience of post-op pain

Amy Wainwright traces her passion for helping others overcome their injuries to an early hospital visit. Her father, Alan, had a leg amputated after a motorcycle accident when she was a child, and Wainwright says she would go to physiotherapy every other Friday at a children’s hos- pital, recalling: “I had trouble with my knees and would go to physiotherapy every other Friday” at a children’s hos- pital.

Wainwright, 34, has an undergraduate degree in kinesiology from McMaster University and a masters in physical therapy from the University of Toronto. She has been a physiotherapist at Sunnybrook’s Holland Orthopaedic & Arthritic Centre for eight years.

Patients with hip and knee replacements often experience challenges with pain manage- ment and rehabilitation, she explains. But there are unique concerns for patients who under- go knee replacement. They often experience more pain, and they have the added pressure of hav- ing to work to regain their knee movement quickly, beginning the day after surgery.

Wainwright has been involved in several patient-centered initiatives, including working on the development of a mobile app for patient use. Sunnybrook’s myKneeD app helps patients prepare for hip or knee replacement surgery by sending them reminders about what they should be doing before an operation, for instance.

After surgery, the app can help them keep on track during recovery by sending them questions to answer about their health. It also has a range-of- motion tracker that allows a patient who has had knee replacement to gauge how well the knee is bending and straight- ening. Wainwright also plays an important role in the innovative, post-op knee replacement classes for patients, which offer peer support and focus on mobil- ity, strengthening and functional training.

Wainwright says patients in the classes have reported that the classes are motivating and have helped them build confidence and make “functional gains.” She is also a member of an inter- professional committee that uses patients’ feedback to find ways to help them with pain manage- ment.

As patients identify a need for more information on how to better manage their pain after discharge, one aspect of Wain- Wright’s fellowship program research is focused on creating new educational resources.

“Our patients have played such an important role on the team by identifying their needs and then helping us by providing important insights into how to make the resources more meaningful to them,” she says.
International arrivals

Doctors trained abroad face hurdles in getting certified to practise in Canada. But fellowship programs help smooth the transition.

BY ALEXIS DOBRANOWSKI

When Dr. Dooa Elrouby and her husband decided to move to Canada from Egypt, they knew there would be challenges. A physician and assistant lecturer at Cairo University, Dr. Elrouby’s credentials wouldn’t be accepted in Canada. But they hoped for the best for themselves and their young son, moving to Mississauga, Ont., in 2010.

Dr. Elrouby wrote the necessary medical exams. Then, through online searching, she found an internal medicine fellowship program at Sunnybrook, applied and was accepted.

A fellowship is an educational licence, with which fellows work under supervision, typically to gain a specialty. In order for physici-

ans to practise as independent practitioners, they must also do a residency, which requires them to work under supervision in a hospital setting.

“When you start to work here, the system is new,” she recalls. “It’s very different than working in Egypt.”

A few months into her fellowship, Dr. Elrouby began chatting with another doctor on rounds. Dr. Umberin Najeeb, an internal medicine specialist, born and trained in Pakistan, had moved to Canada several years before. “It was really helpful to talk to someone who had been on a similar journey,” Dr. Elrouby says. “While Dr. Najeeb and I aren’t from the same country, we could discuss the differences we found in the Canadian health-care system to those in the country where we trained.”

If a physician was trained in Canada, Dr. Elrouby added, he or she may not be able to understand the differences or the cultural gaps that exist.

Dr. Najeeb is well aware of the differences. She moved to Canada in 2004. After arriving in Canada with her husband and two young children, like Dr. Elrouby she took a series of exams and tried to find a residency in order to be accepted in Canada. But they hoped for the best for themselves and their young son, moving to Canada from Egypt, they knew there would be challenges.

Luckily, Dr. Najeeb learned about fellowships from an international medical graduate (IMG) at her mosque. So she searched the programs at the University of Toronto and applied to each one with a medicine focus. She was selected for the hospitalist program at Sunnybrook six years before Dr. Elrouby.

“I think that was a good thing for me because I learned the Canadian health-care system,” Dr. Najeeb says. She quickly realized there were key differences at Sunnybrook, including the doctor-patient relationship.

“Doctors in the Middle East and Asia, for example, have a very paternalistic role. They just tell patients what to do. Here, we don’t tell patients what to do,” she says. “We discuss options with them. And the patient has autonomy in making decisions.”

After spending 10 months as a fellow, Dr. Najeeb was accepted into a two-year condensed internal medicine residency (the condensed option is no longer available in Ontario) and was later hired at the University of Toronto and at Sunnybrook. She now works — often beyond her role as a staff internist — to help internationally educated professionals (IEPs) transition into the Canadian health-care system.

“I have personal experience. It’s my major scholarly interest: What are the challenges these professionals face, and how can we support them? That’s the focus of my education research,” says Dr. Najeeb. As a member of Sunnybrook’s internationally Educated Professionals Committee, she has designed a series of workshops aimed at helping staff at Sunnybrook who were educated outside Canada transition into the workplace. The workshops focus on communication and providing feedback. “These are what we call ‘soft skills,’” she says. “You learn and use these skills at work. These skills aren’t formally taught.”

As a fellow at Sunnybrook, Dr. Elrouby attended Dr. Najeeb’s workshops. “It was confusing when I started working in Canada, to not know what people meant in some situations,” Dr. Elrouby says. “This wasn’t due to a language difference, but because the styles of communicating are different. In Egypt, people in the workplace are much more direct.”

Other differences are discussed in the workshops, and attendees are given new strategies for effectively communicating with colleagues, patients and their families. They also learn how to give feedback. “Sandwiching,” a negative comment in between two positive ones. So far, 140 professionals have attended, including IMG fellows, nurses, lab technicians, pharmacists and researchers.

The workshops and the companion course for managers on how best to support IEPs are part of the Sunnybrook Leadership Institute, which offers courses for all employees.

“Supporting internationally trained professionals in turn supports Sunnybrook’s patients.”

Christopher Townsend, manager, Organizational Development and Leadership

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“When the workshops are about cultural fluency,” says Christopher Townsend, manager, Organizational Development and Leadership, which runs the leadership program and other staff development programs. “A person can get that information on how to work with someone from a different background.”

“Supporting IEPs in turn supports Sunnybrook’s patients,” he says. “People bring different perspectives and different knowledge. Our patients represent countries all over the world, and our staff can relate. It reflects the cultural fabric that makes up Toronto.”

Dr. Elrouby is now halfway through a residency at another hospital. She is a mentor to a first-year resident via the University of Toronto IMGP Mentorship Program, developed and run by Dr. Najeeb. “The mentorship program helps people at various points on their trajectory — we help them find their way,” Dr. Elrouby says.

“IMGs can include Canadian students,” Dr. Najeeb says. “Many Canadian students go abroad to medical school. The cultural shock for them on return to Canada can be quite similar. If someone is coming from Ireland, let’s say, the medical students there just don’t know what to do. They don’t have the same level of responsibility as they do here. They are shocked by the responsibilities of our third-year medical students.”

While designing and teaching workshops, connecting applicants with the right programs and taking on observers adds to Dr. Elrouby’s workload, she’s happy to help international graduates get on the right path in Canada.

“Someone needs to be there to at least give them the opportunity to know how the Canadian health-care system works,” she says. “I get a personal satisfaction out of it. I’m helping someone and playing a small part in their success.”
The colourful art of healing

Daphne Tully has been soothing patients for decades with her hospital room paintings

BY STEPHEN KNIGHT

“They’re in every room possible,” says Daphne, who has painted about 30 tiles. She’s been around long enough to see in practice what science has now established – that there’s a connection between visual art and the brain’s ability to alleviate stress, anxiety and pain. Art provides a chance for patients to go to another place – a respite on the often long road to recovery following a life-changing event, such as a cancer diagnosis or a traumatic injury. And ceilings and bare hospital walls have proven to be prime real estate for helping improve the patient experience.

Daphne’s art doesn’t just make life brighter for patients, employees and visitors. It has also become an important part of the fundraising mix at Sunnybrook. She has been selling cards featuring her watercolours since 2008.

Last year alone, Daphne sold about 200 packs. Over the years there have also been corporate requests for large purchases. One organization ordered 1,000 cards.

For Christmas, cards are printed from paintings by local artists entered in a competition every year organized by Daphne. These are sold in packets of 10 in the gift shop and around the hospital for the holidays. Daphne’s watercolourists of Meaford House, Vaughan Estate, the historic Kilgour House, the hospital and the Odette Cancer Centre are sold in packets of 10 year round in the gift shop.

“It’s very gratifying when people buy the cards,” says Daphne. “I’m very pleased to help. It is a constant thing; the hospital can use the cards for fundraising forever. It’s very, very special.”

Through the Sunnybrook Volunteer Association, ceiling tiles can be sponsored by donors and come with a plaque, complete with the artist’s name and the donor’s contribution amount. With a $125 donation, one of the four-feet-by-two-feet ceiling tiles can be customized and hung in the hospital.

Daphne hasn’t always been a painter, but after hearing a CBC radio interview with famed Hungarian-Canadian-American watercolourist Zoltan Szabo one day in the early 1970s, she resolved to pick up a brush and take a course. She says painting in oil or acrylic is fine, but watercolours present a unique challenge because they move. “Sometimes,” she says, “they go where you don’t want them to go.”

“A lot of people get discouraged if they don’t paint a masterpiece after the first class,” says Daphne, whose kitchen acts as her studio. “I’m a very determined person, and I was fortunate to take one or two workshops with Szabo. He said most people have it quite wrong when it comes to painting. He said anyone can do it. You just have to keep at it.”

Determination defines Daphne’s extraordinary volunteer journey at Sunnybrook. Her first role, long before the age of smartphones, tablets and on-demand video, was working on a pilot project to help patients access television service during their stay.

She remembers first being approached to volunteer at the hospital. “A very good friend asked, ‘Can you start this afternoon?’ I said, ‘No, but I can come in tomorrow,’” she says. “It’s been a great match ever since. Daphne, who was a bookkeeper in her working days, then became treasurer of the Sunnybrook Volunteer Association before overseeing the hospital’s Fine Arts Program, which invites local artists to submit their work to be displayed on Sunnybrook’s walls.

She not only led the program, but was also one of its artists.

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It was around that time that Daphne convinced her husband, Stan, to join her as a Sunnybrook volunteer. The two of them logged a remarkable 60-plus years of volunteer service, including 25 years together. Sadly, Stan passed away in February 2015. They had been married for 65 years.

“Daphne’s caring, creativity and commitment to Sunnybrook exemplify the true spirit of volunteerism,” says Katherine Alexopoulos, director of volunteer resources at Sunnybrook. “She and Stan initiated and led numerous projects that have had so many positive impacts at the hospital. If it’s about helping to improve the patient experience in some way, Daphne’s attitude has always been, ‘We can do this!’ She is well-loved, well-known and admired for her many contributions and accomplishments.”

A hospital can be a sterile and imposing place. The painted ceiling tiles offer warmth and colour, and there are now almost 600 of them to help Sunnybrook patients on the road to recovery.

One patient in particular had a lasting impression on Daphne. “She had been in a car accident and could not move,” recalls Daphne. “She could only move her eyes. She said, ‘I really love dolphins.’ I had never drawn a dolphin in my life, but she was absolutely delighted with the ceiling tile. She took it with her when she left, and I will always have that connection with her.”

During the SARS outbreak in Toronto in 2003, there were extensive restrictions on family and friends visiting patients, and everyone was under stress.

“We were the only volunteers,” she says. “The nurses, staff and patients really appreciated looking at the art at that time.

Whether it’s painting old stone houses or recreating van Gogh’s The Starry Night, Daphne says she loves to help bring colour into patients’ lives – and critical fundraising dollars to Sunnybrook.

“It’s such a worthwhile thing to do,” she says. “It has made such a difference in my life to have the chance to help the hospital and help the patients.”
RESEARCH & INNOVATION
the latest in leading-edge developments at Sunnybrook

ADVANCE IN TREATING ARTERY PAIN
Neuropathic pain is one of the reasons patients continue to experience pain after total knee replacement. This chronic pain is similar in sensation to burning or electric shock and may be caused by something minor such as light touch.

“Our study found that about 14 per cent of patients experience this pain five years after knee replacement,” says Helen Razmjou, lead investigator and advanced practice physiotherapist at Sunnybrook. “Considering the large number of joint replacement surgeries performed in Canada, a substantial number of people may be suffering from ongoing severe symptoms.”

The study, published in 2015 in the journal Physiotherapy Canada, looked at whether reporting neuropathic pain an average of five years after total knee replacement was related to indicators such as age, sex and disability before surgery. The team looked at data for 64 patients, and findings determined that the pain was no more or less common in men or women, the old or the young. “There was no demographic that was more predisposed to development of neuropathic pain than another,” says Razmjou.

Patients who see a high risk for neuropathic pain are identifiable as early as one year after their operation and could benefit from preventive strategies. Physicians should inquire about the types of pain experienced by their patients. Certain surveys help to determine if neuropathic pain is at the root of the problem, as there is potential for medications that will ease it.

NEW KNEE, OLD PAIN
The pain can come in waves of muscle cramping in the thigh and the upper calf, and sometimes there is discomfort in the feet at night or while sitting. Patients with peripheral artery disease, also known as hardening of the arteries that lead to the extremities, face not only an impaired quality of life, but also a higher risk for heart attack and stroke. While there are surgical treatment options that can improve the condition, there is often a need for a follow-up procedure if the artery becomes blocked again.

Sunnybrook is one of the first centres in Canada to offer a new therapy option that reduces the need for subsequent surgery. Dr. Andrew Dueck, division head of vascular surgery at Sunnybrook, says a new drug-coated balloon angioplasty restores blood flow and delivers a drug directly into the wall of the artery. The drug minimizes scar tissue formation, which can lead to blockage of the artery and a return of symptoms. For patients, this means a reduction in pain and discomfort, a lower risk of heart attack and stroke, and less chance of more surgery.

Lowering Blood Pressure, One Text at a Time

The researchers hope their findings will encourage others to continue studying how outcomes of elderly burn patients can be improved. “By learning the major differences that come with this age group, we will be able to better help elderly people who have been subjected to burn injuries,” says Dr. Saeid Amin-Nik, junior scientist at the Sunnybrook Research Institute.
Your hospital, your say

BY MONICA MATYS

If you've ever wanted to voice your opinion, Sunnybrook wants to hear from you. As part of the hospital’s unique Patient Engagement Strategy, members of the community can cast their votes on a series of interesting poll topics. Results are shared with the hospital’s senior leadership team and help inform the decisions around a number of hospital-wide strategies. To date, the polls – available on Sunnybrook’s homepage and through its social media channels – have yielded hundreds of responses. If you haven’t yet, now’s the perfect time to throw in your two cents! sunnybrook.ca/engagement

Should Sunnybrook play music in its Emergency Department?

70%

“Playing music has the potential to support the psychological well-being of patients and improve their overall experience.”

20%

“For those who are hearing impaired, sound makes it harder to understand someone speaking to you.”

10%

“Depends on the type of music played.”

Should visiting hours remain the same, be open 24-7 or be extended by a few hours?

59% Stay the same

“Patients need sleep at night. They need the rest.”

“Should be up to the patient.”

33% Be open 24-7

“For family members and direct caregivers (who should not be considered visitors), there should be no limits. They should be seen as members of the care team.”

8% Extend by a few hours

“Family demands are many. Huge stress on families with sick loved ones. The extended time helps.”

FINAL WORD

“Playing music has the potential to support the psychological well-being of patients and improve their overall experience.”

“Patients need sleep at night. They need the rest.”

“For family members and direct caregivers (who should not be considered visitors), there should be no limits. They should be seen as members of the care team.”

“Family demands are many. Huge stress on families with sick loved ones. The extended time helps.”