London Health Sciences Centre

Multi-Organ Transplant Program

Five founding values
of the transplant program
drive our clinical care and research

Compassion

Creativity

Competence

Commitment

Collaboration

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Contents

At a glance

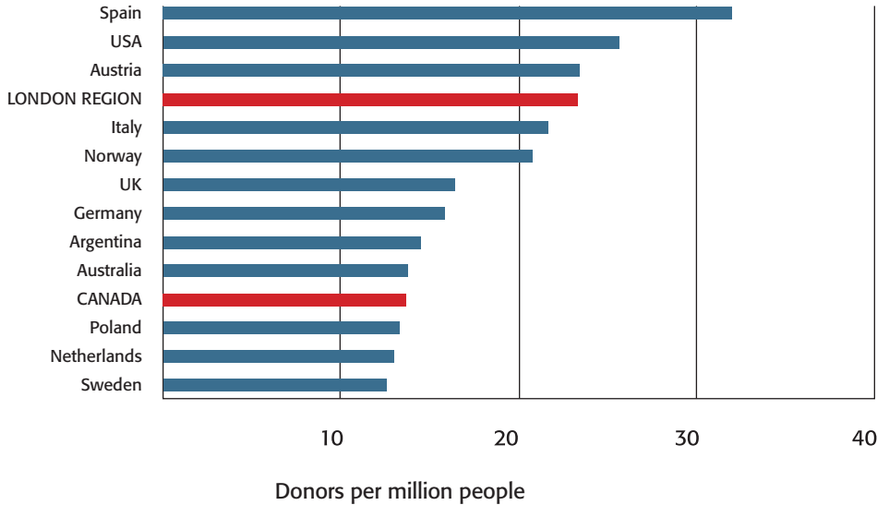
Transplants at London Health Sciences Centre

2,145	kidney
1,734	liver
600	heart
95	heart-lung/lung
57	kidney-pancreas/islets
27	liver-bowel/multi-visceral

Total 4,658

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

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



Source: International Registry of Organ Donation and Transplantation (2010)

"My recent transplant at your hospital was an experience beyond belief; not only with the care and compassion of the doctors and nursing staff and the entire transplant team, but also the assistance from the dietitians, pharmacist, even the orderlies would go out of their way…. I was very fortunate to have been a patient there."

Jim Pighin
kidney transplant patient

"Getting a transplant doesn't change your life, it gives it back. The staff in the Multi-Organ Transplant Program are the most caring group of people I've ever experienced."

Bonnie Di Bernardo
liver transplant patient

Message from the directors

The Multi-Organ Transplant Program at London Health Sciences Centre is a leading transplant program in Canada. Almost 5,000 patients – adults, children and babies – have received life-saving 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 liver transplants that used living donors, and we are now extending this innovation to **splitting the pancreas so two patients can each receive a combined kidney/pancreas transplant (page 7)**. Different combinations of organs, such as **heart and liver transplants (page 11)**, are being used to treat rare diseases.

We are the leading Canadian centre in **donation after cardiac death (page 10)**, which has substantially increased the number of donated organs for transplantation. In an effort to help get more patients off the transplant waiting list, we're also taking part in the **new Canadian registry that is helping to match living kidney donors with unrelated patients (page 8).**

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 while they wait for their heart transplant (page 9).** As another example, kidneys are being maintained in new perfusion machines instead of being placed 'on ice' prior to transplantation. By infusing preservation fluid through the organs, patients have improved kidney function immediately after their transplant, which means a smoother and quicker recovery.

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 community involvement and **public education (page 12)**, which have played a vital role in our outstanding organ donation rate. The newly created **Matthew Mailing Centre for Translational Transplant Studies (page 13)**, which houses the most advanced microsurgery transplant facility in the world, will enable us to continue pushing forward into new frontiers. With several years spent in planning, its doors officially opened in October 2011. 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 (page 16).**

Dr. Patrick Luke & Dr. Anthony Jevnikar

Message from the President and CEO

Not only have thousands of patients been cared for and undergone successful transplantation at London Health Sciences Centre, but the transplant program's visionary approach and research contributions have led the way in Canada. Indeed, some of the contributions of the program have been global in scope.

There are many patient stories of inspiration, a few of which you will find here - that speak to the essence of the five founding values of the transplant program: compassion, creativity, competence, commitment and collaboration. These stories affirm that our transplant staff, our researchers, and our community are working together to make a significant difference every day.

Building on past successes, LHSC's transplant program is committed to advancing the standard of care provided to our patients while remaining a medical leader in our region, across Canada and beyond. These efforts truly embody LHSC's vision of exceptional experiences, extraordinary people and engaging partnerships.

Bonnie Adamson

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 and Dr. William Wall, and the current directors, Dr. Patrick Luke and Dr. Anthony Jevnikar, our program developed as a truly multi-disciplinary group of physicians and research scientists, working together with allied health professionals including nurses, physiotherapists, social workers, recipient coordinators, donation specialists, dietitians, psychologists and pharmacists. Nearly 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 liver and heart patients are the longest surviving recipients in the country, now approaching 30 years of healthy life after transplant. Our longest-surviving kidney recipient is celebrating 36 years without needing dialysis.

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 split livers from deceased donors into two halves so each part could be transplanted into separate recipients, suitably size-matched for the grafts. We are now applying this 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 – paediatric DCD kidney transplant
2011 – split pancreas/kidney transplant

Splitting the pancreas so two patients can receive transplants

In the 1990s, Dr. Wall and the liver transplant team at LHSC started to split donated livers into two parts for transplant into two recipients as a way to address the organ shortage. This innovative technique has recently been extended to pancreas transplantation by the kidney-pancreas transplant team at University Hospital. "The blood supply and structure of the pancreas make it ideal to divide into two grafts," says transplant surgeon Dr. Vivian McAlister.

Drs. McAlister, Patrick Luke and Alp Sener have now done four split-pancreas with kidney transplants in 2011, the first time that this type of transplant has been done in Canada. Pancreas transplant pioneer, Dr. David Sutherland at the University of Minnesota, attempted to transplant split pancreas grafts over 10 years ago using an older method of draining the pancreas through the bladder. The LHSC transplant team has modernized the technique by using intestinal drainage.

A person requires only 20 percent of a whole pancreas to avoid diabetes. By splitting a pancreas in half, according to Dr. Sener, "We can offer more transplants to patients who are waiting, especially in special situations such as rare blood types. In the future, if we can make it work, we will also be able to offer parents the option of living donation – they may be able to donate half their pancreas to treat their children who have diabetes."

"After 28 years as an insulin-dependent diabetic, of which seven years were spent on dialysis, my life changed when I received a kidney-pancreas transplant in August, 2004. Seven years later, I still refer to my kidney and pancreas as 'my new organs!' 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."

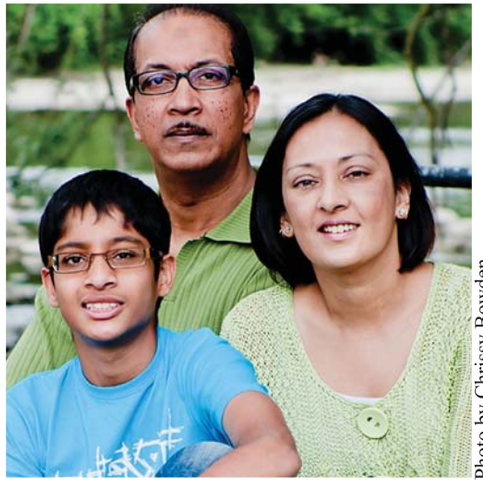


Photo by Chrissy Bowden

Rizwana Ramzanali, one of our early kidney-pancreas recipients, with her family

Increasing kidney matches through a national registry

Unfortunately, there have never been enough deceased donors to transplant all the patients who are waiting. This is especially true for kidney patients with more than 2,700 Canadians currently on the wait list. Less than 750 kidney transplants are done each year.

For many years, healthy living donors have been able to donate one of their kidneys, but only if their kidney "matches" the recipient as determined by medical tests. Sometimes, patients are forced to remain on the waiting list because they and their living donor are incompatible.

A new Canadian registry has been created to help facilitate living kidney donation and increase the number of transplants.

Managed by Canadian Blood Services, the Living Donor Paired Exchange Registry identifies incompatible donor-recipient pairs who might be able to exchange donors.

Sometimes, a simple paired exchange is done – two recipients swap donors so they each get a suitably matched kidney much more quickly. In some situations, multiple pairs are matched by a computer algorithm, and in some of these cases, an anonymous or "non-directed" donor is involved. These are altruistic donors who are willing to donate one of their kidneys to anyone in need, and this option is now possible through the coordinated efforts of this national registry.

Jennifer Cross, nurse practitioner, evaluates a living donor.

Saving lives – new technology helps heart transplant patients

Dr. Mac Quantz, Dr. Peter Pflugfelder, patient Terry Elliott, Dr. Bob Kiaii

The cardiac transplant team has begun using an innovative device – the Impella cardiac-assist device – to stabilize patients with heart failure until suitable hearts become available for transplant. The Impella, the world's smallest heart pump, acts as a 'bridge' to transplant by maintaining a patient's heart until a donated organ becomes available. Terry Elliott, 49, from Woodstock, Ontario, needed a heart transplant, but his health was declining so quickly – his kidneys, liver and lungs were beginning to give out – that it was becoming too dangerous to operate.

"In some cases, patients are simply too sick and they need an intervention to help them become well enough to survive an intensive operation such as a heart transplant. We call this 'reconditioning'," explains Dr. Bob Kiaii, cardiac surgeon and chief of cardiac surgery at LHSC. During his time on the Impella, Mr. Elliott's kidneys, liver and lungs improved, as did his general condition. After being on the Impella support for five days, Mr. Elliott received the heart transplant that he desperately needed.

Dr. Kiaii and Dr. Mac Quantz, director of cardiac transplantation, are now working towards expanding this life-saving device program through fundraising initiatives so that this technology will be part of standard care for any patients who require it.

Leading the way in Canada with donation after cardiac death

Dr. Michael Sharpe, Dr. Roberto Hernandez

Donation after cardiac death (DCD) is a new approach to increase the number of organs for transplantation. Some patients with hopeless conditions who cannot survive have life support withdrawn as part of compassionate, end-of-life care. In some circumstances, some of their organs can be donated after death.

London Health Sciences Centre is the Canadian leader in DCD to meet the needs of patients on transplant waiting lists. Our program has now performed 68 kidney transplants, 36 liver transplants and four kidney-pancreas transplants using organs from DCD donors. The relatives of these donors have consistently expressed their gratitude that donation was possible and that the wishes of the deceased were honoured.

Dr. Michael Sharpe, ICU physician, and Dr. Roberto Hernandez, liver transplant surgeon, have both been invited to speak nationally and internationally about the importance of this new approach to save patients' lives.

Treating a rare, genetic condition with combined heart and liver transplantation

In 2002, Ken Knott discovered he had an extremely rare, inherited condition called familial amyloidosis. His liver produced a mutant protein that was destroying his heart. Prior to the onset of the disease, Ken was fit, athletic and loved baseball and hockey. Three years later, he was showing symptoms of the disease and had to give up the sports and activities he loved due to the pain and exhaustion.

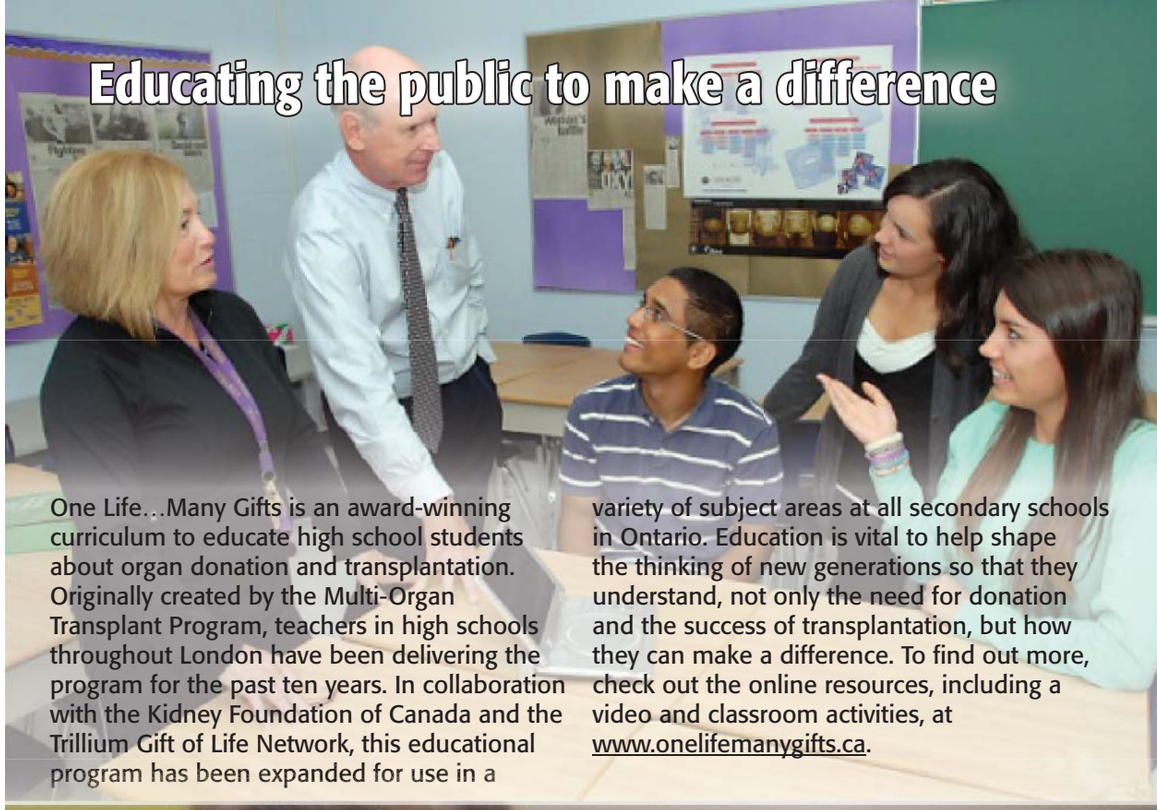
The only solution for Ken was the replacement of both organs – a combined heart and liver transplant, a procedure that had only been done a handful of times in Canada and only once before at LHSC. After being on the transplant waiting list for a year and a half, Ken and his family received the call they had been waiting for on – of all days – Christmas Eve.

Ken's transplant was performed by the team of heart transplant surgeon Dr. Neil McKenzie and liver transplant surgeon Dr. William Wall, each of whom founded their respective transplant programs at LHSC. After nearly 13 hours of surgery, Christmas morning arrived and Ken had the greatest gift of all: a new lease on life and the promise of many more Christmases with his family.

Check out this YouTube video, *Transplant: The Greatest Gift*, developed by the London Health Sciences Foundation: http://bit.ly/qDDdp7.

Dr. Neil McKenzie, Dr. William Wall, patient Ken Knott

Educating the public to make a difference



One Life…Many Gifts is an award-winning curriculum to educate high school students about organ donation and transplantation. Originally created by the Multi-Organ Transplant Program, teachers in high schools throughout London have been delivering the program for the past ten years. In collaboration with the Kidney Foundation of Canada and the Trillium Gift of Life Network, this educational program has been expanded for use in a variety of subject areas at all secondary schools in Ontario. Education is vital to help shape the thinking of new generations so that they understand, not only the need for donation and the success of transplantation, but how they can make a difference. To find out more, check out the online resources, including a video and classroom activities, at www.onelifemanygifts.ca.

Along with our staff, many community volunteers provide tremendous support in helping promote awareness about the need for more donors. Many of our volunteers are transplant recipients who spread the message that "transplants work" by participating in special events, promotional campaigns, and public speaking. At events throughout the year as well as during National Organ and Tissue Donation Awareness Week in April, our message is this: Consider organ and tissue donation. Talk with your family. Register your consent at www.beadonor.ca.

Translating research for our patients

Matthew Mailing Centre for Translational Transplant Studies

"Go see human beings who are suffering, and then ask yourself, is the work I did today relevant to human suffering? Did I do something that is going to help to change somebody's life, maybe not today but sometime soon?"- Christopher Reeve, accepting the American Society for Cell Biology Public Service Award in 2001

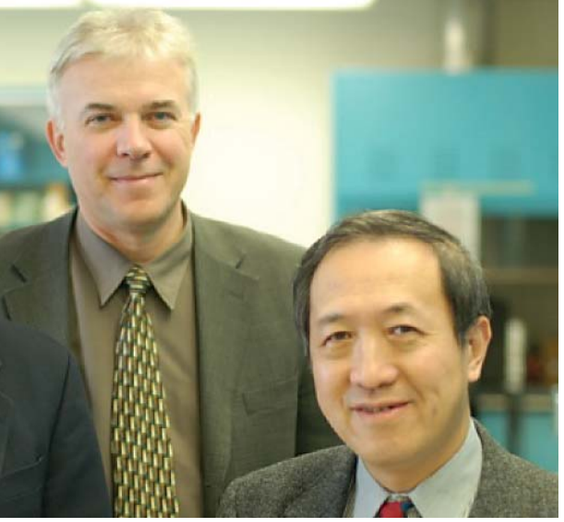
When he passed away in 2003 at the age of 34 from complications related to heart transplant surgery, Matthew Mailing bequeathed one-third of his estate to support our Multi-Organ Transplant Program. Matthew's gift became the catalyst for establishing a world-class facility in transplant research – The Matthew Mailing Centre for Translational Transplant Studies, a joint venture between LHSC and Lawson Health Research Institute.

Since the early 1970s, University Hospital and the London Health Sciences Centre have always been on the forefront of clinical transplantation and transplantation research in Canada and internationally. University Hospital and its research partners, the Lawson Health Research Institute and the Multi-Organ Transplant Program, believed that basic and clinical research in London had reached a critical mass that would greatly benefit from a comprehensive translational research centre. Led by Dr. Anthony Jevnikar, the state-of-the-art, $4.25 million Mailing Centre was funded through the generous support of the Mailing family and friends along with donations from hockey great Eric Lindros, the Department of Medicine, pharmaceutical companies and individuals from health care and our community.

"The Mailing Centre is the first centre of its kind in Canada that focuses on transplantation research problems, built entirely by privately-donated funds from many who believed in us and our mission," says Dr. Jevnikar, the first director of the Centre. "Our scientists and clinician-scientists will discover new treatments, including novel immune therapies, molecular 'fingerprinting' to identify how well patients respond to anti-rejection drugs and the ability to accept their new organs, possibly without long-term drugs. Nanotechnology approaches will improve organ preservation, and stem cells will be used to 'repair' organs." The nearly 9,000-square-foot Mailing Centre houses the most advanced

I know that down the road great things will be discovered. That's what this research centre is all about – to help people, to make it better for all transplant patients. That's what Matt wanted."

Carol Mailing, Matthew's mother



microsurgery facility in Canada, a legacy of the late Dr. Robert Zhong (right), a Canadian transplantation and microsurgery pioneer.

collaboration. This will accelerate the time it takes to move laboratory discoveries to directly impact patient care. In keeping with the translational focus, the Mailing Centre is located on the 4th floor of the Lindros Legacy Research Pavilion, immediately adjacent to the Multi-Organ Transplant Unit.

The Matthew Mailing Centre is already proving to be a magnet for the brightest young researchers in transplantation, including Dr. Lakshman Gunartnam, nephrologist and research scientist, and Dr. Alp Sener, transplant surgeon and research scientist. The Mailing Centre will prove to be an ideal environment for the training of clinician-scientists, surgeon-scientists, scientists and students – our future.

This centre created previously non-existing infrastructure and has as its primary focus the accelerated 'translation of basic discovery research' in solid organ and cellular transplantation. 'Translational research' breaks down the traditional boundaries that exist among basic research, clinical research and patient-oriented research. Recognizing that research benefits from the natural communication that occurs when researchers work together, the Mailing Centre is an open environment workspace, which encourages interaction and

"Thousands of patients will benefit from the research that will be done in the Mailing Centre at LHSC."

Dr. Patrick Luke

Moving into the future

Hand transplantation

Worldwide, only about 60 hand transplants and one foot transplant have been done. The early results, according to the International Registry on Hand and Composite Tissue Transplantation, are very promising. Patients are doing well, having returned to work and capable of everyday activities that most of us take for granted – shaking hands, holding a cup and writing. In collaboration with Dr. Doug Ross and the Hand and Upper Limb Centre at St. Joseph's Health Care, London's transplant program is poised to begin hand transplants using donated tissue from deceased donors. This extremely complex surgery requires collaborative effort from many specialties in order to succeed. Few centres in the world have the people and support to accomplish this level of transplantation care. We are very fortunate in London to have so much support and expertise to help those in need of transplants.

Photo by Shawn Simpson

Pancreas transplantation

Since 2004, the transplant program has been doing combined kidney-pancreas transplants to improve the quality of life for those patients who have kidney failure and diabetes. With a success rate of 94%, we are now looking at performing pancreas transplants alone. The goal is to transplant patients who must take insulin to treat their diabetes. Transplanting a pancreas will replace the role of insulin, acting as a cure for diabetes.

Directors

Dr. Anthony Jevnikar Dr. Patrick Luke

Manager

Ms. Carla Cormack

London Health Sciences Centre
Multi-Organ Transplant Program

www.lhsc.on.ca/transplant