ON SIZE DOES NOT FIT ALL
How precision medicine is transforming cardiovascular care

PUSHING THE BOUNDARIES OF SCIENTIFIC DISCOVERY
World-class researchers probe the mysteries of the heart

GAME-CHANGING DEVICES
An artificial heart the size of a AA battery

the life & legacy of
PETER MUNK
1927 – 2018
NEWS AND NOTES FROM THE PETER MUNK CARDIAC CENTRE

REMEMBERING PETER MUNK
Peter Munk arrived penniless in Canada from war-torn Europe. But he brought giant ambitions and a grateful heart, as he began a remarkable journey toward becoming one of this country’s greatest business leaders and philanthropists.

SURVIVOR STORIES
The stories of four individuals who are grateful recipients of the centre’s world-class cardiovascular care. They each faced the fear, pain and uncertainty of heart disease, and came out the other side with a new lease on life.

A DAY IN THE LIFE
It takes more than world-class surgeons and researchers to create a centre of exemplary patient care. Behind the scenes and on the front lines are medical professionals striving every day to ensure an exceptional patient experience.

CONTENTS

4 REMEMBERING PETER MUNK
2 NEWS AND NOTES FROM THE PETER MUNK CARDIAC CENTRE
10 SURVIVOR STORIES
21 DR. BARRY RUBIN
24 PRECISION MEDICINE
29 DR. TIRONE DAVID
32 WHAT’S NEXT FOR THE PETER MUNK CARDIAC CENTRE
34 GAME-CHANGING DEVICES
36 FUTURE OF DISCOVERY
40 IN HIS OWN WORDS
PROBING WHY VIRAL INFECTIONS CAN CAUSE HEART FAILURE

Heart failure is commonly caused by heart attacks, but did you know that viral infections can lead to the condition too? Even a harmless cold virus can do damage. While most colds clear up in a few weeks, some people persist and cause risky infections in other organs. Dr. Stanislav Spahovic, a clinician-scientist with the Peter Munk Cardiac Centre and the Loretta Rogers Chair in Interventional Cardiology at the Ted Rogers Centre for Cardiac Research, is examining which specific types of immune cells actually help prevent an infection from wreaking havoc on the heart.

The findings so far? Some cardiac immune cells generate antiviral T cells, which prevent long-term damage. The absence of these cells not only suppresses the anti-virus response, but can also lead to heart damage that weakens the organ’s ability to pump.

The results may eventually lead to new understanding about why only some people who contract viral infections of the heart go on to develop heart failure.

NORTHERN EXPOSURE

Thunder Bay hospital and the Peter Munk Cardiac Centre partner in innovative program: one program, two sites

Not long ago, when people living in Thunder Bay and northwestern Ontario experienced cardiovascular problems requiring surgery, their lives were turned upside down—again and again. Not only were they required to travel to southern Ontario for face-to-face time with a cardiovascular diagnostic team in Toronto, Hamilton or London, but preoperative testing required traveling south too. Then, of course, there was another gruelling trip for the surgery. Multiple journeys not only created a financial burden, but they placed undue stress on patients and families. But now that’s changing, because of an innovative program in partnership with the Peter Munk Cardiac Centre.

“Our motto is, ‘one program, two sites,’” explains Helen Storey, the Thunder Bay Nurse Co-ordinator at the Peter Munk Cardiac Centre. “We’re committed to providing the same level of care to our northern patients, no matter where they live.”

The “one program, two sites” program helps northwestern patients receive care closer to home, says Ms. Storey. There are two Peter Munk Cardiac Centre-trained vascular surgeons currently working at the Thunder Bay Regional Health Sciences Centre. On the cardiovascular side, two pioneers—Healthcare professionals who use the cardiosurgical bypass machine during an operation—are now training at Toronto General Hospital, so they’ll be ready to head north soon.

What’s more, four cardiovascular surgeons from the Peter Munk Cardiac Centre are already on rotation to travel to Thunder Bay and handle 12 clinics per year. The surgeons see patients patiently and then follow up with them in the months after their Toronto surgeries. Because of this postgraduate partnership between medical institutions, more people in northwestern Ontario are getting cardiovascular care at home.

Medical professionals like Ms. Storey, a 35-year nursing veteran, help bridge the two communities by offering attention and support. “Nobody is getting lost in the shuffle,” says Ms. Storey.

APP HELPS PATIENTS MANAGE SYMPTOMS FROM HOME

After spending time in a hospital for heart failure, patients may have concerns about their condition between their six-month follow-up visits. They wonder: Is that heart flutter just a beat or could it be early signs of atrial fibrillation? Many Canadians may head back to the hospital’s emergency room, just in case.

But a new app called Medly is changing how heart failure patients at the Peter Munk Cardiac Centre manage their symptoms. Developed at University Health Network, Medly can also help patients keep in contact with their health teams without leaving their homes.

HERE’S HOW IT WORKS

Patients record their physical measurements, like blood pressure, heart rate and body weight.

Patients get instant feedback about their health. Analysis of an electrocardiogram transmission is real time. If there are heart arrhythmias or heart fail symptoms, they are warning or publishing.

The app reminds patients to check in from anywhere—我市, province or county. For those who live far away, they can bridge the gap by receiving preoperative testing in Thunder Bay and having the procedure at the Peter Munk Cardiac Centre. Ms. Storey, the Thunder Bay Nurse Co-ordinator at the Peter Munk Cardiac Centre, is working to coordinate the program and keep patients informed every step of the way.

For more than 40 years, Dr. Wayne Johnston has trained generations of physicians and saved countless lives. Yet when he received a call from Canada’s Governor General’s office earlier this year, he was surprised to learn he would be receiving one of the country’s highest civilian honours: becoming a recipient of the Order of Canada. “This is an honour that goes beyond the medical community and speaks to one’s impact as a surgeon,” says Dr. Johnston, Medical Director of the Vascular Lab at the Peter Munk Cardiac Centre.

According to the Order of Canada website, Dr. Johnston receives his honour “for his foundational leadership as a surgeon, teacher and educator in the field of vascular surgery in Canada.”

Dr. John Byrne, a vascular surgeon at the Peter Munk Cardiac Centre, is the 25th Wyile Scholar. The Wyile Scholar Program awards one outstanding surgeon-scientist annually in North America. Dr. Barry Rubin, Medical Director and Chair of the Peter Munk Cardiac Centre, was the first Canadian to win this award. Dr. Byrne is the second.

Dr. Byrne’s research will study how abnormal arterial aneurysms develop and become inflamed, which could improve how physicians predict and treat those at high risk of a fatal rupture.
Peter Munk had an uncanny ability to spot opportunities, the drive to pursue grand visions and the courage to create.

When Mr. Munk died in March 2018, at the age of 90, he left a sweeping legacy – as founder of the world’s largest gold producer, financial savour of one of the largest international property developers, builder of Porto Montenegro (a superyacht marina on the Adriatic coast dubbed “the new Monaco” by Forbes) and a prominent philanthropist who helped make Canada a global leader in cardiovascular care and research.

*a sixth sense* Unlike many billionaires who make their wealth in a single industry, Mr. Munk pursued disparate ventures in numerous countries and succeeded across multiple sectors.

In the early eighties, when he founded what would become Barrick Gold Corp., he made a point of letting people know that, in contrast to most executives in the field, he wasn’t a “gold bug.” He looked at the gold-mining business with an outsider’s clarity and decided the best way to attract investors to the notoriously volatile sector was to limit both risk and ups and downs by hedging against the future price of gold. Other producers thought he was crazy. Why would you build a gold business and then bet against the precious metal? But the market had the answer: In Barrick’s first 10 years as a public company, its valuation soared. By 1993, 10 years after Barrick’s initial public offering on the Toronto Stock Exchange (TSE), $1 initially invested as a public company, its valuation soared. By 1993, 10 years after Barrick’s initial public offering on the Toronto Stock Exchange (TSE), $1 initially invested as a public company, its valuation soared. By 1993, 10 years after Barrick’s initial public offering on the Toronto Stock Exchange (TSE), $1 initially invested as a public company, its valuation soared. By 1993, 10 years after Barrick’s initial public offering on the Toronto Stock Exchange (TSE), $1 initially invested as a public company, its valuation soared. In Barrick’s first 10 years as a public company, its valuation soared. By 1993, 10 years after Barrick’s initial public offering on the Toronto Stock Exchange (TSE), $1 initially invested as a public company, its valuation soared. In Barrick’s first 10 years as a public company, its valuation soared. By 1993, 10 years after Barrick’s initial public offering on the Toronto Stock Exchange (TSE), $1 initially invested as a public company, its valuation soared. In Barrick’s first 10 years as a public company, its valuation soared. By 1993, 10 years after Barrick’s initial public offering on the Toronto Stock Exchange (TSE), $1 initially invested as a public company, its valuation soared.

When his holding company acquired real-estate giant TrizecHahn, quickly acquired an expansive portfolio “not a real estate guy.” Nevertheless, the firm, renamed TrizecHahn, quickly acquired an expansive portfolio of such iconic properties as Chicago’s Sears Tower, the Watergate Office Building in Washington, D.C., and management of Toronto’s CN Tower.

Mr. Munk was a risk-taker, but his keen eye for opportunity seldom let him down.

“Peter Munk is in the business business,” Canadian corporate chronicler Peter C. Newman wrote in 1996. “He has a sixth sense of knowing when and where and how to move.”

**FINDING ‘PARADISE’**

Mr. Munk was a man blessed with eternal optimism and charm, and the traits of a natural salesman. Underneath it all, he was a man galvanized to succeed, driven by what he called an “immense debt” to the country that had welcomed him and his family from war-ravaged Europe.

Mr. Munk was an adopted country. After the dehumanizing regime in Nazi-occupied Europe, he could only describe Canada as “paradise.”

Again and again, he would gently chide native-born Canadians for taking their country for granted. “You will never appreciate the immense debt I have,” Mr. Munk told an audience gathered at Toronto General Hospital in September 2017. He was at the hospital to announce the $100-million gift that he and his wife, Melanie, had made to the Peter Munk Cardiac Centre – the largest donation to a Canadian hospital – but his speech that day centred on his love for his adopted homeland. “To do what I can to help this country, to help repay this country, is never enough.”

Seventy years later, Mr. Munk would still be talking about those formative years with a sense of wonder and gratitude for the generosity of his Canadian classmates. “They were there to show me what a hot dog is, because they were there to show me what a hot dog is, because they were there to show me what a hot dog is, because they were there to show me what a hot dog is, because they were there to show me what a hot dog is, because they were there to show me what a hot dog is.”

Born into a wealthy Jewish family in Budapest on Nov. 8, 1927, he was 16 years old when, in the the spring of 1944, Hitler ordered Nazi troops to occupy Hungary. Mr. Munk’s paternal grandfather, Gábor, arranged for the escape of 14 immediate family members on a train to Switzerland. The small group included Peter Munk, his father, Lajos, and his grandfather – but, because his parents were divorced, his mother was left behind in Budapest and deported to Auschwitz. The family would survive the Holocaust, including his mother, but it would cost them everything they owned.

In 1949, at the age of 20, Peter Munk arrived in Canada with a student visa. He spent his first year as a Grade 13 student at Toronto’s Lawrence Park Collegiate Institute, learning English, then enrolled at the University of Toronto (U of T). He spent his summers working on a tobacco farm in Delta, Ont. Back on campus, he began his first business by recruiting fellow students to sell Christmas trees. He graduated from U of T in 1952 with a degree in electrical engineering and a love of his newly adopted country. “To do what I can to help this country, to help repay this country, is never enough.”
innovative researchers, leading the charge to improve their breakthroughs." That's where philanthropists can come comes from the top people," he said. "But the top people philanthropists, he said. Pursuing the highest levels of excellence falls to one more testament to the world that it should aspire Don't waste your time. "If you found a way to develop an unbreakable shield, wouldn't you be the first to wear it?" he asked rhetorically. Pursuing the highest levels of excellence falls to one more testament to the world that it should aspire guidance for the whole PURSUING to elaborate. He set his sights on the highest levels of achievement. "If I can achieve them, so can you," he would declare. They showed me how to eat fish. I'd never heard of a hot dog. His gifts to the Peter Munk Cardiac Centre have indeed made a difference in cardiac care in Canada and around the world, and they have helped the centre become a pioneering, world-leading institution in the cutting edge of cardiac care. All told, since 1983, the Munks have donated $772-million to Toronto General and Western Hospital Foundation. A $37-million gift in 2011, the seed money for Barrick. The company into Barrick Resources, a low-cost North American gold producer that grew quickly by making one opportunistic acquisition after another, yet limited its risk by hedging against the future price of gold. The company's $40-million purchase of Nevada's Goldstrike mine in 1986 proved to be not only shrewd, but legendary. The mine was valued in expectation of holdings of 600,000 ounces. But actual holdings in 35 times greater, giving Barrick one of the richest known deposits on Earth. Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..." Mr. Munk: "He was an immigrant..."
Peter and Melanie Munk gave their first gift to establish the Peter Munk Cardiac Centre. Though neither was a heart patient, they clearly identified the need to improve the lives of Canadians living with cardiovascular disease.

1993
Peter and Melanie Munk gave their first gift to establish the Peter Munk Cardiac Centre. Though neither was a heart patient, they clearly identified the need to improve the lives of Canadians living with cardiovascular disease.

2006
Donated $37-million, which was then the largest-ever gift to a Canadian hospital, to transform the Peter Munk Cardiac Centre into a state-of-the-art facility with the world’s most advanced diagnostic and interventional techniques, medical imaging and cardiac procedures.

1996
Funded four new Chairs and Centres of Excellence at the Peter Munk Cardiac Centre. The Centres of Excellence are multi-disciplinary, breaking down silos and encouraging teams to collaborate.

2008
Established the Melanie Munk Chair in Cardiovascular Surgery, which allowed the centre to retain the renowned cardiac surgeon Dr. Tirone David, and hire and retain a growing number of the world’s most highly-skilled doctors.

2011
Established the Melanie Munk Chair in Cardiovascular Surgery, which allowed the centre to retain the renowned cardiac surgeon Dr. Tirone David, and hire and retain a growing number of the world’s most highly-skilled doctors.

1997
Funded four new Chairs and Centres of Excellence at the Peter Munk Cardiac Centre. The Centres of Excellence are multi-disciplinary, breaking down silos and encouraging teams to collaborate.

2014
Established the Melanie Munk Chair in Cardiovascular Surgery, which allowed the centre to retain the renowned cardiac surgeon Dr. Tirone David, and hire and retain a growing number of the world’s most highly-skilled doctors.

2017
$100-million
This landmark gift from Peter and Melanie Munk will fund and shape the future of cardiovascular care, not only in Canada, but globally. By investing in precision medicine, molecular medicine, genomics and the world’s most forward-thinking therapies, this unprecedented donation will transform how people with heart disease are diagnosed and treated. Above all, it will ensure that the Peter Munk Cardiac Centre continues to lead the world in discovery, innovation and patient care.

For more than 25 years, Peter and Melanie Munk’s generosity helped the Peter Munk Cardiac Centre become the pre-eminent hub for cardiovascular care and research in Canada. From their first donation in 1993 to their historic $100-million gift in 2017, the Munks continually stoked the fires of innovation at this remarkable institution.
A HEARTFELT THANK YOU

Peter Munk said it meant a great deal to him when family members of patients at the Peter Munk Cardiac Centre approached him out of the blue to share how the hospital had saved a loved one’s life. Here are some stories from individuals who are grateful recipients of the centre’s world-class cardiovascular care. They each faced the fear, pain and uncertainty of heart disease, and came out the other side with a new lease on life.

BY JORDANA FELDMAN

John Dickhout is a 55-year-old man with the energy of someone several decades younger. The Burlington, Ont., resident speaks with the projection of a stage actor, apt for a man who decided to plunge full-time into acting two years ago. His eyes well up with tears when discussing emotional subjects, and he has a range of unconscious habits – like angling sideways when engaging in conversation and twirling the silver Superman insignia ring on his left pinky.

In that last detail, there’s a profound link between subject and object. The ring once belonged to Adam Prashaw, a 22-year-old man from Kanata, Ont. And the heart giving Mr. Dickhout his high colour and boundless energy once belonged to Mr. Prashaw, too.

“I wear this to remind me that he’s my superhero,” Mr. Dickhout says. “The first time I met her, I felt I’d known her my whole life,” Mr. Dickhout says of Mrs. Prashaw. “She wasn’t so much focused on the event, or the ‘why.’ Her focus was on getting better and, ‘What do we do now?’”

In 2016, Mr. Dickhout received a call from the Peter Munk Cardiac Centre informing him they’d found a match. At the time, as per custom, he was given no information about his donor’s identity in order to protect the family’s privacy. The heart was a perfect match for him.

He’s since developed a “special friendship” with Mr. Prashaw’s family, Struggling to speak through tears, Mr. Dickhout recalls what Mr. Prashaw’s father wrote to him during their early correspondence. “Based on your enthusiasm and zest for life, we know our son’s heart is also the perfect match for you.”

One Saturday, Mr. Dickhout woke up in the middle of the night with a racing heart. He tried to control his breathing and eventually went back to sleep.

“Old depictions of heart attacks have people clenching their chest in agony and falling over, and that’s part of the challenge, because that’s what you expect. [But] that’s not what happened to me,” he recalls of the heart attack that nearly killed him that day.

Mr. Dickhout was immediately admitted to intensive care in the Philippines. His condition confounded his doctors, but they were clear about one thing: the otherwise perfectly healthy middle-aged man would need a heart transplant.

With costly private health care their only option in the Philippines, Mr. Dickhout and his wife moved back to Ontario, where he was referred to the Peter Munk Cardiac Centre. There, he was “extraordinarily fortunate” to land in the office of cardiologist Dr. Heather Ross, he says. Dr. Ross is Director of the Ted Rogers and Family Centre of Excellence in Heart Function and the Cardiac Transplant Program at the Peter Munk Cardiac Centre.

“They even confided in me that the donor’s family through the Ontario Trillium Foundation, who removed markers surrounding the hospital’s grounds and playing golf with other ex-pat friends on Sundays.

In 2013, Mr. Dickhout suffered a heart attack as a result of sarcoidosis, a rare disease that causes the immune system to turn on the body’s internal organs.

“Old depictions of heart attacks have people clenching their chest in agony and falling over, and that’s part of the challenge, because that’s what you expect. [But] that’s not what happened to me,” he recalls of the heart attack that nearly killed him that day.

Mr. Dickhout was immediately admitted to intensive care in the Philippines. His condition confounded his doctors, but they were clear about one thing: the otherwise perfectly healthy middle-aged man would need a heart transplant.

With costly private health care their only option in the Philippines, Mr. Dickhout and his wife moved back to Ontario, where he was referred to the Peter Munk Cardiac Centre. There, he was “extraordinarily fortunate” to land in the office of cardiologist Dr. Heather Ross, he says. Dr. Ross is Director of the Ted Rogers and Family Centre of Excellence in Heart Function and the Cardiac Transplant Program at the Peter Munk Cardiac Centre.

“They even confided in me that the donor’s family through the Ontario Trillium Foundation, who removed markers surrounding the hospital’s grounds.”

Several months post-op, Mr. Dickhout set up a social media account and contacted the family of the man whose heart he believed had ended up in his chest. Once he realized he wanted to know his donor’s identity, he plugged five or six “clues” from the letter into Google and pulled up an obituary for Mr. Prashaw. “I was sure it was him,” he says.

Taking a risk, Mr. Dickhout set up a social media account and contacted the father of the man whose heart he believed had ended up in his chest. Once he realized he wanted to know his donor’s identity, he plugged five or six “clues” from the letter into Google and pulled up an obituary for Mr. Prashaw. “I was sure it was him,” he says.

Several months post-op, Mr. Dickhout set up a social media account and contacted the family of the man whose heart he believed had ended up in his chest. Once he realized he wanted to know his donor’s identity, he plugged five or six “clues” from the letter into Google and pulled up an obituary for Mr. Prashaw. “I was sure it was him,” he says.

Taking a risk, Mr. Dickhout set up a social media account and contacted the family of the man whose heart he believed had ended up in his chest. Once he realized he wanted to know his donor’s identity, he plugged five or six “clues” from the letter into Google and pulled up an obituary for Mr. Prashaw. “I was sure it was him,” he says.

Several months post-op, Mr. Dickhout set up a social media account and contacted the family of the man whose heart he believed had ended up in his chest. Once he realized he wanted to know his donor’s identity, he plugged five or six “clues” from the letter into Google and pulled up an obituary for Mr. Prashaw. “I was sure it was him,” he says.

Taking a risk, Mr. Dickhout set up a social media account and contacted the family of the man whose heart he believed had ended up in his chest. Once he realized he wanted to know his donor’s identity, he plugged five or six “clues” from the letter into Google and pulled up an obituary for Mr. Prashaw. “I was sure it was him,” he says.

Several months post-op, Mr. Dickhout set up a social media account and contacted the family of the man whose heart he believed had ended up in his chest. Once he realized he wanted to know his donor’s identity, he plugged five or six “clues” from the letter into Google and pulled up an obituary for Mr. Prashaw. “I was sure it was him,” he says.
From the very start, it was going to be a bumpy ride. Keri-Lynn Kasaboski, because they thought I was going to die,” says Ms. Kasaboski. “I think they only allowed them to adopt me as a case occurrence of the time. Ken and Barbara Threlfall, an expat British couple with two adopted teenagers at home, took up the challenge. “My parents were in their 50s and, at the time, they exceeded the legal age, my heart, that caused her to lose consciousness. From a distance, it was going to be a bumpy ride. Kasaboski delivered safely – a healthy son born in 1999. But herJoy was short-lived. Realizing the vulnerability of her situation, Ms. Kasaboski developed complications and returned to the centre for support. “That’s when she met Dr. Erwin Oechslin, a man who would becomes instrumental in her recovery. Dr. Oechslin, Director of the Adult Congenital Heart Disease Program at the Peter Munk Cardiac Centre, looked after her in to see one of the hospital’s clinical psychologists with expertise in congenital heart disease, a resource that she says saved her life. “They had a program at the time that helped me, and it was the spark that started turning me mind from the dark place with all the things that had gone on in my life,” Ms. Kasaboski says. But circumstances led to more challenges, both psychological and physical, at the age of 42. A combination of family and workf X stress exacerbated her depression. She was overweight, unhappy and inactive, and it was clear she was done. She had reached my case.” So, when Ms. Kasaboski found herself pregnant at 28, she was shocked back into reality. “I’ll never forget when Patricia got up. Zola made her go upstairs,” says Mr. Church. “I apparently said to Patricia, ‘My elbows are sore,’” says Mr. Church, an athletic man with no medical history of heart problems, Mr. Church says that on the surface, his life hasn’t changed very much. “But really, I think it’s something to do with gratitude. My proximity to the Peter Munk Cardiac Centre saved my life.” Since his heart attack, Mr. Church has modified his exercise regimen and discovered the benefit of meditation. “I’m incredibly lucky to be living where I am,” says Mr. Church. “My proximity to the Peter Munk Cardiac Centre saved my life.”
Sharon Greer was in her 60s when her family doctor retired and was replaced by an enthusiastic young upstart near her North York, Ont., home. Although she complained of no medical ailments, the doctor wanted to make sure he was doing his job. “He said, I don’t know you, so let me run a whole bunch of tests so I can be familiar with what your problems are,” recalls Ms. Greer, who is now in her early 80s.

When he summoned the grandmother of two back into his office, her doctor didn’t mince words. “He said, ‘You’re a mess,’” says Ms. Greer. He immediately sent her to the Peter Munk Cardiac Centre.

Ms. Greer would spend more than a decade and 10 major surgeries sorting out that “mess.” Tests revealed Ms. Greer initially had a thoracic aneurysm, which had presented in her chest. Aneurysms of this type are a degenerative condition of the aorta that cause the artery to enlarge due to a weakness in the arterial wall. A ruptured aneurysm causes internal bleeding and can be fatal if blood leaks into the chest.

Ms. Greer was referred to Dr. Thomas Lindsay, vascular surgeon at the Peter Munk Cardiac Centre. He quickly assessed a series of complications in Ms. Greer’s case that would require him to assemble a team of fellow experts. “The problem is she also had a symptomatic hardening of the arteries in her neck, so before we could get to the main procedure, I had to clean the artery that goes to her brain to prevent a stroke and make sure the brain had maximal blood flow,” Dr. Lindsay says, noting she would also present with a thoracoabdominal aneurysm in her abdomen over the course of her treatment.

With a two-month recovery window, Ms. Greer returned to the Peter Munk Cardiac Centre for the next round. She would need an aneurysm repair, or a TEVAR. This is a spring-like device that’s inserted into the artery in a collapsed position and, once successfully positioned, gets expanded via X-ray control in order to cover over the aneurysm. While her body recovered from multiple serious operations, Ms. Greer recalls feeling nothing but optimism. “I didn’t go into one surgery being frightened, because I knew who was doing it and I had such confidence in them,” she says. “Everyone was so kind and good, and no one ever put me under stress.”

Dr. Lindsay returns the compliment, saying Ms. Greer’s sunny attitude made treating her a pleasure. “When patients are positive, it makes them easier to look after, it makes the whole process a whole lot smoother,” he says. “She’s a very delightful individual.”

Phelps integrated cardiovascular care, because every heart is unique.

As a proud supporter of the Peter Munk Cardiac Centre, Philips is committed to working together to stretch convention and inspire innovation. At Philips, we strive to bring new cardiovascular solutions to providers and patients at UHN and around the world. There’s always a way to make life better.
A DAY IN THE LIFE OF THE PETER MUNK CARDIAC CENTRE

It takes more than world-class surgeons and researchers to create a centre of exemplary patient care. Behind the scenes and on the front lines are medical professionals striving every day to ensure an exceptional patient experience. Working early in the morning and late into the night, here are some of the many dedicated individuals who make up the Peter Munk Cardiac Centre family.

BY MIRJAM GUESGEN

STARTING THE DAY WITH A PLAN

It’s 9 a.m. at the Peter Munk Cardiac Centre, and close to 25 people are crowded into a room not much bigger than most office break rooms. They wear the uniforms affiliated with the many different roles at the hospital: nursing, housekeeping, medical residents, physiotherapy and social work. Standing in one corner overseeing it all is Linda Flockhart, Clinical Director at the Peter Munk Cardiac Centre.

The hospital implemented these daily “huddles” a little over a year ago. It is a chance for all the staff working in a particular unit to come together and plan for the next 24 hours and anticipate any issues that may arise. The huddles happen throughout the centre each morning, with the manager of each unit feeding the most vital information to Ms. Flockhart on a 9-10 a.m. phone call.

Put simply, Ms. Flockhart’s job is to realize the organizational goals and vision of the Peter Munk Cardiac Centre. As Clinical Director, she is tasked with managing the centre’s $100-million budget, making sure her staff has the tools to do their job and working with physicians to support their initiatives. “Within reason,” she says with a laugh.

Before stepping into management roles, Ms. Flockhart was a critical care nurse on the front lines of patient care. Her passion for her patients never waned – she’s just able to influence patient care in a different way now. “I think I always was vocal in wanting to change the system and speak up, so this role gives me that opportunity,” she says.
THE GUARDIAN ANGEL

Titi Manning-Atwell is nimbly working on patient Jason Sun’s foot wounds – wiping the foot with iodine, cutting up a specialized fabric embedded with silver and shaping dressings to perfectly fit the contours of his arch. “This is the part where he’s looking good and he can go away into the sunset,” she says.

Ms. Manning-Atwell is a chiropodist, a medical professional who works on all aspects of foot health, from gait analysis to orthotics to treating diseases or ulcers of the foot. The majority of her patients have issues with their vascular system, the blood vessels outside the heart. When blockages occur in the vessels of the body, wounds farthest away from the heart, like the foot, may not heal as quickly because they are not supplied with enough blood. The Peter Munk Cardiac Centre Vascular Program is a one-stop shop for patients to have their condition diagnosed, be seen by a surgeon, be given a treatment plan and have their wounds healed.

A veteran in the field of chiropody for more than 42 years, Ms. Manning-Atwell gets the most difficult cases. “I tend to get them when they’ve been everywhere else and they’re told they have to have their leg amputated and there’s nothing anybody else can do,” she says. “I always tell my boss, ‘This is the limb-salvage clinic.’” Her patients call her their guardian angel.

CHOOSING LIFE OVER LEG

In a nearby, dimly-lit room, ultrasound technologist Susan Ungaro is skillfully maneuvering a transducer probe over patient Jerry Paquet’s leg. Mr. Paquet’s heart beats pulses on the screen, making a “wowwow” sound with every beat and a rushing, river-like sound when Ms. Ungaro moves the probe to a vein.

Cindy Dickson, the Vascular Clinic’s sole nurse, explains that Mr. Paquet is being checked into the centre’s Vascular Unit today, a process that involves checking his arteries and veins for any blockages. Fortunately, he is in the clear.

Ms. Dickson joined the foot and wound clinic 12 years ago, so she has seen people from all walks of life at all stages of their disease. Treatment could mean a change of lifestyle (like quitting smoking), vascular surgery or, in rare cases, amputation. Ms. Dickson admits no one wants to have their limb removed, but this option can result in patients feeling markedly better after months of excruciating pain.

“It’s like a new outlook on life. They’re choosing life over leg,” she says.

LEARNING THE ROPE

When a new treatment or procedure is introduced to the hospital, most people only see the final result: the patient success stories. What is often invisible are the hours of training that nurses and surgeons do to prepare.

Outside the operating room, Rebecca Collier-Doyle is already in her scrubs, wearing a cap with blue and green mandala designs. Ms. Collier-Doyle has been tasked with bringing cardiac nurses up to speed with the transcatheter aortic valve implantation, or TAVI, procedure.

TAVI allows high-risk patients to undergo valve replacement surgery without opening up their chest. A replacement valve is inserted through a small incision in the leg and guided up to the heart through a main artery. It can cut operating time from six hours down to 90 minutes and speeds up recovery time because the incisions are so small, and the patient can remain awake.

That by no means makes it a simple procedure to learn, says Ms. Collier-Doyle. “It’s intense in a different way [than open heart surgery].”

Today, she is training operating room nurse Hanishy Pabies to set up for a TAVI procedure. To the untrained eye, many of the instruments laid out for this procedure look the same. Part of Ms. Collier-Doyle’s role as a clinical support nurse is to create resources to assist the nurses in their learning. One of those resources is a binder containing each of the main pieces of equipment used in the TAVI procedure, so her nurses can see, touch and manipulate them before entering the operating room.

Learning how TAVI works and the instruments needed make up only a small part of the training. Up to four patients are wheeled in and out of the operating room in a single day. That leaves little time for cleaning and setting up between procedures, and even less time for breaks.

“It’s a push,” Ms. Pabies says with a sigh. Knowing what to prioritize, like having the equipment laid out and counted, is key. A sip of coffee at the beginning of a sometimes 12-hour day also helps.
SALVING LIVES TO CREATE NEW ONES
ADDY MURCHIE

Addy Murchie is having a mid-pregnancy checkup for her third child at the Peter Munk Cardiac Centre’s Adult Congenital Heart Disease Pregnancy Clinic, a program that runs in partnership with the Mount Sinai Hospital Prental Care Program. As Ms. Murchie discusses her health with her physician, Dr. Rachel Walz, the conversation is punctuated with laughter from her healthy son and daughter, and toys being boisterously thrown around the room. “Sometimes it’s a little crazy coming in,” she admits.

Ms. Murchie is a clinic success story. She was born with a coarctation of the aorta, or a narrowing of the main artery that pumps blood from the heart to the rest of the body. She says all her pregnancies have gone smoothly and she credits the clinic for that.

Ms. Murchie’s husband, Nick, notes that although they live in Port Hope, Ont., which is over an hour from Toronto, “it’s worth it for the help we get here. You never know what can happen.”

It’s nearing the end of the day, and Jessica Pereira is at the Peter Munk Cardiac Centre for a checkup. Ms. Pereira is engrossed in a music video by Selena Gomez, her favourite singer. The annual visits are sometimes tedious for Ms. Pereira, so her mother carries her smartphone with her favourite shows and music on it.

Ms. Pereira has Down syndrome and an atrioventricular septal defect, or holes in the heart. She attends the Dalglish Family 22q Clinic, a specialized clinic geared toward patients with special needs. The clinic is about Ms. Pereira’s mother, Maria, it is comforting to know that her daughter is looked after by experts who care. “It’s a very positive feeling when she comes,” she says. “If I know she’s comfortable, then I know they’re treating her [well] and they’re looking after her the best they can.”

For Ms. Pereira’s mother, Maria, it is comforting to know that her daughter is looked after by experts who care.

It’s been a long road for Ms. Pereira, who was born in the upper room of a Toronto hospital because her mother was in labour in the lower room. "I realized how integrated Peter's thinking has become in the way we run the heart centre," Dr. Rubin says. "It's a very positive feeling when she comes," she says. "If I know she's comfortable, then I know they're treating her [well] and they're looking after her the best they can.*"
In recovery, he visited her every day, including weekends,” she says. “I had thought of him as a cool-and-two-white-shirt-kind of guy, yet he showed up on the weekend in a baseball cap. I almost didn’t recognize him.”

“Dr. Rubin is so kind that years ago, he gave up a full face protector for karate,” says Dr. Robert Ginzberg, a vascular surgeon. “He had a full face protector on) and broke a knuckle. But one day during a sparring match, he had studied the martial art for seven years and achieved a second-level brown belt. But they have no interest in medical careers themselves, he says. “Given the hours they saw me come home late, working nights and weekends, I think that went into their decision.”

“It’s so dedicated that years ago, he gave up one of his few outside hobbies, karate. He had studied the martial art for seven years and achieved a second-level brown belt. But one day during a sparring match, he punched an opponent in the face (who had a full face protector on) and broke a knuckle. “I thought it wouldn’t be good to be a surgeon with mangled hands,” he says. In reflecting back on his career, Dr. Rubin again cites Peter Munk. He shares one of the lessons learned from his mentor: “He said we should be bold, we should be fearless.”

“Dr. Rubin is so kind that years ago, he gave up a full face protector for karate,” says Dr. Robert Ginzberg, a vascular surgeon. “He had a full face protector on) and broke a knuckle. But one day during a sparring match, he had studied the martial art for seven years and achieved a second-level brown belt. But they have no interest in medical careers themselves, he says. “Given the hours they saw me come home late, working nights and weekends, I think that went into their decision.”
One size does not fit all

What if your health care could be tailored to your own biology and lifestyle? That’s precision medicine. Through the development of a “massive data lake,” the Peter Munk Cardiac Centre is aggregating the health information of thousands of patients across Ontario and taking the first step in making precision cardiology a reality.

Barry Rubin has a vision. The Medical Director and Chair of the Peter Munk Cardiac Centre imagines a day when a patient comes in, has an oral swab taken and has their entire genome sequenced in an hour. That, together with data about their lifestyle, weight and blood pressure, is integrated into a complete patient profile, along with all of their imaging studies, such as ultrasounds and x-rays. The profile is then used to create a personalized treatment plan, and a computer algorithm automatically predicts treatment success and chances of readmission.

“It will be totally different,” he says of patient care in the future. “In 10 years, I think we’ll be unrecognizable in how we work.”

Dr. Barry Rubin

The precision medicine approach has been applied primarily in the field of oncology, but Dr. Rubin and others at the Peter Munk Cardiac Centre see heart disease as its next frontier. As part of the strategic vision for the centre, doctors and data scientists are coming together to realize the possibility of one day providing individualized care for their patients. Their efforts will not only mean a better match between patient and treatment, but also the potential to detect diseases earlier.

“Creating a ‘lake’ of data,” Rubin explains, “is the first step.” The patient’s genome is the first piece of the puzzle, but Dr. Rubin and others at the centre have access to other data, including millions of medical records, clinical research, imaging studies, even social media posts.

“We think we’re as secure as we can possibly be because we’ve integrated privacy considerations into the actual construction of the platform,” Dr. Rubin says.

A TRIP INTO THE MATRIX

Dr. Heather Ross, cardiologist and Director of the Ted Rogers Family Centre of Excellence in Heart Function and the Cardiac Transplant Program at the Peter Munk Cardiac Centre, led the development of the digital platform alongside her colleague Dr. Cedric Manlhiot, Director of the Cardiac Transplant Program at the Ted Rogers Centre. Dr. Ross, who holds the Loretta A. Rogers Chair in Heart Function, says the first-time data streams into the lake was a “real wow” moment.

“It was like The Matrix,” she recalls, referring to the famous 1999 sci-fi film. “All this information was coming in, but you had to know how to read it. That’s when I knew (precision cardiology) was possible.”

Dr. Ross is involved in many of the Peter Munk Cardiac Centre’s research projects, which aim to harness the power of artificial intelligence to “find patterns in the chaos,” as she puts it. The centre has already partnered with one of Canada’s AI leaders, the Vector Institute for Artificial Intelligence, a Toronto-based, independent, not-for-profit corporation dedicated to excellence in this area. The Peter Munk Cardiac Centre is planning to hire a team of AI specialists in-house, in collaboration with the Vector Institute.

The hope is that any physician or surgeon at the Peter Munk Cardiac Centre will be able to access the expertise of the AI group to investigate factors they think could make a difference in the efficacy of patient treatment.

PREDICTING THE BEST TREATMENT FOR EACH PATIENT

Genes have played a prominent role in oncology in the quest for subpopulations, but Dr. Patrick Lawler, a cardiologist who leads the Molecular Epidemiology and Precision Medicine Group at the Peter Munk Cardiac Centre, says biomarkers may be better indicators in cardiology.

“Biomarkers are measurable substances or characteristics in the body that may indicate disease, such as proteins or enzymes. For example, blood cholesterol is a well-known biomarker for risk of heart disease.”

For that reason, much of the effort in bringing precision medicine to cardiology has focused on developing a way to bring all available data for many patients together in one place at one time. Thanks to generous support from the Rogers Foundation and from the Peter and Melanie Munk Charitable Foundation, doctors at the Peter Munk Cardiac Centre have developed a Digital Cardiovascular Health Platform. This platform – a digital repository storage that holds a vast amount of data until needed – draws together more than 40 databases with information from thousands of patients across Ontario, in real time.

Some of those databases include the Ontario Laboratory Information System, which tracks patients’ blood test results, the Canadian Institutes for Health Information Database, which tracks patient outcomes, and data from the Peter Munk Cardiac Centre’s own Cardiovascular Biobank, a physical repository containing more than 50,000 blood and tissue samples. After they provide consent, each new patient admitted to the centre will automatically have their data added to the data lake.

To ensure patient privacy, the digital platform was developed in consultation with the Privacy Office at University Health Network and the Information and Privacy Commissioner of Ontario.

“We think we’ve as secure as we can possibly be because we’ve integrated
Understanding the mechanisms of disease

Although cardiologists have a good understanding of how cancers, diseases or disorders manifest themselves and how to treat them, the genetic or molecular mechanisms underlying those diseases still need to be elucidated. Having the ability to analyze large amounts of data using artificial intelligence opens a world towards better understanding.

Dr. PHILIP BILLIA, cardiologist, Peter Munk Cardiac Centre Research Lead and Co-Director of the Peter Munk Cardiac Centre Cardiovascular Biomedical Informatics, explains: “Dr. Arthur stability will (enable us) to develop a better understanding of pathogenesis, or what underlies the disease, until we have a better understanding of the heart disease process, we are unable to target the genetic problem.”

Finding or developing the right treatments

Once cardiologists know the underlying cause of a disease, they are better able to tailor treatments to subgroups based on their disease profile or lifestyle attributes.

Dr. VIVEK RAO, head of the division of vascular surgery at the Peter Munk Cardiac Centre and the Peter Munk Cardiac Centre Chair in Advanced Cardiovascular Therapeutics, hopes to use precision medicine to get to a dosage that works. Dr. Rao knows to find the genetic basis of a low dosage after surgery, and that dosage is gradually increased over time until the medication has the desired effect. But some people are sensitive to the medication and cannot take a high dosage, with resistance, so that his patients can get the right dosage right away.

Dr. THOMAS FORBES, division head of vascular surgery at the Peter Munk Cardiac Centre and the Peter Munk Cardiac Centre Chair in Advanced Cardiovascular Therapeutics, says the way forward is to emphasize how new data is fed into a computer program that works like artificial intelligence.

“Ultimately it’s patients who decide they’re going to come back to hospital,” he explains. “If a patient is not feeling well at home, and we’re able to ask a doctor earlier using data collected and entered by the patient, then we’re probably better able to anticipate the treatment of the patients and recommend something up in the hospital. That’s a missing link that hasn’t been there before.”

Better risk assessment

Dr. DINESH THAVENDIRANATHAN, cardiologist and the Heart Failure and Function Outcomes at the Peter Munk Cardiac Centre, is working to predict the chances of readmission to hospital following treatment by analyzing patients’ perspectives in addition to traditional medical and biological data. His team will utilize patient-reported outcomes and the language patients use during conversation exchange with their healthcare professionals (called cardiaco-linguistics). Combined with other measures, such as new biomarkers and machine learning, this could be a better predictor than what’s currently available. “Ultimately it’s patients who decide they’re going to come back to hospital,” he explains. “If a patient is not feeling well at home, and we’re able to ask a doctor earlier using data collected and entered by the patient, then we’re probably better able to anticipate the treatment of the patients and recommend something up in the hospital. That’s a missing link that hasn’t been there before.”

Better risk assessment

Dr. DINESH THAVENDIRANATHAN, cardiologist and the Heart Failure and Function Outcomes at the Peter Munk Cardiac Centre, is working to predict the chances of readmission to hospital following treatment by analyzing patients’ perspectives in addition to traditional medical and biological data. His team will utilize patient-reported outcomes and the language patients use during conversation exchange with their healthcare professionals (called cardiaco-linguistics). Combined with other measures, such as new biomarkers and machine learning, this could be a better predictor than what’s currently available. “Ultimately it’s patients who decide they’re going to come back to hospital,” he explains. “If a patient is not feeling well at home, and we’re able to ask a doctor earlier using data collected and entered by the patient, then we’re probably better able to anticipate the treatment of the patients and recommend something up in the hospital. That’s a missing link that hasn’t been there before.”

Better risk assessment

Dr. DINESH THAVENDIRANATHAN, cardiologist and the Heart Failure and Function Outcomes at the Peter Munk Cardiac Centre, is working to predict the chances of readmission to hospital following treatment by analyzing patients’ perspectives in addition to traditional medical and biological data. His team will utilize patient-reported outcomes and the language patients use during conversation exchange with their healthcare professionals (called cardiaco-linguistics). Combined with other measures, such as new biomarkers and machine learning, this could be a better predictor than what’s currently available. “Ultimately it’s patients who decide they’re going to come back to hospital,” he explains. “If a patient is not feeling well at home, and we’re able to ask a doctor earlier using data collected and entered by the patient, then we’re probably better able to anticipate the treatment of the patients and recommend something up in the hospital. That’s a missing link that hasn’t been there before.”

Better risk assessment

Dr. DINESH THAVENDIRANATHAN, cardiologist and the Heart Failure and Function Outcomes at the Peter Munk Cardiac Centre, is working to predict the chances of readmission to hospital following treatment by analyzing patients’ perspectives in addition to traditional medical and biological data. His team will utilize patient-reported outcomes and the language patients use during conversation exchange with their healthcare professionals (called cardiaco-linguistics). Combined with other measures, such as new biomarkers and machine learning, this could be a better predictor than what’s currently available. “Ultimately it’s patients who decide they’re going to come back to hospital,” he explains. “If a patient is not feeling well at home, and we’re able to ask a doctor earlier using data collected and entered by the patient, then we’re probably better able to anticipate the treatment of the patients and recommend something up in the hospital. That’s a missing link that hasn’t been there before.”
Commitment
The changing cardiac surgery landscape is challenging. We understand that—and with our breadth and depth of products and people, we can provide solutions for the complex healthcare environment.

In his 40-year career, Dr. Tirone David has performed thousands of surgeries, developed pioneering surgical procedures and saved countless lives. He’s one of the most influential cardiac surgeons in the world—and he’s not done yet.

Imagining holding a person’s broken heart in your hand, then being forced to improvise an unprecedented technique for its repair. For most cardiac surgeons, this would be a non-starter. For Dr. Tirone David, overcoming seemingly impossible surgical hurdles became his clinical calling card.

“I find the challenge never dies,” the renowned cardiac surgeon says from behind the desk of his office at the Peter Munk Cardiac Centre at Toronto General Hospital. “I’m fighting a disease that never dies. I’m trying to resolve a problem.”

Over the course of a more than 40-year career, Dr. David, who holds the Melanie Munk Chair in Cardiovascular Surgery, has contributed more to the resolution of deadly heart conditions than almost any other cardiac surgeon in the world. By his own estimate, he has performed open-heart surgeries on more than 15,000 patients, with a success rate of close to 100 per cent. Dr. David has published more than 350 scientific papers and, when pressed, humbly allows that he has developed approximately 16 to 17 life-saving surgical procedures to treat heart disease—some perfected from other surgeons’ innovations, but mostly his own.

Of his earliest days in the operating room, the 73-year-old says, “The passion was incredible. I could do an operation much faster than my peers.” Instead of doing two surgeries in a single day, as would be standard for most surgeons, Dr. David was able to perform four or five. In his prime, he says he was able to manage about 300 patient cases per year, or about double his current workload.

“He’s had probably the biggest influence in cardiac surgery around the world for the last 30 years,” explains Dr. Michael Borger, Director of Cardiac Surgery at the Leipzig Heart Center in Leipzig, Germany. Dr. Borger studied and worked under Dr. David in Toronto at the start of his career, and credits that time with helping to advance his own understanding of complex surgical procedures.

Dr. Borger points to procedures such as the pioneering David Operation—also known as aortic valve-sparing operation—as an example of Dr. David’s surgical prowess at work. The procedure was developed to overcome challenges stemming from aortic root aneurysms that are common in younger patients with genetic ailments, such as Marfan syndrome, but without the use of artificial aortic valves.

“Basically, through Dr. David’s operation, you can get these people back on a life expectancy comparable to other people their own age without worrying about the long-term consequences of an artificial valve,” Dr. Borger says. “He
In 1978, he was earning $15,000 a year when he was prowess spread, offers poured in from across the U.S. for a socialist kid in 1975, that was heaven. It was General Hospital. 1975 to train in cardiac and thoracic surgery at Toronto his wife, Jacqueline. Then he made his way to Toronto in the wealthiest of the country’s 1 per cent – where he met to provide medical care to the masses. He worked for a doctor,” Dr. David recalls. “I was reluctant, but I was with his three daughters from construction supply company. His was so conflicted that he couldn’t sleep at night as he laboured over his next move. He called an old mentor in search of advice. Indeed, crowning Dr. Tirone David a legend in his field would still of thousands of patients around the world.”, Image 195x414 to 648x743

A LEGACY OF COMPASSION Having devoted his life to the care of others, Dr. David scholar.” “I know one day I’ll begin to fail, but nobody else will know me. I’ll walk away,” he says.

Such talk begs the question of his legacy. How best to reflect on Peter Munk’s commitment to advancing cardiac research in Canada. The visionary business magnate, and it was there that the foundation for a Dr. David now spends at least of a damaged mitral annulus – a problem common in patients with heart failure. But his socialist political leanings would soon steer his career northeast. His eldest, at three years old, enjoys demonstrating his cycling again and again. How, for example, did he manage to spend time with his daughters? As any specialist physician in this country can attest, the demand on a long day of patient appointments. “When I see patients, I try to be reassuring. Not to paint a rosy picture, but show the positive side and serve them he says. “You’re a teenager. And you’re not always happy with your father’s decisions, or your father’s wishes. I know but me. I’ll walk away,” he says.

Such talk begs the question of his legacy. How best to reflect on Peter Munk’s commitment to advancing cardiac research in Canada. The visionary business magnate, and it was there that the foundation for a Dr. David now spends at least of a damaged mitral annulus – a problem common in patients with heart failure. But his socialist political leanings would soon steer his career northeast. His eldest, at three years old, enjoys demonstrating his cycling again and again. How, for example, did he manage to spend time with his daughters? As any specialist physician in this country can attest, the demand on a long day of patient appointments. “When I see patients, I try to be reassuring. Not to paint a rosy picture, but show the positive side and serve them he says. “You’re a teenager. And you’re not always happy with your father’s decisions, or your father’s wishes. I know but me. I’ll walk away,” he says.

Such talk begs the question of his legacy. How best to reflect on Peter Munk’s commitment to advancing cardiac research in Canada. The visionary business magnate, and it was there that the foundation for a Dr. David now spends at least of a damaged mitral annulus – a problem common in patients with heart failure. But his socialist political leanings would soon steer his career northeast. His eldest, at three years old, enjoys demonstrating his cycling again and again. How, for example, did he manage to spend time with his daughters? As any specialist physician in this country can attest, the demand on a long day of patient appointments. “When I see patients, I try to be reassuring. Not to paint a rosy picture, but show the positive side and serve them he says. “You’re a teenager. And you’re not always happy with your father’s decisions, or your father’s wishes. I know but me. I’ll walk away,” he says.
The next evolution of the Peter Munk Cardiac Centre

Home to many world firsts, the Peter Munk Cardiac Centre has changed the way patients with heart and vascular diseases are treated here in Canada and around the globe. But they’re far from done. In the next stage of evolution, the aim is to become the world’s leading heart and vascular centre. Here’s how the Peter Munk Cardiac Centre is going to get there:

DEVELOP A WORLD-CLASS DIGITAL CARDIOVASCULAR HEALTH PLATFORM

All patient information will be securely integrated under a single digital platform, or “data lake.” The platform will include clinical notes, blood tests, pathology results, imaging studies, genetic information and more – all while maintaining the highest degree of data security – and will build on work initiated through the Ted Rogers Centre for Heart Research.

Worldwide, the healthcare industry is significantly behind in digitizing information, and the Peter Munk Cardiac Centre is beginning the evolution of digitizing patient information to inform patient care.

GENERATE NEW KNOWLEDGE THROUGH MORE FIRST-IN-HUMAN STUDIES AND CLINICAL TRIALS

Clinical trials are crucial to the development of new therapies for cardiovascular disease. They provide the real-world evidence needed to determine how successful therapies will be outside of the lab. A new Clinical Trials and Translation Unit will dramatically increase the number of clinical trials that are led by the Peter Munk Cardiac Centre. Research will focus on areas of strength, such as heart failure, adult congenital heart disease (patients born with structural heart disease), cardiovascular imaging and novel device evaluation.

EXPAND AND STRENGTHEN THE PETER MUNK CARDIAC CENTRE’S PRECISION CARDIOVASCULAR MEDICINE PROGRAM

Precision medicine is the key to finding the right treatments for the right people. By harnessing the valuable information in the “data lake,” researchers can identify similarities between patients and tailor treatment like never before. Predictive modelling will improve the early detection of heart disease, increase the accuracy of diagnoses and tailor treatments to patients’ individual characteristics. To lead this precision medicine revolution into the future, the centre will build a top-flight team of clinician scientists to solve the mysteries of genetics and heart disease.

DRIVE MEDICAL INNOVATION AND QUALITY

At the root of all initiatives at the Peter Munk Cardiac Centre is a commitment to constantly improve diagnoses, care and outcomes for patients. One important initiative is participation in international quality assessment databases to benchmark the centre’s performance against leading cardiac centres across North America. The Peter Munk Cardiac Centre will be the first in Canada to participate in the National Cardiovascular Data Registry, the Vascular Quality Initiative and the Society for Thoracic Surgery databases, allowing the centre to compare the outcomes of the 163,000 patients they treat every year with millions of patients in the United States.

Uncompromising tax advice. Tailored to your needs.

Thorsteinssons is proud to support the Peter Munk Cardiac Centre and to share in their vision of integrating excellence into every aspect of client care.
We pride ourselves on being the hospital that introduces new technologies to the country’s healthcare system,” says Dr. Yvonne Kao, head of the division of cardiovascular surgery at the Peter Munk Cardiac Centre and the Peter Munk Cardiac Centre Chair in Advanced Cardiac Therapeutics. When it comes to bringing broken hearts back from the brink, the Peter Munk Cardiac Centre is a global leader.

The Peter Munk Cardiac Centre is a go-to proving ground for the latest devices that are rapidly changing the treatment of heart disease. It’s often on the short list when industry partners seek to test new devices on patients who often have no other safe, viable therapy alternatives.

Call it the cutting-edge technology that can reduce the “cutting” involved in surgery. “The device field is rapidly evolving as the technology improves, and even three to four years a new device is introduced into the market,” says Dr. Rao.

New devices tested at the centre save lives. They also transform what were once major surgeries into safer procedures, involving smaller incisions and less recovery time.

These game-changing devices are welcome additions to health providers’ toolkits across many disciplines of acute cardiovascular care, including these three key areas.

**VALVE REPLACEMENTS**

Surgery matters when it comes to getting the latest technologies to treat valvular problems. In the case of the Peter Munk Cardiac Centre, it helps to be big.

“Because of our size and volume – being in Toronto – we have access to a lot of technologies before they’re used. ‘Cutting-edge’ is the term to use, meaning we can fit a patient with the right device,” says Dr. Rao.

New devices can not only travel up a blood vessel into the heart, they also fit more perfectly within the heart, like a bespoke suit, resulting in less leakage and a longer lifespan.

Dr. Horlick points to new imaging technologies combining magnetic resonance imaging (MRI) and computed tomography (CT) scan modalities that create three-dimensional, highly accurate copies of a patient’s heart. Using 3D printing technology in a facility at the Peter Munk Cardiac Centre, cardiac teams can construct an exact, life-sized model of a patient’s heart that they can hold in their hands.

“This allows us to ensure the replacement valve is a perfect fit,” he says, adding they can literally place the valve within a three-dimensional model. “Our team of cardiologists and surgeons have carefully and meticulously refined the process of choosing the right size and type of valve for the right patient, and that gives these confidence and piece of mind when we offer TAVI [transcatheter aortic valve implantation] to our patients.”

Altogether, these advances have made procedures safer and more effective, Dr. Horlick says.

What used to involve a large incision in the chest, splitting open the rib cage, for five to 10 days in hospital and about six weeks of recovery can now be done in about half an hour. And the patient can often go home the next day.

“Think of it from the patient’s perspective,” Dr. Horlick adds. “Who would want to have surgery if this alternative would work? Who would want to have surgery if this alternative is available?”

**TREATING AORTIC ANEURYSMS**

For more than a decade, the Peter Munk Cardiac Centre has been revolutionizing treatment for aortic aneurysms. Essentially a thinning of a section of the wall of the aorta, an aneurysm can burst without treatment leading to fatal hemorrhaging.

Says Dr. Thomas Forbes, division head of vascular surgery and chair of the Peter Munk Cardiac Centre involving next generation replacement and repair devices used to treat aortic aneurysms – the narrowing of the vessel of the main artery entering the heart.

“It’s a common problem we see as people get older,” Dr. Horlick says. In the past, valve replacements would involve major surgery, and were often not a good option for elderly patients.

But the latest heart valve to treat this condition can fit through all but the smallest arteries using a catheterization procedure. Catheterization means inserting the device through a vessel in the neck or leg and up to the heart.

“When we started this 10 years ago, we were one of the first centres in the country doing catheterization procedures,” he says. “At the time, it was so unbelievable to shave a rather large valve up someone’s leg, so it was only done in the highest risk people with no other options.”

Now, new devices can not only travel up a blood vessel into the heart, they also fit more perfectly within the heart, like a bespoke suit, resulting in less leakage and a longer lifespan.

“Correspondingly, the procedure was a longer wait, and those elderly people, so the cure could be worse than the disease,” Dr. Rao says. “But may we would not have the procedure.

Enter fenestrated (or branched) stent grafts that can be personalized to fit the vessel structure of the individual patient. Similar to stents used in catheterization procedures to unblock coronary arteries in heart attacks, these devices are made from stainless steel mesh frameworks. Only aortic stent grafts are larger, about two to three centimetres in diameter, as opposed to a few millimetres. And unlike coronary artery stents, aortic stent grafts’ metallic frame on rapidly aortic vessel structure.

Rather than holding open a narrowing vessel, it relines the aorta to protect against rupture and bleeding,” Dr. Forbes says.

The procedure has been fine-tuned by the centre over several years, and the results have improved as a result. Today, they are more reliable, more customizable to the patient and, perhaps most importantly, smaller. Again, the move toward greater miniaturization has opened the procedure up to more patients, especially women.

“In the past, we were not able to repair aneurysms in women with this therapy, because they had small blood vessels,” Dr. Forbes says.

Surgery still occurs to treat aneurysms today, he adds, but it is much rarer.

Of course, notes Dr. Forbes, “the least invasive procedure is prevention.”

The Peter Munk Cardiac Centre is involved in ground-breaking research on this front too, carrying out basic research to understand how aneurysms form so that one day, pharmacological treatments could treat them rather than just wait for an aneurysm to rupture.

“We’re a ways off,” Dr. Forbes says. “But we’re always looking at different ways to transform the treatment paradigm.”

**ARTIFICIAL HEARTS**

The Peter Munk Cardiac Centre is one of Canada’s top centres for heart transplants – a last-ditch option for patients with severe heart failure. But many patients are considered too sick for a donor heart. As well, other options may not be suitable for the most invasive of cardiac procedures.

That’s why since the early 2000s, the centre has been at the forefront of procedures involving left ventricular assist devices (LVADs) – essentially the technical term for an artificial heart.

Working with industry leaders, the centre was among the first hospitals in the world to implant the earliest version of the device in a patient with heart failure – whose organ could not anymore adequately pump blood throughout the body.

After years of testing and implanting new-and-improved iterations of LVAD technology, another new device is on the horizon, called a miniaturized ventricular assisted device. The size of a AA battery, it will be the smallest artificial heart device yet.

“It’s a very different kind of surgery to do a much more rapid fashion, and with a less invasive procedure so that people who are elderly and frail and may not tolerate an operation to implant an [LVAD] may now have a viable option,” Dr. Rao says.

Many, many time will tell if the next generation of devices improves outcomes and expands care options for patients who may not be good candidates for other therapies.

And that’s just fine with Dr. Rao and the clinical care team at the Peter Munk Cardiac Centre. After all, they see themselves as the gatekeepers for new innovations, helping to determine whether they increase safety and efficacy of treatment. “Or are they very expensive toys you would like to have on your shelf, but they don’t provide a cost-effective solution?” Dr. Rao says.

“In that respect, we’re not just clinical implanters of the latest devices; we’re scientists evaluating the benefits of new technology.”

---

**GAME-CHANGING DEVICES**

[Image 493x66 to 649x811]

**PETER MUNK CARDIAC CENTRE**

---

**SAPION SAPIEN 3 valve by Edwards**

**HeartMate 3 LVAD photo courtesy of Abbott Medical Devices**

WINTER 2019
The Peter Munk Cardiac Centre is well into what Dr. Robin calls its Discovery Program – ongoing research and breakthroughs that go back more than 80 years at Toronto General Hospital and University Health Network, before the Peter Munk Cardiac Centre was established in 1993 through donations led by the late Peter Munk and his wife, Melanie.

For example, researchers are mapping single cells in unprecedented detail and exploring the potential of stem cells to support heart repair. They are using ever-more detailed imaging to treat patients with less intervention and more precision. And they’re making strides in areas ranging from immunology to genetics.

This is the future of discovery at the Peter Munk Cardiac Centre and the world-class researchers who are driving it.

PROBING THE MYSTERIES OF GENETICS

Could doctors predict who will develop heart disease and who will not? While environment and lifestyle are always factors, some heart disease is genetic and inherited, says Dr. Robin Kim, the Cardiogenomics Leader of the Cardiac Genome Project at the Ted Rogers Centre for Heart Research, which spans the Peter Munk Cardiac Centre, The Hospital for Sick Children and the University of Toronto.

“Naturally, those families with a history of heart disease would want genetic testing for the one particular gene that may be the cause,” Dr. Kim says. But up until about five years ago, that kind of genetic testing was not easily available because of a hefty cost. It would cost about $1,000 per gene and take about three months for the results to come back. An unrealistic proposition, since there are upwards of 25,000 genes in the human genome.

“The breakthrough is that now, testing all 20,000–25,000 genes – not just one – costs just $2,000 and takes about three months for everything,” Dr. Kim says. “It took 20 years and $3 billion to map the human genome. Now we have terabytes of information.”

Dr. Kim says he and his team are now using that information, with the goal of finding out more about the relationship between genetic disorders and heart disease. Ultimately, those relationships could lead to doctors being able to gain more insight into who will develop heart disease in future.

The biggest obstacle to the next phase of this discovery breakthrough is not technology. Dr. Kim adds, “It’s computational power, and our understanding of the actual biology of the gene. But the challenges ahead. Dr. Kim has high hopes for his field.

“Heart disease has one of the highest yields for new discovery, so it’s a good place to be,” he says.

BREAKTHROUGH IN BRUGADA SYNDROME

We’ve all read the tragic stories about young people who’ve been struck down suddenly by heart problems, before anyone knew there was a problem.

Brugada syndrome is a condition that can result in those kinds of tragedies. It’s a potentially dangerous heart rhythm disorder that affects one in 2,000 people and sometimes runs in families. People with the syndrome have an increased risk of sudden cardiac death from the lower chambers of the heart, and it’s also associated with the risk of sudden arrhythmic death.

When it comes to disorders like this, finding a genetic link could be a crucial step in preventing sudden, life-threatening cardiac events. It’s an area of study that Dr. Michelle Gollob is passionate about.

Until recently, scientists thought that some 21 genes were connected to Brugada syndrome. But a new study, led by Dr. Gollob, a cardiologist and the Peter Munk Chair in Molecular Medicine, found that only one genetic gene – the SCN5A gene – has a definitive association with the syndrome.

The study findings could dramatically alter how Brugada syndrome is diagnosed and treated in the coming years. "Remarkably, 20 to 25 percent of people previously believed to be causes for Brugada syndrome have been shown in our study to have any evidence to support this belief," says Dr. Gollob, who published the findings in June in Circulation, the journal of the American Heart Association.

“This has huge implications to our approach of genetic testing and screening of patients and their families.”

Narrowing in on the exact cause of the condition is important, otherwise there’s a risk that some patients may be misdiagnosed or receive untreatable treatment due to inaccurate genetic diagnosis.

“The knowledge of genetics is important for families who have lost someone suddenly, or who have lost a child to heart disease," he says.

UNDERSTANDING ANEURYSMS

An aneurysm – which occurs when an artery wall is weakened and balloons out – can lead to a blood vessel tear or heart rupture and sudden death.

“Every aneurysm, there’s a 50 per cent chance you’ll be dead before you even reach the hospital,” says Dr. Clinton Robbins, scientist and the Peter Munk Chair in Vascular Therapy.

Dr. Robbins is on the hunt for what causes these frequently fatal occurrences and how to prevent them, including how they might be triggered by cigarette
Dr. Veit-Haibach, a radiologist and nuclear medicine physician who came from the University of Zurich in 2017. “For example, we could use imaging to monitor how blood vessels are behaving, a great benefit to this sort of investigation, he adds. "PET [positron emission tomography] scanners can enable them to monitor how blood vessels are behaving, [but] we’re looking at even finer technology. For example, we could use stem cells to rebuild blood vessels, instead of using a stent."

The idea is that blood would be taken from the patient and filtered. Once the specific “signalling factors” that stimulate the blood vessels in the vessels were identified, they could be injected back into the patient to help rebuild the artery.

There are already clinical trials underway,” says Dr. Tan of this novel approach.

The centre also has new imaging equipment that will enable them to monitor how blood vessels are behaving. “There’s a lot of anecdotal information, but we’re trying to do better than that,” says Dr. Robbins. “It’s very collaborative,” he says. “I have been in places where it’s much more positive a atmosphere at the Peter Munk Cardiac Centre, he says.

Dr. Veit-Haibach says. “In five years, I would hope that the projects we’re working on will help us and patients make decisions on transplants and treatments,” says Dr. Veit-Haibach, a radiologist and nuclear medicine physician who came to the Peter Munk Cardiac Centre from the University of Zurich in 2017. “For example, we could use imaging biomarkers to predict the success of a procedure, as well as when it is important to intervene earlier.”

A biomarker is any measurable biological characteristic that can measure a disease state or bodily process. Researchers can use sophisticated imaging tools, such as the centre’s cutting-edge PET-MRI (positron emission tomography–magnetic resonance imaging) scanner to identify biomarkers and measure disease activity.

Dr. Veit-Haibach is working on a number of complex projects that involve mapping the heart and how it functions. Ultimately, they all come down to answering simple questions. Why do certain things happen in the heart, and what can be done?

“We’ll look at patients with treated cancer, for example, who also have shortness of breath,” he says. “We want to try to figure out through imaging what the underlying reasons are. Perhaps it’s cardiac dysfunction, perhaps lung hyperinflammation.”

Dr. Veit-Haibach and his co-researchers are also looking at the metabolism of heart attacks, using imaging to figure out why some patients who have heart attacks might recover, while others don’t survive or have limited recovery.

Another project is with patients [who have received] radiation therapy to the neck. Dr. Veit-Halbach adds, “Those patients are known to have higher risks for cardiovascular events; however, nobody knows the exact reason.”

He and other experts suspect that the arteries supplying the brain are altered after the radiation therapy (also called radiotherapy). PET-MRI scans can look at these vessels in astonishing detail, pinpointing areas of very subtle inflammation that were never detectable before.

“We can compare what we see to ‘normal’ vessels, because not all vessels [would have been] in the radiotherapy field. We hope to see biomarkers that will determine the difference,” Dr. Veit-Halbach says. The centre’s infrastructure and funding enable Dr. Veit-Halbach to work toward the future of discovery with the confidence that there will be more breakthroughs. The PET-MRI equipment is a boon, and so is the positive atmosphere at the Peter Munk Cardiac Centre, he says.

“It’s very collaborative,” he says. “I have been in places where it’s much more complicated.”

PREDICTING PATIENTS’ CARDIOVASCULAR HEALTH

For Dr. Patrick Veit-Halbach, the future of discovery is in imaging biomarkers.

“In five years, I would hope that the projects we’re working on will help us and patients make decisions on transplants and treatments,” says Dr. Veit-Halbach, a radiologist and nuclear medicine physician who came to the Peter Munk Cardiac Centre from the University of Zurich in 2017. “For example, we could use imaging biomarkers to predict the success of a procedure, as well as when it is important to intervene earlier.”

A biomarker is any measurable biological characteristic that can measure a disease state or bodily process. Researchers can use sophisticated imaging tools, such as the centre’s cutting-edge PET-MRI (positron emission tomography–magnetic resonance imaging) scanner to identify biomarkers and measure disease activity.

Dr. Veit-Halbach is working on a number of complex projects that involve mapping the heart and how it functions. Ultimately, they all come down to answering simple questions. Why do certain things happen in the heart, and what can be done?

“We’ll look at patients with treated cancer, for example, who also have shortness of breath,” he says. “We want to try to figure out through imaging what the underlying reasons are. Perhaps it’s cardiac dysfunction, perhaps lung hyperinflammation.”

Dr. Veit-Halbach and his co-researchers are also looking at the metabolism of heart attacks, using imaging to figure out why some patients who have heart attacks might recover, while others don’t survive or have limited recovery.

Another project is with patients [who have received] radiation therapy to the neck. Dr. Veit-Halbach adds, “Those patients are known to have higher risks for cardiovascular events; however, nobody knows the exact reason.”

He and other experts suspect that the arteries supplying the brain are altered after the radiation therapy (also called radiotherapy). PET-MRI scans can look at these vessels in astonishing detail, pinpointing areas of very subtle inflammation that were never detectable before.

“We can compare what we see to ‘normal’ vessels, because not all vessels [would have been] in the radiotherapy field. We hope to see biomarkers that will determine the difference,” Dr. Veit-Halbach says. The centre’s infrastructure and funding enable Dr. Veit-Halbach to work toward the future of discovery with the confidence that there will be more breakthroughs. The PET-MRI equipment is a boon, and so is the positive atmosphere at the Peter Munk Cardiac Centre, he says.

“It’s very collaborative,” he says. “I have been in places where it’s much more complicated.”

"In five years, I would hope that the projects we’re working on will help us and patients make decisions on transplants and treatments."

Healthy eating, healthy living!

Summer Fresh is proud to support the Peter Munk Cardiac Centre.

- Vegetarian
- Gluten-Free
- Salads, Hummus, and Dips

summerfresh.com for recipes
Rogers is proud to contribute to the Peter Munk Cardiac Centre, and to share its pioneering spirit of pursuing new technology for the betterment of Canadian lives.

On September 19, 2017, just short of his 90th birthday, Peter Munk made history when he and his wife, Melanie, added to their transformational giving with a new $100-million gift to the Peter Munk Cardiac Centre. It was the largest gift to a single Canadian hospital in the nation’s history — a gift that will forever change the future of cardiovascular care in this country and around the world.

Mr. Munk addressed the crowd at Toronto General Hospital to a standing ovation that day with his usual passion, sense of purpose and complete command of the audience. He talked about arriving in Canada as a refugee after the Second World War, the warm welcome he and his family received in this country, and why giving back was for him an attempt to repay his enormous debt to the nation. Here are some condensed and edited excerpts from his speech, giving us insight into why he chose to give, and give so much:

“You know, in life, few people are given real privileges. The ability to give, the ability to donate is truly a rare privilege.

When you thank me for what I’ve done for Toronto, when you thank me for what I can do for this community, it doesn’t begin to express my immense gratitude for what this country has done for me and my family.

My first job was in southern Ontario on a tobacco farm, then as an engineer for Toronto Hydro — and at every job I worked with labourers who invited me to their homes… and would say, ‘Make yourself at home, go to the fridge, eat what you wish: Go to the fridge?! This after coming from a country where you had to save up a month to get a meal! Where people were dying on the streets for food! This was paradise delivered. From then on, in every step in my career — which has been long, boring and full of failures and successes — I felt that enormous desire to become more Canadian, to do more for Canada. The further I went, the more passionate I became.

If you are in the position to give away money, you’ve got the opportunity to give for education and for arts and for religion and for a million causes, from foreign aid to having more beautiful libraries, and they are all important. But does anything compare to human need? To the human quest for health?

If you want to pick one centre of excellence that can make Toronto and therefore Canada stand out in the world and prove we are number one, there is nothing better than [this] hospital. It’s down the street from where I was educated, my grandfather was looked after and passed away here, and the Toronto General Hospital’s origins make it an outstanding institution…. The satisfaction you get from being able to contribute to the excellence of health care is immense.

Let me tell you, this was a hell of a trip. When you are reaching 90, you can be allowed the luxury of leaning back a bit and starting to dream. My dream was always about trying to repay Canada.

The world needs more Canada, not less. And if my contribution to the Cardiac Centre, together with all of your contributions, helps achieve that by creating one more building block, one more testament to the world that Canada is indeed a country to follow, I've achieved my dream. And for that, I thank all of you, every one of you in this room. I don’t care whether you clean the floor, or whether you’re chairman of the bank or whether you run the biggest law firm. We are all together in this because it’s the future of our country that will determine the future of your children’s children. So thank you.”

Creating a healthier tomorrow.
We embrace the tough cases.

This relentless pursuit of answers, treatments and cures is what the Peter Munk Cardiac Centre is built on.

Watch a virtual tour and support this pursuit at inaheartbeat.ca