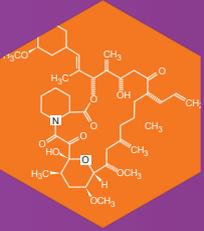




# History and Experience



For more than **30** years, UPMC Transplant Services has forged new treatments and innovative research that has allowed the field of transplantation to thrive around the world.

With this historical excellence in the field of solid-organ transplantation that has defined UPMC, our program has been consistently challenged with some of the most difficult and complex cases. Despite this, we maintain outcomes that are on par with national benchmarks.

This book is a comprehensive resource with information about our robust transplant programs. It is meant to assist you in determining if your patients would benefit from such treatments.





Our  
**Transplant**  
Services



## Heart Transplant Program

### PROGRAM HIGHLIGHTS

- > Began performing heart transplantation in 1980.
- > Performed the world's first heart-liver transplant in 1984, and the world's first heart-liver-kidney transplant in 1989.
- > Second program in the world to surpass 3,000 heart, lung, and heart-lung transplants procedures in 2012.

## Artificial Heart Program

### PROGRAM HIGHLIGHTS

- > Began performing VAD implantation in 1987.
- > Became the first medical center in the world to discharge a patient with a VAD in 1990.

### Summary

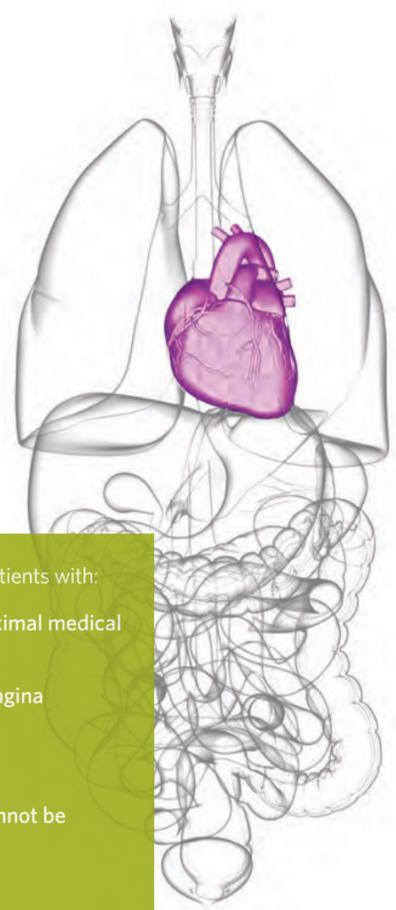
Our surgeons and cardiologists are international leaders in heart transplant research. Such work has continued to improve the care and outcomes for heart transplant patients. We have pioneered techniques in high-risk cases, and the use of multiple-organ transplants. We are able to successfully handle complex cases because the breadth of experience at UPMC ensures that patients receive care that is best suited to their unique clinical needs.

Unfortunately there are more patients waiting for transplant than suitable donors, so most patients have to wait a long time for transplant. Patients listed at our center have significantly shorter average waiting times until transplantation, compared with national and regional averages.

If patients waiting for a transplant become too sick before a suitable donor becomes available, they are evaluated for a ventricular assist device (VAD) to support their heart function, relieve their heart failure, and allow them to wait at home with better exercise tolerance and quality of life until they receive a transplant. This tailored, patient-centered approach continues after transplantation: our experience and resources ensure that treatment strategies are individualized for each patient.

### Who is eligible?

- General indications for heart transplantation include patients with:
- End-stage heart failure that fails to respond to maximal medical therapy including intravenous drugs
  - Severe coronary artery disease with untreatable angina
  - Cardiogenic shock
  - Recurrent ventricular arrhythmias
  - Congenital heart disease with heart failure that cannot be surgically repaired
  - Severe hypertrophic heart disease



### Summary

The UPMC Artificial Heart Program is integrated with the UPMC Heart and Vascular Institute and world-renowned UPMC Heart Transplant Program for truly comprehensive care. Program leaders have authored widely published research and are internationally regarded as pioneers in VAD development and application. This program features a full complement of physicians, nurses, and bioengineers working together 24/7 along with referring physicians to co-manage all aspects of patient care.

A VAD, or a ventricular assist device, is a device that pumps blood for patients with a weakened heart muscle. Blood flows from the heart to the VAD, which then pumps it to the body's circulatory system. The VAD is typically used one of two ways:

- As a bridge to transplant — Patients get a VAD so that they can then wait for heart transplantation while in a more stable condition.
- As destination therapy — These patients live on the pump as an alternative to transplantation as outpatients. VAD technology for severe heart failure improves quality of life for patients and allows them to live a life free of heart failure symptoms.

*The HeartWare® HVAD left ventricular assist device has been approved for bridge to transplant.*



*The Thoratec HeartMate II® left ventricular assist device has been approved for bridge to transplant and for destination therapy.*



### Who is eligible?

- Candidates for VAD implantation include:
- Patients with advanced heart failure, who may be eligible for transplant, but are too sick to wait for a heart to become available
  - Patients who have advanced heart failure but are not transplant candidates either because of other medical problems or age

TO MAKE A REFERRAL, CALL 1-800-544-2500.



## Lung Transplant Program

- PROGRAM HIGHLIGHTS**
- > Began performing lung transplantation in 1982.
  - > One of the most active ECMO (extra-corporeal membrane oxygenation) centers in the country.
  - > In 2016, our program performed its 2,000th lung transplant, more than any other center in the country.

## Kidney Transplant Program

- PROGRAM HIGHLIGHTS**
- > Began performing kidney transplantation in 1966.
  - > National leader in solid-organ and living-donor kidney transplantation.
  - > Expertise in minimally invasive living-donor surgery.

### Summary

UPMC's Lung Transplantation Program is one of the most experienced centers in the world for lung and combined heart-lung transplantation. Since our program's inception in 1982, we have performed more than 2,000 lung and heart-lung transplants. The UPMC Lung Transplantation Program works within the UPMC Comprehensive Lung Center to provide exceptional care for patients along the entire spectrum of life-threatening lung diseases. Approximately 30 percent of our recipients have been declined for lung transplantation at other centers. Our clinical experience and dedicated support resources have allowed our specialists to medically manage the most complex cases, including pulmonary parenchymal disease that significantly limits life activities despite previous surgical and medical therapy. We share insight and knowledge with our colleagues so that each patient receives the individualized treatment he or she needs, from pulmonary rehabilitation to medical

management, to surgery. Our physicians are pioneers in the use of ECMO, or extra-corporeal membrane oxygenation, which replaces the heart and lung function by circulating the patient's blood through an artificial lung. UPMC is also actively involved in research pertaining to organ perfusion. Perfusing the organ outside of the body (ex vivo organ perfusion) can improve the quality of the donor

lung and result in transplantation of lungs that were previously determined to be unsuitable. Through ex vivo lung perfusion, we hope to expand the utilization of donor lungs and offer this life-saving therapy to more patients with end-stage lung disease.



### Who is eligible?

UPMC lung and heart-lung transplant specialists care for people with life-threatening lung diseases. Diseases treatable by transplantation therapy include:

- Chronic obstructive pulmonary disease (COPD)/emphysema
- Idiopathic pulmonary fibrosis (IPF)
- Cystic fibrosis
- Alpha-1 antitrypsin deficiency
- Primary pulmonary hypertension
- Bronchiectasis
- Retransplantation for chronic rejection
- Pulmonary fibrosis related to collagen vascular disease
- Sarcoidosis
- Scleroderma

### Summary

More than 26 million Americans have kidney disease, and millions more are at risk. For many patients with end-stage renal disease (ESRD), kidney transplantation is a viable, lifesaving option. The UPMC Kidney Transplant Program brings decades of experience in both deceased-donor and living-donor transplants. The significant expansion of UPMC's exclusively laparoscopic (minimally invasive) live donor program provides another option for patients awaiting transplant. Although a kidney transplant is a complex, serious procedure, we maintain a personal, patient-focused approach that takes into consideration the stress and concerns that many individuals experience throughout the evaluation, operation, and recovery period.

### Living Donation

Living-donor kidney transplantation provides a way for patients to overcome the limitations of the waiting list, with improved outcomes compared with deceased-donor kidneys.

While the typical wait for a deceased-donor kidney transplant ranges from two to six years, a living-donor transplant can usually be performed within a few months. UPMC offers patients one of the nation's most experienced teams dedicated to living-donor kidney transplantation. Living-donor kidney transplantation consistently improves both graft survival and patient survival compared with deceased-donor transplantation.

Other advantages include a lower incidence of complications, less delayed graft function, a shorter hospital stay, and elimination of

waiting time. UPMC clinicians will educate potential living donors about the procedure and determine whether donation is his or her best option. Early referral for a living-donor kidney transplant is key. It allows our dedicated team to provide comprehensive assessments and determine if living-donor kidney transplant is an option. With this option, the recipient can avoid dialysis altogether.

### Who is eligible?

Candidates for kidney transplants include:

- Patients suffering from end-stage renal disease.

Patients do not have to be on dialysis to be evaluated for or receive a transplant. For some individuals, a kidney transplant may not be an option due to other medical problems. These conditions can be identified based on your input or during our initial evaluation.





**PROGRAM HIGHLIGHTS**

- > The liver transplantation program is one of the oldest and largest in the United States.
- > Expertise in solid-organ, living-donor, and multivisceral transplantation.
- > National leader in treatment and transplant for primary liver cancers.

**Liver Transplant Program**



**Summary**

The UPMC Liver Transplant Program distinguishes itself as a worldwide leader with respect to volume and experience in treating a wide range of patients, including those with complex liver disease. The UPMC Liver Transplant Program has historically been home to many of the world's most recognized transplant experts. From pioneering surgeons to highly skilled hepatologists and specially trained nurses who provide care before, during, and after surgery, to the researchers who move the field forward, our level of expertise enables us to medically manage patients along the entire spectrum of liver disease. To ensure that each patient is carefully evaluated to determine his or her best course of treatment, many patient referrals start at the UPMC Center for Liver Diseases (CLD), which provides patients with a variety of comprehensive medical options that may delay, or even prevent the need for transplantation altogether. The CLD complements the UPMC Liver Transplant Program by offering convenient access to the most advanced methods of evaluation and medical management of patients diagnosed with acute or chronic liver disease.

**Living Donation**

As the disparity between organs available for transplantation and the number of potential recipients increases, the waiting list grows rapidly. Living-donor liver transplantation provides a way for patients to overcome the limitations of the waiting list, with improved outcomes compared with deceased-donor liver transplants. While the typical wait for a deceased-donor liver transplant ranges from one-and-a-half to two years, a living-donor transplant can usually be performed within a few months. Living donation is a life-saving option that should be discussed

with every patient on the waiting list. UPMC offers patients one of the nation's most experienced teams dedicated to living-donor liver transplantation. There are many advantages for a recipient with a living-donor transplant. Most importantly, the recipient can receive a life-saving transplant before he or she becomes critically ill or dies from their liver disease. Additionally, with the growing liver transplant waiting list, living donation increases the amount of deceased-donor organs available and helps to reduce deaths on the transplant waiting list.

**Who is eligible?**

- Candidates for liver transplantation are those patients whose livers no longer function adequately (liver failure). This can be treated in:
1. Patients with hepatocellular disease (chronic viral hepatitis, hepatitis B [HBV], hepatitis C [HBC], alcoholic liver disease, autoimmune cirrhosis, cryptogenic cirrhosis)
  2. Patients with cholestatic disease (primary biliary cirrhosis [PBC], primary sclerosing cholangitis [PSC], secondary cholangitis)
  3. Patients with metabolic disease (hemochromatosis, Wilson's disease, alpha-1 antitrypsin deficiency, oxalosis, hemophilia, cystic fibrosis, amyloidosis, non-alcoholic steatohepatitis [NASH])
  4. Unique patient populations (co-infected patients [HIV], bloodless liver transplant, multiple organ transplants - liver/kidney, liver/heart, liver/lung)



**PROGRAM HIGHLIGHTS**

- > Offering three types of pancreas transplant: pancreas transplant alone; simultaneous pancreas-kidney transplant; pancreas-after-kidney transplant.
- > Exploring research into genetic biometrics leading to pancreatitis.
- > Experienced in total pancreatectomy with auto-islet pancreas transplant.

**Pancreas Transplant Program**



**Summary**

Diabetes is the leading cause of end-stage renal disease and a national health problem; 23.6 million Americans have been diagnosed with type 1 or type 2 diabetes. Many patients with diabetes seek pancreas transplantation as a medical alternative to lifelong dialysis. Frequently, these select patients also may be candidates for pancreas transplantation to replace insulin therapy. The UPMC Pancreas Transplant Program has historically been home to many of the world's most recognized transplant experts for both pancreas and kidney-pancreas transplants in patients with diabetes. With improved surgical techniques, UPMC surgeons have found that pancreas transplantation offers new hope to patients with insulin-dependent diabetes, with or without end-stage renal disease. Our team considers the advantages of medical treatments before evaluating patients for a pancreas transplant.

Successful pancreas transplantation improves quality of life, achieves a euglycemic state, and may help to prevent or improve secondary complications of diabetes. The UPMC Pancreas Transplant Program is part

of a comprehensive system that brings together highly experienced surgical and medical specialists to care for patients throughout their course of treatment.

**Who is eligible?**

- Patients with the following conditions may benefit from a pancreas transplant:
- Insulin-dependent type 1 diabetes that is difficult to control
  - Hypoglycemic unawareness event with excellent medical management
- The ideal candidate has diabetes with no renal failure. However, the majority of pancreas transplant candidates have progressive secondary complications of type 1 diabetes, despite satisfactory glucose control. These include:
- Diabetic nephropathy
  - Diabetic neuropathy
  - Diabetic retinopathy
  - Autonomic neuropathy or gastroparesis
  - Accelerated atherosclerosis
- Due to the prevalence of renal complications in patients with diabetes, some whom become candidates for pancreas transplantation may have underlying renal problems. These patients may be candidates for a simultaneous kidney-pancreas transplant or a kidney transplant followed by a pancreas transplant at a later date. Pancreas-after-kidney transplantation is best when a living donor is available to provide the kidney.





## Team Members



Throughout each patient's transplant journey at UPMC, they will interact with a dedicated transplant team whose main goal is to provide a seamless and comforting experience for them and their loved ones.

This team includes:

## Intestinal Rehabilitation and Transplant Program

### PROGRAM HIGHLIGHTS

- > Began performing intestinal transplantation in 1990.
- > More than 600 intestinal and multivisceral transplants on both adult and pediatric patients have been performed at UPMC, representing more than 25 percent of the worldwide total.
- > Our team developed and standardized many of the procedures currently used by top centers around the world.

### Summary

The UPMC Intestinal Rehabilitation and Transplantation Center (IRTC) was formally developed in 1999, at which time UPMC already had a decade of experience in performing intestinal transplants. The specialists at the IRTC use state-of-the-art medical and surgical treatments to successfully treat patients, restoring his or her lifestyle without the need for intravenous nutrition. Many of our patients have experienced success with rehabilitation services, while others with more advanced diseases benefit from transplant. Patients from both of these groups have gone on to experience greatly improved quality of life, enjoying a normal oral diet.

Our dietitians assist with the management of TPN therapy and provide individualized diet counseling to patients at home, as well as in the hospital or at clinic appointments. Whether the patient has surgical or medical intervention, nutritional counseling is an integral part of the treatment process. Patients go through a nutritional assessment to determine the appropriate needs and course of action.

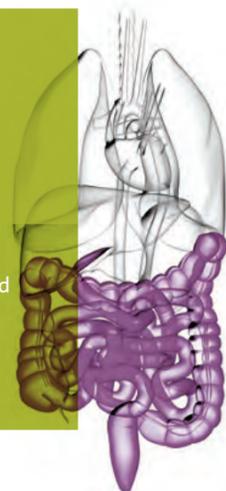
Gastrointestinal rehabilitation means restoration of nutritional autonomy with an unrestricted oral diet and elimination of the need for intravenous nutritional support. This has recently been achieved with more successful outcomes by surgical autologous reconstruction combined with a special diet regimen and pharmacologic manipulation of the gut with enterocyte trophic factors such as growth hormone, and most recently GLP-2.

The surgical approach is tailored according to patients' needs, including restoring continuity of the gut, repairing enteric fistulae, and lengthening procedures, such as serial transverse enteroplasty (STEP). When rehabilitation alone is not successful, the highly experienced transplant team at the IRTC will provide intestinal transplant based on the length of the remaining bowel.

### Who is eligible?

Candidates for intestinal rehabilitation or transplant include:

- Patients with irreversible intestinal failure due to:
  - > Short bowel syndrome
  - > Complex enterocutaneous fistula
  - > Complications of gastric bypass surgery
  - > Crohn's disease
  - > Vascular occlusion
  - > Abdominal trauma
  - > Dysmotility
  - > Unresectable desmoid and complex tumors
- Other gut disorders combined with organ failure



- Transplant specialists
  - > Hepatologists
  - > Gastroenterologists
  - > Pulmonologists
  - > Cardiologists
  - > Nephrologists
  - > Endocrinologists
  - > Pathologists
- Transplant surgeons
- Dedicated pre- and post-transplant nurse coordinators
- Dedicated transplant pharmacists
- Psychologists and psychiatrists
- Transplant social workers
- Dedicated transplant dietitians
- Financial credit analysts
- Independent living-donor advocates

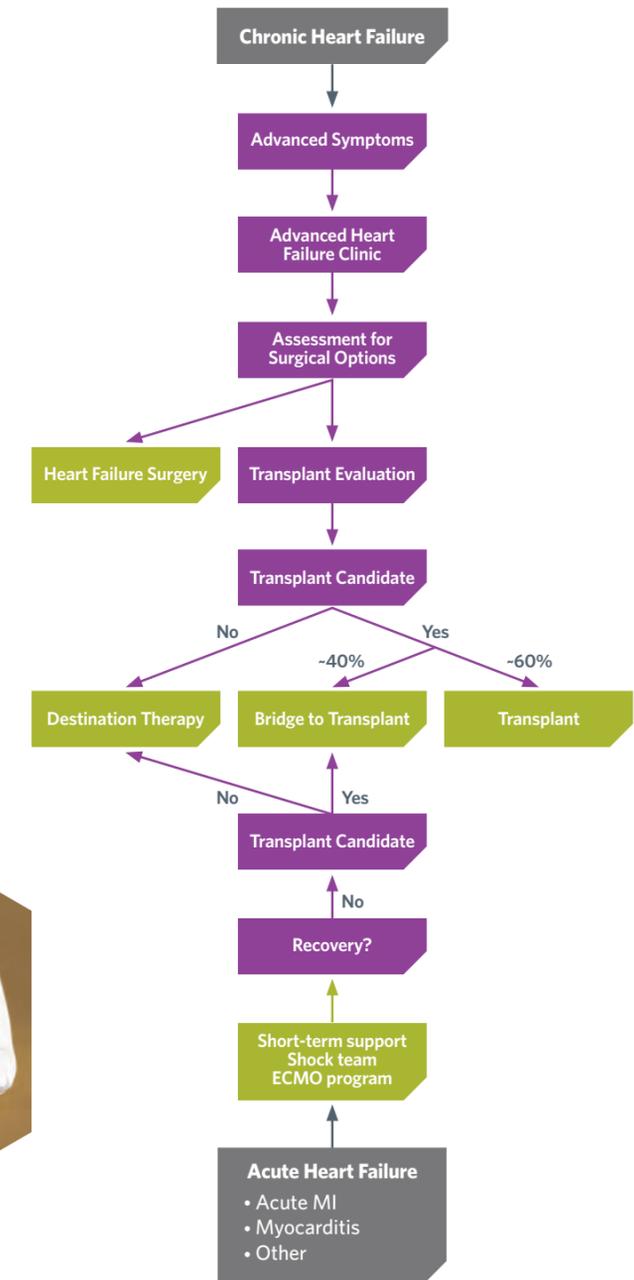
TO MAKE A REFERRAL, CALL 1-800-544-2500.

# The **Transplant** Process

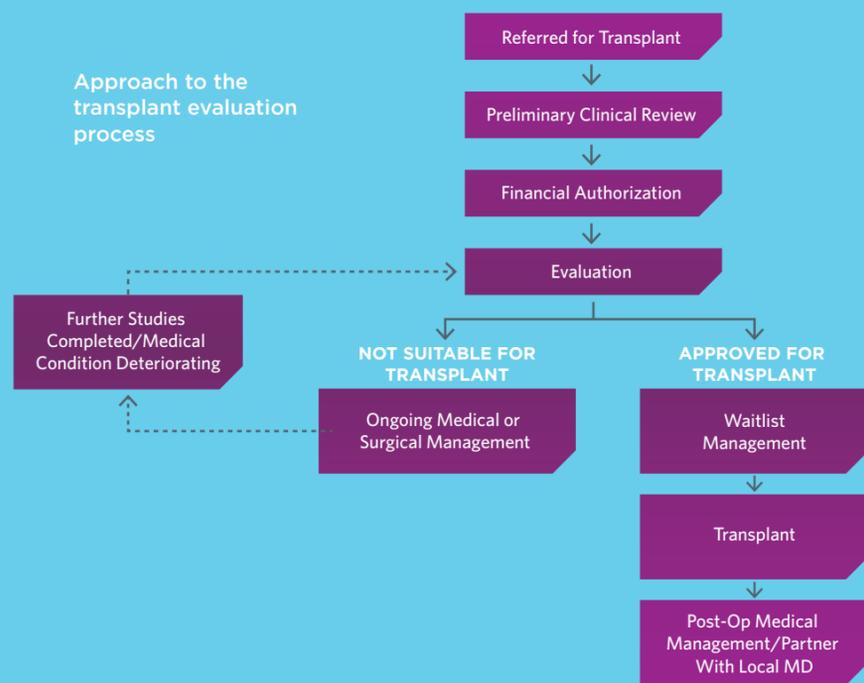


- Preliminary Clinical Review** - A pretransplant nurse coordinator collects the patient's medical history, radiology studies, recent blood work, and current physical findings, which are then reviewed by the transplant team.
- Financial Authorization** - Before scheduling a transplant evaluation, a UPMC transplant credit analyst and insurance case manager will work together to determine the extent of insurance coverage for the individual patient.
- Evaluation** - Typically conducted on an outpatient basis, transplant evaluation requires a week-long stay in Pittsburgh, during which a multidisciplinary team of specialists provide diagnostic testing and consultation.
- Pretransplant** - The UPMC transplant team partners with the referring physician in the ongoing care of the patient once he or she is listed for an organ with the United Network for Organ Sharing (UNOS).
- Transplant Surgery and Hospitalization** - Once an organ becomes available, the transplant coordinator notifies the referring physician, who then reports for admission to UPMC and is prepped for surgery.
- Long-term Collaboration for Follow-up Care** - The transplant team provides primary care during hospitalization and collaborates with referring specialists to provide long-term and follow-up care after discharge.

Approach to the patient with advanced heart failure



Approach to the transplant evaluation process



We will communicate with the patient's own physician as a valued team member during key steps of the transplant process and work together to co-manage the patient after transplantation. Once the patient is transferred back to the physician's care full time, our transplant team will continue to be available for consultation.





## Partnering for **Life**

We take pride in keeping the lines of communication open with patients, families, and referring physicians regarding status, procedures, treatments, and follow-up care. Although transplantation is a complex, serious procedure, we maintain a personal, patient-focused approach that takes into consideration the stress and concerns many individuals experience.

To ensure optimal continuity of patient care, the UPMC transplant team pursues a collaborative approach with referring physicians. UPMC's transplant surgeons and physicians are available for consults 24 hours a day, seven days a week.



**Thomas E. Starzl**

**Transplantation Institute**

UPMC Montefiore, 7 South  
3459 Fifth Ave.  
Pittsburgh, PA 15213  
Telephone: 1-877-640-6746 or  
412-647-5800  
Email: [transplant@upmc.edu](mailto:transplant@upmc.edu)

**Cardiothoracic  
Transplantation Program**

UPMC Presbyterian, Suite C-900  
200 Lothrop St.  
Pittsburgh, PA 15213  
Telephone: 1-800-544-2500  
Email: [cttransplant@upmc.edu](mailto:cttransplant@upmc.edu)

**Hillman Center for Pediatric  
Transplantation**

Children's Hospital of Pittsburgh  
of UPMC  
One Children's Hospital Drive  
4401 Penn Ave.  
Pittsburgh, PA 15224  
Telephone: 412-692-5325

-  Kidney Transplant Specialist Clinics
-  Liver Transplant Specialist Clinics
-  Cardiothoracic Transplant Specialist Clinics



ISMETT, or the Istituto Mediterraneo per i Trapianti e Terapie ad Alta Specializzazione in Palermo, Italy, has performed more than 1,300 transplants in the last decade, making it one of the leading organ transplant centers in Europe and a major referral center for other Mediterranean countries. For more than a decade, UPMC Transplant Services has been partnering with ISMETT to provide cutting-edge training to transplant surgeons in Italy. Exporting our expertise abroad means that we can provide patients in other countries closer access to life-saving transplant treatments. And, as a world-class transplant center, this provides an unparalleled standard of training with hopes of spurring medical innovation in other parts of the world.