London Health Sciences Centre

Multi-Organ Transplant Program

Contents

At a glance

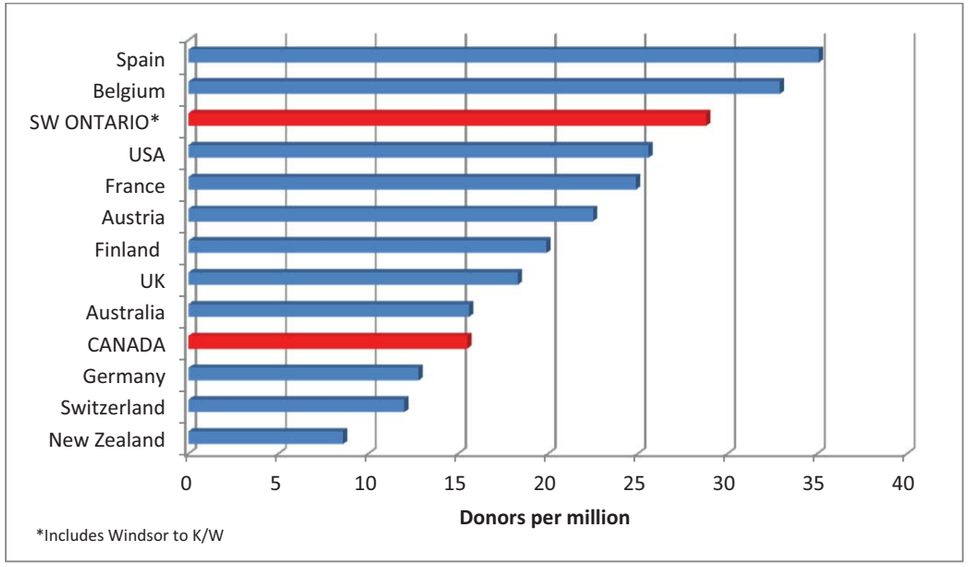
Transplants at London Health Sciences Centre

2,409	Kidney
1,882	Liver
639	Heart
95	Heart-lung / Lung
68	Kidney-pancreas
41	Combination (heart-liver; kidney-liver)
6	Pancreas / Islets
11	Bowel

Total 5,151

6,500 outpatient clinic visits each year
98-100% bed occupancy in the Transplant Unit

The organ donation rate in the London region is double the Canadian rate, rivaling the top countries in the world.



Dr. Cal Stiller and his wife, Angie, with family celebrate the re-naming of the Stiller Blackburn Multi-Organ Transplant Unit on September 17, 2014.

Transplant Unit renamed to recognize Dr. Cal Stiller's contribution

The creation of the renowned Walter J. Blackburn Multi-Organ Transplant Unit – the first of its kind in Canada – was driven by the visionary work of Dr. Cal Stiller, the first director of the transplant program. The unit was originally opened in 1987 and named to honour philanthropist Walter Blackburn who served as president of the London Health Association from 1969 to 1973.

On September 17, 2014, the unit was renamed the Stiller Blackburn Multi-Organ Transplant Unit to recognize the contributions of Dr. Stiller, in partnership with the Blackburn family. Dr. Stiller says he never envisioned the transplant unit being renamed: "This is a tremendous honour, to share the naming of this unit with the Blackburn family is extraordinary."

Dr. Stiller also highlighted his pride in the high organ donation rate that the London region continues to have – comparable to the best donation rates worldwide – as well as our innovative research.

Message from the directors

The Multi-Organ Transplant Program at London Health Sciences Centre is a leading transplant program in Canada. More than 5,000 patients – adults, children and babies – have received lifesaving and life-enhancing transplants in London. The benefits to patients have been enormous.

Recognized as a world leader, we helped pioneer the drug cyclosporine in the late 1970s and early '80s to overcome transplant rejection. Our surgeons performed the world's first successful liver-bowel transplant as well as transplanted the world's youngest multi-organ recipient – Sarah was only 5 months old when she received her combined liver, bowel, stomach and pancreas transplant.

In Canada, the first heart-lung transplant was done in London and the longest-surviving heart and liver recipients all received their new organs at University Hospital. We also performed the first transplants in Canada that used living liver donors. We are now extending our innovation to r**emove kidneys from living donors through a small incision in their navel (page 7).** We're excited to offer **pancreas transplantation (page 14)** as another alternative for some of our patients. We are the leading Canadian centre in **donation after circulatory death (page 10),** which has substantially increased the number of donated organs for transplantation.

Transplant staff are using new technology to enhance the care of our patients before their transplant such as **ventricular assist devices to mechanically support the failing hearts of patients (page 9)** while they wait for their heart transplant. As another example of translating new technology, **kidneys and livers will likely soon be maintained in 'body temperature' perfusion machines (page 8)** instead of being placed 'on ice' prior to transplantation. By infusing preservation fluid through the organs and keeping them at body temperature, patients can have improved organ function immediately after their transplant, which means a smoother and quicker recovery.

Dr. Patrick Luke & Dr. Anthony Jevnikar

Our transplant program is a model for Canada that demonstrates the importance of teamwork in success. The integration of multi-disciplinary experts in a focused effort to achieve transplant excellence has received local, national and international attention. Recognition of the importance of surgery and medicine in transplant success was highlighted by the appointment of surgical and medical co-directors, Dr. Patrick Luke and Dr. Anthony Jevnikar, in 2009.

Since the beginning, our program has firmly believed in the importance of public awareness and **community involvement (page 15),** which has played a vital role in our outstanding organ donation rate. Our linked research centre, **The Matthew Mailing Centre for Translational Transplant Studies (page 11),** houses the most advanced microsurgery transplant facility in the world as well as a leading research team of transplant scientists, enabling us to continue pushing forward into new frontiers. As an international leader in transplant investigation, we will ultimately improve treatment for patients in Canada and around the world as we move into the future of transplantation.

Message from LHSC's Chief Clinical and Transformation Officer

From the time that London Health Sciences Centre (LHSC) opened the transplant unit in 1987, patient-centred care has been the focus. Our dedicated and specialized teams of health-care professionals pay special attention to the unique needs of each transplant patient and family. We have heard many powerful and heartwarming stories from our patients on the impact the transplant team has had on their lives. Each story speaks to the transplant program's guiding values: compassion, creativity, competence, commitment and collaboration. Each and every day, our staff work together, making a difference for our patients, families and the wider community.

LHSC has also been at the forefront of transplant medicine in Canada and indeed the world, having performed a number of transplant firsts. In addition to caring for thousands of transplant patients from Ontario and beyond, the LHSC transplant program's education and research contributions have led the way both nationally and internationally. Almost one hundred physicians from Canada and around the world have received their transplant training at LHSC.

Building on our past success, the LHSC Multi-Organ Transplant Program is committed to achieving transplant excellence while maintaining a national and international role in innovation and discovery.

Laurie Gould

Moving forward from our past

Long before "patient-centred care" became a common phrase in health care, the unique needs of transplant patients, regardless of their organ transplant, were identified as special at University Hospital. This concept led to the design of Canada's first Multi-Organ Transplant Unit, which opened at UH in 1987. Our hospital had already established itself internationally as a centre for organ transplantation.

Thanks to the tremendous leadership provided by our previous directors, Dr. Cal Stiller (1987-1997) and Dr. William Wall (1997-2007), and the current directors, Dr. Anthony Jevnikar and Dr. Patrick Luke, our program developed as a truly multi-disciplinary group. Physicians and research scientists work together with allied health professionals, including nurses, physiotherapists, social workers, recipient coordinators, donation specialists, dietitians, psychologists and pharmacists. More than 5,000 patients have received transplants that have transformed their lives.

LHSC's transplant program is credited with dozens of firsts, including the first clinical trial on cyclosporine, the world's first liver-bowel transplant, as well as the first heart-lung transplant and living donor liver transplants in Canada. More heart transplants have been performed at LHSC than at any other transplant program in Canada. Some of our earliest patients are the longest surviving recipients in the country, now celebrating more than 30 years of healthy life after transplant.

Living donors are an option to increase the number of kidney and liver transplants. In 1993, surgeons at LHSC were the first in Canada to take a piece of liver from a mother and transplant it into her infant son. Seven years later, in another Canadian first, this technique was extended to our adult patients when the larger right segment of the liver was removed from a living donor for transplant into a relative.

Innovation has always been a hallmark of our transplant program. As one way to address the shortage of donated organs, our transplant surgeons have divided livers from deceased donors into two halves so each part could be transplanted into separate recipients, suitably size-matched for the grafts. We have applied this type of surgical innovation to split pancreas-kidney transplants – another first in Canada.

Research has been a strong foundation in the care of LHSC patients, from basic discovery of new drugs to prevent transplant rejection, new surgical approaches in organ transplants, and optimal identification and management of living donor transplants.

Our transplant program is accredited by the American Society of Transplant Surgeons as well as the American Society of Transplantation to offer specialized surgical and medical training in kidney, kidney-pancreas and liver transplantation. Our nurses are highly trained with ongoing education, and several have received certification by the International Transplant Nurses Society.

"We have a mature program that has been excellent for so many years, sometimes we take that for granted. If you have a miracle every day, it can just become routine … but they're still miracles."

Dr. Anthony Jevnikar, director of the transplant program

The MOTP has an impressive history of innovation and leadership, both nationally and worldwide:

1982 – first patient trial using cyclosporine
1988 – world's first successful liver-bowel transplant
1997 – world's youngest recipient for liver/bowel/stomach/pancreas

1983 – heart-lung transplant
1987 – Transplant Unit opens
1990 – cluster transplant (liver/bowel/stomach/pancreas)
1993 – living-related liver transplant for a child
2000 – living-related liver transplant between adults

2006 – DCD liver transplant
2008 – DCD kidney-pancreas transplant
2008 – pediatric DCD kidney transplant
2011 – split pancreas-kidney transplant
2013 – robotic surgery removes kidney from living donor

Investing in surgical innovation

When LHSC invested in the da Vinci robotic surgical system, our transplant surgeons knew that this technology could improve patient care by minimizing the impact of surgery. The da Vinci robot has now played a role in our legacy of transplant innovation – surgeons Dr. Alp Sener and Dr. Patrick Luke were able to remove a healthy kidney from a living donor through a single, tiny incision.

Kelley Kunkel of Walkerton, ON underwent this procedure to provide her husband, Steve, with a new lease on life. A type 1 diabetic for over 30 years, Steve was in kidney failure and faced a lifetime of dialysis without a kidney transplant. Deemed a "perfect match", Kelley didn't hesitate to share this gift of life with her husband.

Kelley was the first person in Canada to donate a kidney using this new robotic technology. The entire donor operation, including the kidney removal, was done through a small incision in her belly button. With this innovative approach, patients require less pain medication after the operation and they recover more quickly. Kelley was out of the hospital in three days, and had a fully healed incision within four weeks. "You can't even tell I had surgery now."

Dr. Sener adds "We're very fortunate at LHSC to have state-of-the-art da Vinci robotic systems which allow us to take minimally invasive surgery to the next level. By using robotic assisted Lapro-Endoscopic Single Site (LESS) Surgery on living kidney donors, we're able to minimize risk, shorten recovery times, and return the donor back to his or her normal day-to-day activities sooner."

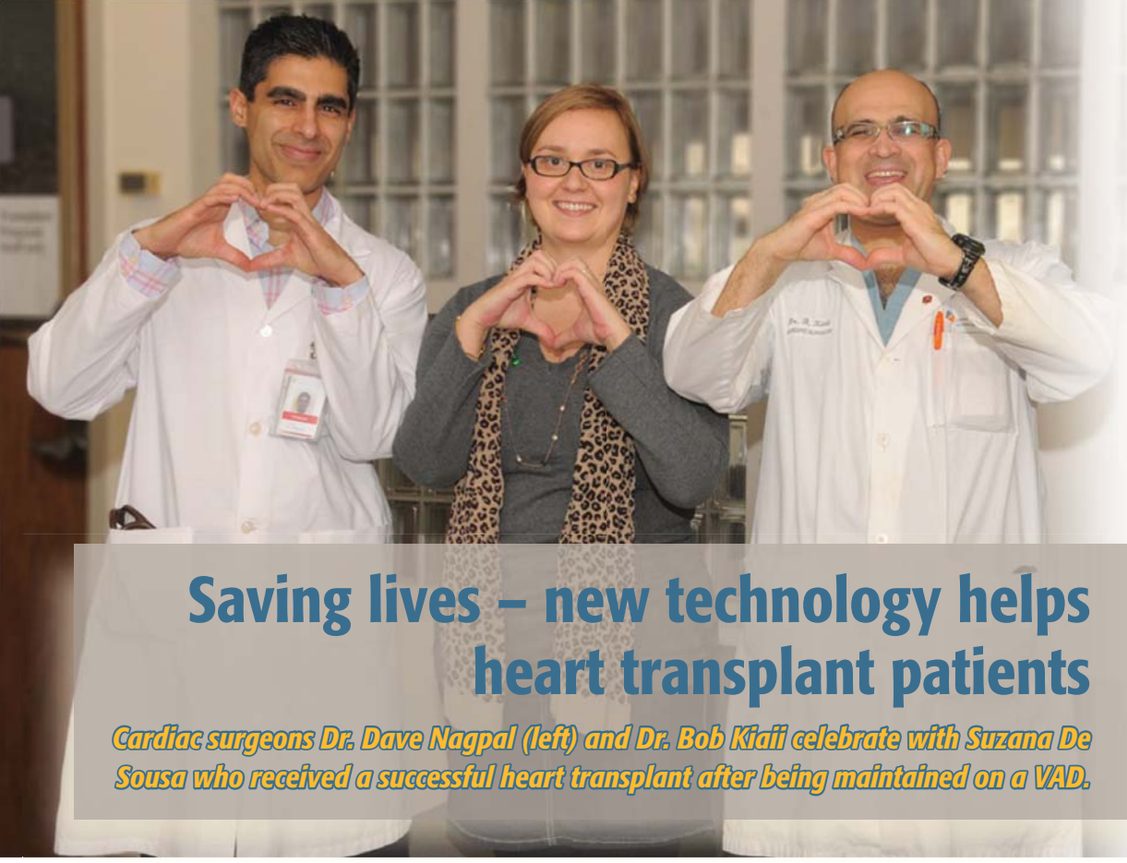
For more photos about this robotic surgery, check out the LHSC Facebook page at http://on.fb.me/1BdDSRE.

Improving the function of transplanted organs

Since the beginning of transplantation 50 years ago, the standard method to preserve organs has been simple cold storage at a temperature of 2-4°C. Cooling slows the organ's metabolism, reducing the need for oxygen to almost zero during transportation to LHSC. Unfortunately, these conditions can injure transplant organs, and sometimes they are too injured to work well.

The Multi-Organ Transplant Program is world renowned for its clinical and research innovation. Continuing in this tradition, we are now taking a different approach to ensure the best possible outcomes for our patients. Livers and kidneys are being stored under physiological conditions at a normal body temperature. This is possible with machine perfusion, which better protects the organs and also allows for a longer preservation period. Data published by our kidney team show that less-than-ideal kidneys improve from being mechanically perfused. We're now able to transplant organs that used to be discarded. By infusing preservation fluid through the organs during the storage period, patients have better organ function immediately after their transplant, which means a smoother and quicker recovery, as well as better long-term function. London's transplant program is also using machine perfusion for donated livers. As part of a national trial, starting in 2015, we will further study the benefits of machine perfusion for livers.

In addition to this clinical innovation, our physicians, surgeons and scientists continue to lead international research efforts in organ preservation and storage by devising better preservation solutions and more efficient perfusion devices. Our surgeon-scientists have been leading the field for over 15 years by using molecules, which are made inside our own bodies, to minimize injury to the kidney during the storage period. Two of these molecules are hydrogen sulphide and carbon monoxide, and our research suggests that they may one day be used in the clinical setting to reduce organ injury. Many of these research developments, which will soon be ready for clinical trials, will ultimately improve transplant patient care and outcomes.



Saving lives – new technology helps heart transplant patients

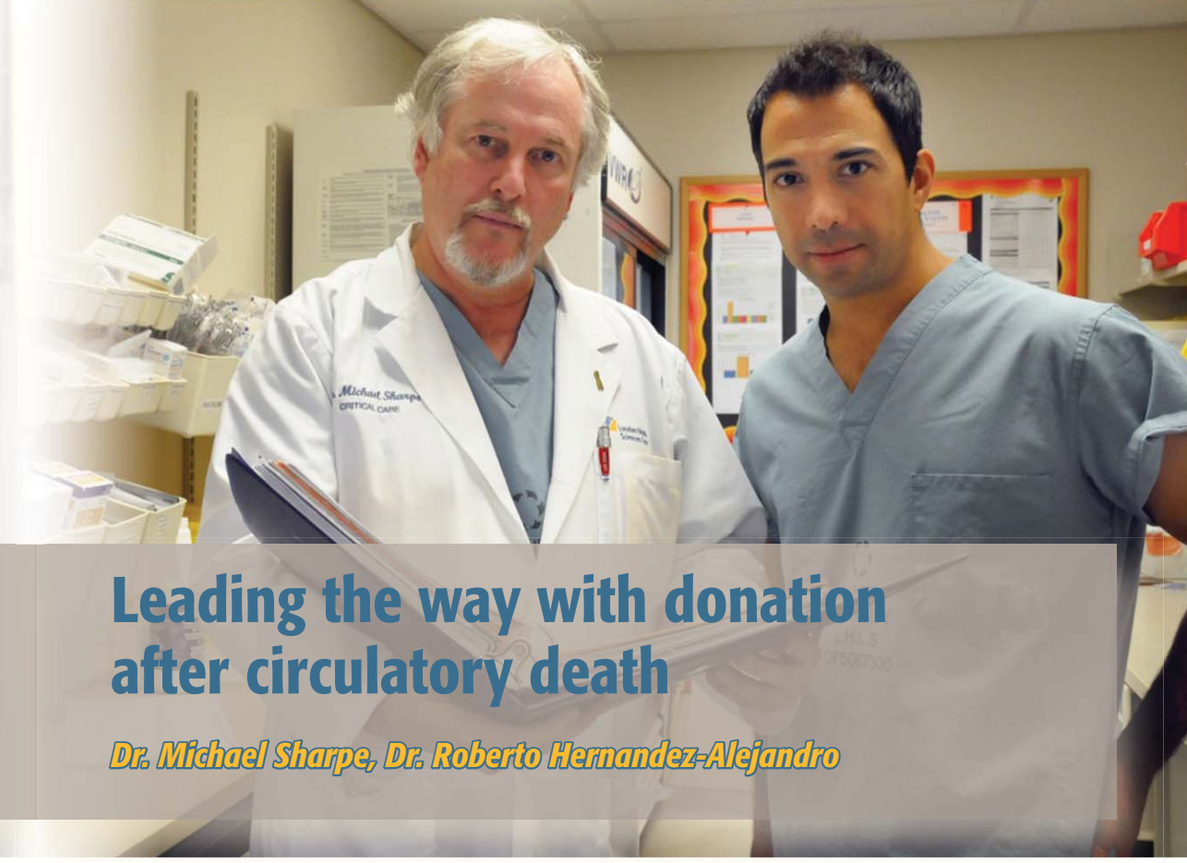
Cardiac surgeons Dr. Dave Nagpal (left) and Dr. Bob Kiaii celebrate with Suzana De Sousa who received a successful heart transplant after being maintained on a VAD.

More heart transplants have been performed at LHSC than at any other transplant centre in Canada. Some of the longest-surviving heart recipients are now celebrating 30 years of living healthy lives.

Some patients, however, are too sick to undergo transplant surgery. "Some patients need an intervention to help them become well enough to be successful with such an intensive operation and recovery" explains Dr. Dave Nagpal, heart surgeon and Surgical Director of the Advanced Heart Failure Program at LHSC.

Our program now offers several types of devices to help support patients until they are well enough for transplant surgery. Short-term ventricular assist devices (VADs) act as a temporary "bridge" to transplant by maintaining a patient's heart and improving the function of other organs until a donated heart becomes available. Durable VADs are implantable devices that allow patients to go home and recover while waiting for their transplant.

These new technologies have been invaluable in helping to stabilize some of our patients. Some of have gone on to receive a heart transplant and others have recovered well enough that they no longer need a transplant.



Leading the way with donation after circulatory death

Dr. Michael Sharpe, Dr. Roberto Hernandez-Alejandro

Donation after circulatory death (DCD) is a new approach to increase the number of organs for transplantation. Some patients who have hopeless conditions and cannot survive will have life support withdrawn as part of compassionate, end-of-life care. In some circumstances, their organs can be donated after death. When DCD began in Canada in 2006, London Health Sciences Centre performed the first DCD liver transplant.

Currently, one in every six donors is DCD, which increases the number of organs available for transplant by 15%. As the Canadian leader with the most experience, almost 200 patients have now received liver, kidney, and kidney-pancreas transplants from DCD donors. Results have been very good with patient survival rates approaching 90%. The families of these donors have consistently expressed their gratitude that donation was possible and that the wishes of the deceased were honoured.

Our transplant program is recognized by international transplant associations as a leader in this area. Dr. Roberto Hernandez-Alejandro, surgical director of liver transplantation, is a member of the North American DCD Consortium that is collecting and analyzing DCD data to further improve outcomes. Both Dr. Hernandez-Alejandro and Dr. Michael Sharpe, ICU physician, speak at national and international meetings about the importance of this new approach to save patients' lives.

Translating research for our patients

Matthew Mailing Centre for Translational Transplant Studies

Since the early 1970s, University Hospital has been at the forefront of organ transplantation in Canada. Our clinical innovation has continued throughout the years, including plans to implement Canada's first Vascularized Composite Allograft (hand transplant) program in the near future. Just as our transplant program possesses the expertise, resources and commitment for clinical excellence, our research is the innovative arm that helps support clinical advances.

The Matthew Mailing Centre for Translational Transplant Studies is located near the Multi-Organ Transplant Unit on the 4th floor of the Lindros Legacy Research Pavilion. The centre integrates several essential facilities, providing researchers with access to advanced molecular imaging, microsurgical techniques and pre-clinical transplant models.

We now have a well-established infrastructure with internationally renowned researchers working collaboratively in the nation's first translational transplant research centre. 'Translational research' represents our primary research theme – we want to break the traditional barriers existing between basic research, clinical research and patient-oriented research with a bidirectional spectrum linking "bench to bedside and back to bench" research.

A primary research area has focused on ways to reduce tissue injury during the organ retrieval and transplant, and our group is internationally recognized for this research. Other research has focused on immune regulation and tolerance – the identification of a new type of T cell (called DN-Treg cells) that can

suppress immune responses and prolong survival of the transplanted organ.

Our future research will encompass the protection and repair of donated organs, including bioengineering. Tissue from human kidneys and liver segments can be placed on scaffolds to create bioengineered organs. Both strategies – to repair and to build – will ultimately increase the number and quality of organs that can be successfully transplanted.

Another research focus will aim to prevent organ rejection by targeting certain signals, called "danger signals", in the immune system. Recently, our researchers identified a new way of cell death during transplantation – one that may be key to long-term transplant survival without immunosuppression. As a result, a new type of therapeutics called "necrostatins" has now been created.

A third research area will address ways to influence the body's immune system so that organs are less likely to be rejected. Referred to as "tolerance", patients may only need a small dose of anti-rejection drugs, and can avoid their potentially adverse side effects while keeping their transplanted organ healthy.

With state-of-the art facilities, including a microsurgery operating suite, specialized care rooms, and tissue culture suites, our researchers can combine their expertise in areas such as better preservation strategies, molecular regulation of cell death, and gene silencing. All these strategies can help improve the outcomes for our transplant patients.

Offering an alternative to patients with diabetes

Since 2004, our transplant program has provided combined kidney-pancreas transplants to improve the quality of life for patients who have kidney failure and diabetes. After a successful kidney-pancreas transplant, dialysis and insulin therapy are no longer required. These patients receive both the pancreas and a kidney from the same donor for a simultaneous transplant.

Recently, our transplant program has begun offering pancreas transplants alone for suitable patients. The pancreas by itself is transplanted in patients who have severe type 1 diabetes who cannot be managed by insulin injections, but who still have good kidney function. Also, for patients who have already had a kidney transplant but suffer from diabetic complications, we can provide pancreas-after-kidney transplants.

The goal is to transplant patients who must take insulin to treat their diabetes. Transplanting a pancreas replaces the role of insulin injections, acting as a cure for diabetes and preventing long-term diabetic complications.

Thanks to our community, the London region has one of the highest donation rates in Canada, among the leading countries worldwide. We continue to increase public awareness about the ongoing need for organ donors and the success of transplantation.

What can you do to help?

- Talk with your family, friends and colleagues about your own personal decision to be an organ and tissue donor, and encourage others to consider this. Find out more about donation and transplantation at www.lhsc.on.ca/transplant.
- Register your wishes or check your donation status. You'll need your health card and 2 minutes online at https://beadonor.ca/lhsc or through any branch of ServiceOntario.
- Follow LHSC, including our transplant program, on Facebook, Twitter and Pinterest or subscribe to the hospital's YouTube channel at https://www.youtube.com/user/LHSCCanada.
- Show your support by attending community events, wearing a green ribbon, or using our merchandise that promotes greater awareness and conversation: https://transplantestore.ca.

Rizwana received a kidney-pancreas transplant in 2004. Ten years later, she continues to promote greater awareness in the London region. "I am forever indebted to my donor family for consenting to donate the organs of their loved one, which has allowed me to live fully without needing dialysis or insulin injections."

As one example of community events, the transplant program organizes an annual art show and auction (www.lhsc.on.ca/artshow) to help increase public awareness as well as raise funds. Contributors are transplant patients, living donors and donor families, transplant staff, local artists and Canadian celebrities.

Sir Roy Calne

Flowers, 2014

Sir Roy Calne is Britain's premier transplant surgeon. He pioneered liver transplantation and was the first to use cyclosporine to prevent organ rejection in transplant patients Represented by Shalini Ganendra Fine Art, his artwork is eclectic, bold and imaginative.

Chris Hadfield

View from the ISS, 2013

Astronaut Chris Hadfield was the first Canadian to walk in space, and he served as Commander of the International Space Station in 2013. Hadfield documented his journey and daily life as an astronaut on the space station. Following his return to earth, the Professional Photographers of Canada awarded him with the Service of Photographic Arts for his photography of space and earth.

Directors

Dr. Anthony Jevnikar

Dr. Patrick Luke

Manager

Ms. Dawna van Boxmeer

Coordinator

Ms. Deborah Kuhar

London Health Sciences Centre

www.lhsc.on.ca/transplant