

Managing the spectrum  
of organ failure  
and transplantation

NewYork-Presbyterian Hospital

# Organ Transplant Program



HEART



INTESTINAL AND MULTIVISCERAL



KIDNEY



LIVER



LUNG



PANCREAS



# Leadership in Organ Transplantation

The comprehensive transplant services at NewYork-Presbyterian Hospital support longstanding programs in heart, liver, lung, kidney, and pancreatic transplantation, and most recently, intestinal and multivisceral transplantation. Ranking first in the nation in the number of solid organ transplants performed each year, NewYork-Presbyterian physicians treat adults and children with the most complex and challenging problems. These include many patients referred from centers across the U.S. and internationally, including multi-organ transplant recipients. The center's outcomes are excellent in each program.

NewYork-Presbyterian Hospital has made important contributions to increasing the pool of available donor organs through innovative approaches in organ selection, preservation, immune protocols, and improved monitoring of graft status. Its faculty are also dedicated to the study of ethics and public policy related to transplantation, and the study of long-term health in donors and recipients.

The Hospital's faculty have a distinguished history of advancing standards of care and survival rates by employing innovative surgical techniques and by applying basic scientific research in immunosuppression to the clinical setting. Additionally, cardiac and liver patients benefit from the invention and perfection of life-sustaining cardiac and liver devices that extend and improve the lives of patients awaiting organ transplantation.

Moreover, the program recognizes the complexity of how outcomes are affected by the myriad factors impacting donors' and recipients' health. When performing transplantation as an immediate lifesaving event, some disparities between donor and recipient are to be expected. In all cases, however, the clinicians strive to maximize patients' health prior to transplantation, minimize donors' medical issues, and, based on clinical experience, to best match donor organs with the most appropriate recipients.

Looking to the future of organ transplantation at NewYork-Presbyterian, Manikkam Suthanthiran, MD, says, "An important goal is to provide individualized treatment for each transplant recipient. With the use of molecular diagnostic approaches, we plan to minimize immunosuppressive drug therapy and offer personalized medicine to our patients. Our ultimate goal is to altogether eliminate the need for immunosuppressive drugs."

## Transplant Initiative

At NewYork-Presbyterian Hospital/Columbia University Medical Center, a major transplant initiative has been launched to drive the growth of both clinical and research aspects of transplantation. This multi-year undertaking will involve medicine, pathology, and surgery in both adults and children.

Although the Hospital is already a national leader in clinical transplantation with respect to volume and patient outcomes, this initiative will further leverage the diverse expertise of its transplant scientists and clinicians. The goal: new discoveries in patient care and deeper understanding of the biology of transplantation. "Formalizing and further integrating the community of transplant professionals will better position NewYork-Presbyterian/Columbia to carry out larger research initiatives both in the laboratory and in patient care," according to Jean C. Emond, MD. "The objective is to have a full-spectrum center dedicated to transplantation – one at the leading edge of discovery and delivery of care – a center of excellence for translational research, new creativity in medical and surgical care, and the achievement of groundbreaking outcomes."

With its commitment to excellence in every facet of organ transplantation, patients and their primary care physicians can expect the Hospital to provide the highest level of care at every stage of transplantation and beyond.



**Manikkam Suthanthiran, MD**

Chief, Department of Transplantation Medicine, NewYork-Presbyterian Hospital/Weill Cornell Medical Center

Chief, Division of Nephrology and Hypertension, and Stanton Griffis Distinguished Professor of Medicine, Weill Cornell Medical College



**Jean C. Emond, MD**

Vice Chair and Director of Transplantation, NewYork-Presbyterian Hospital/Columbia Medical Center

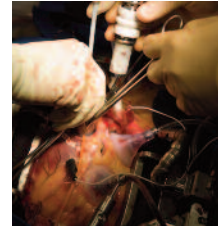
Thomas S. Zimmer Professor of Surgery, Columbia University College of Physicians and Surgeons

# NewYork-Presbyterian Hospital

Comprehensive Capabilities for Adult Organ Transplantation

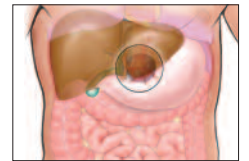
Heart Failure and Transplantation

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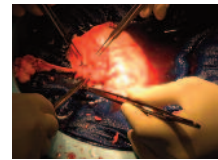
Intestinal and Multivisceral Transplantation

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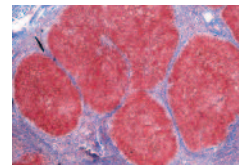
Kidney Transplantation

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Liver Transplantation

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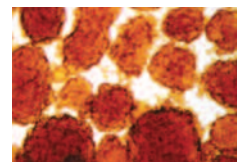
Lung Transplantation

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Pancreas Transplantation

20





# Heart Failure and Transplantation

The heart failure and transplantation program at NewYork-Presbyterian Hospital is the largest and most active heart transplant program in the nation. In 2007, the program celebrated its 2000<sup>th</sup> transplant — a milestone no other U.S. hospital has achieved.



René Perez

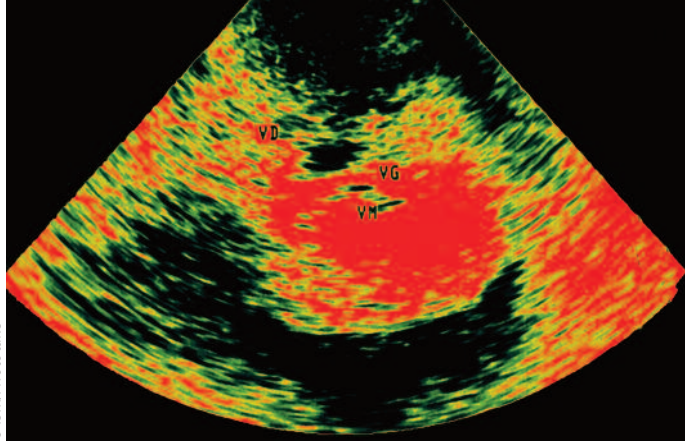
▲  
Surgeons performing a heart transplant at NewYork-Presbyterian Hospital.

## Overview

The program consistently treats patients with significant comorbidities and high risks, including those with cardiac amyloidosis, diabetes-related end-stage organ damage, and HIV. Despite taking on these high-risk patients, the program's survival rates have consistently met or exceeded the national average since its inception in 1977. UNOS ranked NewYork-Presbyterian Hospital's heart transplantation program number one in 2006 and 2007, and the program continues to lead the nation in both transplant volume and outcomes today.

Patients with end-stage cardiac disease receive state-of-the-art care at both campuses of the Hospital.

- ❖ The Center for Advanced Cardiac Care at NewYork-Presbyterian/Columbia has evolved from what was the very first U.S. program devoted solely to the treatment of congestive heart failure. Today it offers the full range of medical and surgical treatments for heart failure, including established as well as late generation investigational LVADs.
- ❖ The Mechanical Circulatory Support Program at NewYork-Presbyterian/Columbia stands as a clear leader in the implantation, development, and study of left ventricular assist devices, both as bridge-to-transplantation and as destination therapy. The program is committed to improving LVAD technology and to extending the availability of LVADs to underserved patient populations (including small adults and children). The latest devices, which are much smaller and more comfortable than earlier predecessors, are now being placed for longer-term use with excellent results.
- ❖ The Perkin Center for Heart Failure at the Ronald O. Perleman Heart Institute of NewYork-Presbyterian Hospital/Weill Cornell Medical Center is dedicated to medical and surgical management of heart failure. It offers special expertise in treating patients with pulmonary hypertension and right heart failure.



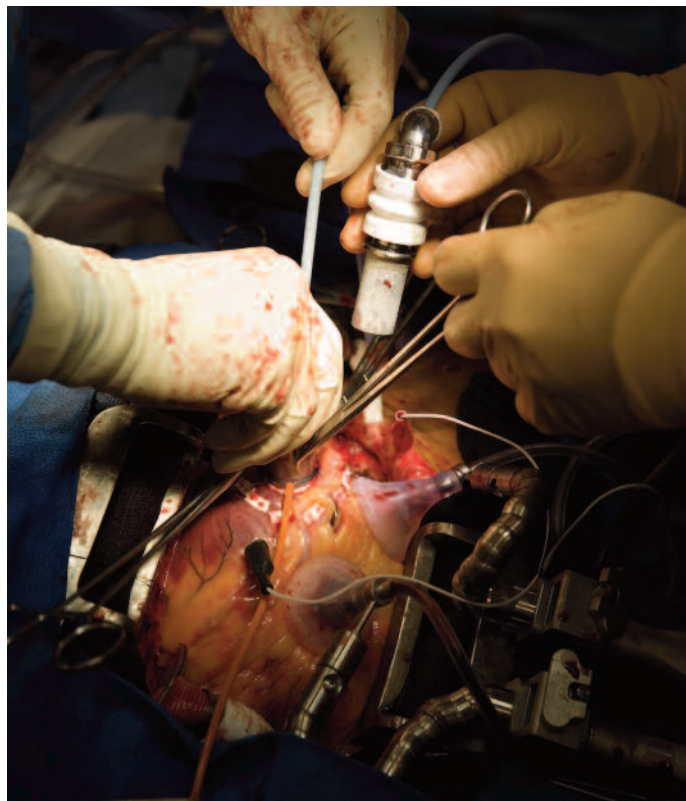
◀ Ultrasound of the heart (axial section) showing left ventricular hypertrophy.

## Innovations

Innovation is the driving force behind the heart failure and transplantation program, with physician-researchers making daily advances in medical therapies, surgical techniques, immunologic therapies, imaging methods, and device development.

The program's long history of innovation encompasses many milestones, including:

- ❖ the first mechanical bridge-to-transplantation using intra-aortic balloon pumps, in the 1970's;
- ❖ the first pediatric heart transplant, in 1984;
- ❖ the development of minimally invasive and hybrid (surgical-catheter based) cardiac procedures;
- ❖ the development of third-generation LVAD technologies;
- ❖ the improvement of immunosuppressant regimens;
- ❖ the creation of a gene-based blood test to replace heart biopsies to detect rejection after transplantation;
- ❖ the implementation of extended criteria organ transplantation to improve access to transplantation; and
- ❖ the use of gene therapy in the treatment of heart failure.



▲ Implantation of LVAD.

## Eligibility for Transplantation

### *Inclusion Criteria*

Patients with end-stage cardiac disease and a life expectancy of less than one year will be considered for transplantation. These patients will have one of the following:

- ❖ NYHA Class III or IV CHF refractory to maximal medical therapy. Objective data would include a reduced left ventricular ejection fraction and a reduced functional capacity with maximal oxygen consumption <10 ml/kg/min;
- ❖ Inoperable coronary artery disease with intractable anginal symptoms;
- ❖ Malignant ventricular arrhythmias unresponsive to medical or surgical therapy.

## Inclusion Criteria for LVAD Implantation

- ❖ Transplant candidate;
- ❖ NYHA Class III or IV CHF refractory to maximal medical therapy;
- ❖ Patients dependent on intravenous inotropic support;
- ❖ PCW or LAP >20, systolic BP <80, CI <2.0;
- ❖ Systolic BP <60.



## Research

### On the cutting edge:

- ❖ Researchers at NewYork-Presbyterian/Columbia are currently conducting a study on the SERCA-2 gene, which is critical for proper contraction of the heart muscle. Intracoronary injections of the gene may restore cardiac function and output in patients with severe heart failure.
- ❖ One arm of the SCCOR grant (see sidebar) is investigating the combination of stem cell therapy in conjunction with LVADs to facilitate recovery of the native heart.
- ❖ Columbia and Weill Cornell researchers are studying the etiologies of heart failure and pulmonary hypertension, and are working to develop targeted therapies based on their discoveries.
- ❖ Cardiac transplantation researchers at NewYork-Presbyterian/Columbia developed a non-invasive blood test to detect organ rejection after heart transplantation. The team is now applying similar genetic techniques to better define the phenotypes of heart failure and develop an approach that will be applicable to pulmonary hypertension.



Jada Fabrizio

▲ Richard Stowe received a HeartMate II in 2006. He feels completely normal and mobile, and has been able to eliminate or reduce many of his heart medications. Echocardiography in April 2009 revealed dramatic improvement: his left ventricle is perfectly normal in size, his ejection fraction has increased from 5-10% to 40%, and the other chambers of his heart continue to improve.



Charles Manley

▲ Comparison of larger LVAD to newer, smaller device.

### Current Clinical Trials:

- ❖ **HeartMate® II:** For advanced-stage heart failure patients: This multicenter trial, led by NewYork-Presbyterian/Columbia, found that recipients of the device as bridge-to-transplantation achieved over 90% survival;
- ❖ **SCCOR:** \$17 million NIH grant to investigate the most significant challenges associated with LVAD therapy – infection, coagulation, and neurological events;
- ❖ **COPS:** Cardiac Output Prognosis Study: noninvasively measuring cardiac output to achieve better risk-stratification and identify patients best suited for transplantation or LVAD therapies;
- ❖ **Rapamycin vs Neoral:** Evaluation of therapy in preserving kidney function after cardiac transplant surgery;
- ❖ **NIH RO1 Grant:** Erythropoietin in diastolic heart failure;
- ❖ **NIH RO1 Grant:** Oxidized LDL in heart failure;
- ❖ Assessment of Endothelial Dysfunction in heart failure with venous biopsies;
- ❖ **CARGO:** Genomic profiling to detect allograft rejection after heart transplantation;
- ❖ **CUPID:** First gene therapy trial in heart failure.

“The use of extended donor and extended recipient criteria permits transplantation for patients who might never receive a transplant otherwise, providing more options to improve patients’ quality of life.”

— Ulrich P. Jorde, MD, Assistant Professor of Clinical Medicine  
Division of Cardiology, NewYork-Presbyterian Hospital/Columbia University Medical Center.

## Patient Care

The surgeons and cardiologists at NewYork-Presbyterian Hospital have a long and distinguished history of advancing standards of care and the survival rates of patients by using innovative surgical techniques, by applying basic scientific research in immunosuppression to the clinical setting, and by inventing and perfecting life-sustaining cardiac assist devices that prolong life during the wait for organ availability. Underpinning all their efforts is a solid foundation of collaborative, multidisciplinary cooperation.

High-risk surgeries, such as coronary bypass surgery with mitral valve repair, are routinely performed to restore ventricular function and improve cardiac function sufficiently to avoid transplantation. Where possible, catheter-based techniques are now replacing open surgeries, or they are employed in conjunction with traditional surgical techniques in new “hybrid” procedures, to provide patients with the least invasive, least traumatic, most effective solutions.

Use of the newest ventricular assist devices now produces fewer complications and less bleeding than older versions, making them suitable for patients in earlier stages of disease. The physicians’ expertise in choosing the best therapeutic window for VAD implantation benefits many patients, who may now receive optimal support before transplantation with smaller, quiet, comfortable devices.

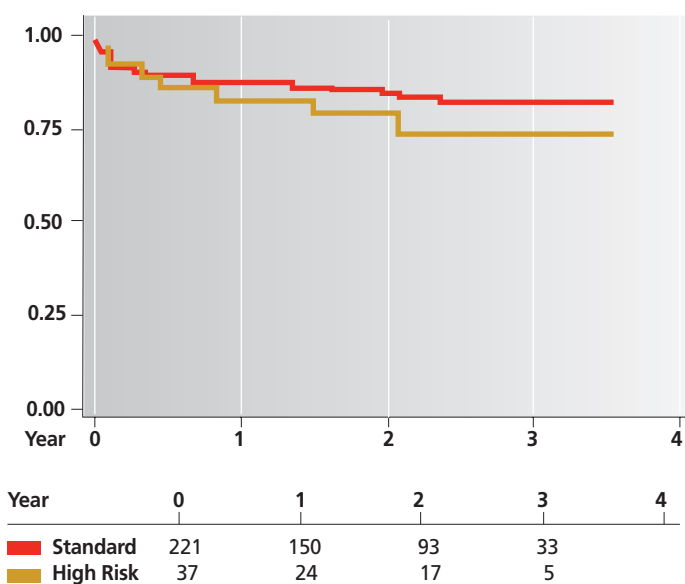
For patients who require transplant surgery, protocols are in place to ensure rapid and seamless coordination of care between the two transplant centers of the Hospital. Alternate waiting list strategies for heart transplantation are helping to maximize the use of extended donor organs. As a result, waiting times to transplantation are lower at the Hospital than at other centers in the region, and the ability to transplant sooner translates into better post-transplant outcomes.

The heart transplant program has implemented extended criteria protocols for both organ donors and transplant recipients. Today, extended donor organs are routinely utilized, and may be offered to patients over age 65 or those formerly considered too compromised to undergo transplantation. These extended criteria protocols are significantly widening the availability of organs and providing the option of transplantation to patients who would otherwise be denied treatment, with superior results.

## Outcomes

The Hospital currently performs over 100 heart transplant surgeries each year, making it the largest U.S. heart transplant program by volume. UNOS ranked this program first in the nation in 2006 and 2007. One of 12 high-performing transplant centers in the nation, the Hospital's heart transplant program is part of the Health Resources Services Administration (HRSA) Transplant Center Growth and Management Best Practices Study.

**Kaplan-Meier actuarial analysis comparing the survival of high-risk and standard list recipients at NewYork-Presbyterian/Columbia, post-transplant ( $p>0.05$ ).**



Source: NewYork-Presbyterian Heart Transplantation Program data, 2007

*For the most current data regarding heart transplant outcomes, please visit [www.ustransplant.org](http://www.ustransplant.org).*



### Heart Failure and Transplantation

NewYork-Presbyterian Hospital/  
Columbia University Medical Center  
Presbyterian Hospital Building, Room 1262  
622 West 168th Street  
New York, NY 10032

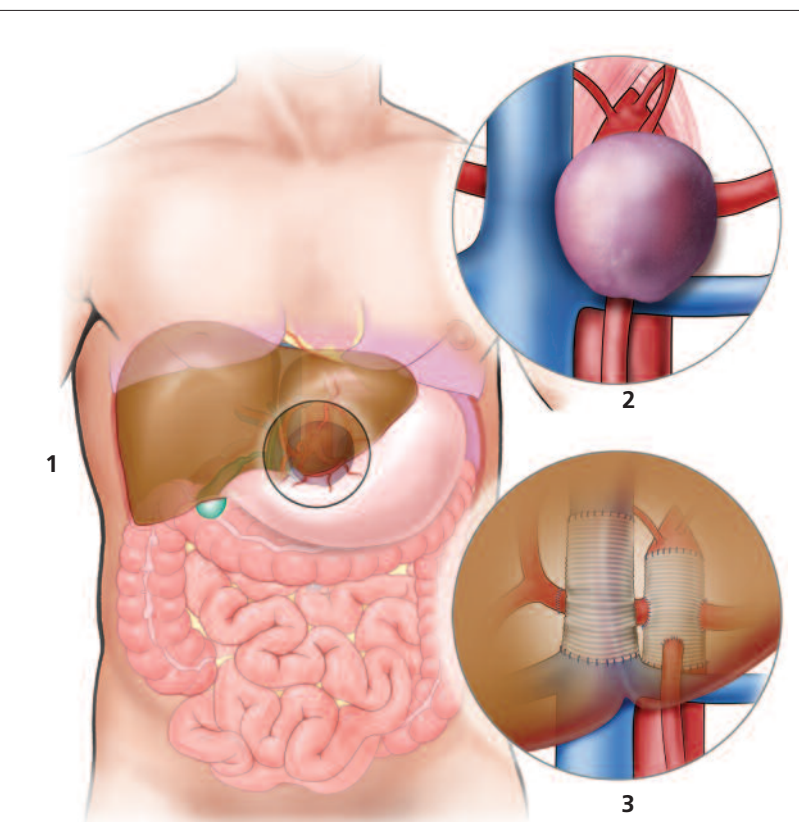
Cardiac Transplant Center: 212.305.7600

Emergency referrals and transfers: **800.NYPSTAT**



# Intestinal and Multivisceral Transplantation

Intestinal and multivisceral transplantation have become a standard of care in adults and children with intestinal failure or certain abdominal tumors.



Nancy Heim

▲ **Advances in multivisceral transplantation now allow unprecedented procedures like the one illustrated above.**

Figure 1: **A lemon-sized tumor, attached to the main arteries and wedged behind several organs, was considered unresectable by other institutions.**

Figure 2: **At NewYork-Presbyterian Hospital, surgeons successfully removed the patient's liver, pancreas, spleen, stomach, small intestine, and two-thirds of the large intestine.**

Figure 3: **After excising the tumor safely, the team reconstructed the blood vessels and performed auto-transplantation to reattach the patient's organs. In a very similar procedure, surgeons successfully excised a deeply embedded tumor from a pediatric patient at NewYork-Presbyterian Morgan Stanley Children's Hospital.**

## Overview

Approximately 200 patients worldwide currently undergo intestinal and multivisceral transplantation each year, the majority of which take place in the United States. NewYork-Presbyterian Hospital/Columbia University Medical Center is among the few U.S. transplantation centers with the expertise to offer this rare clinical service.

Intestinal grafts are classified as one of the following types:

- ❖ Isolated intestinal transplantation for patients with intestinal failure but who have a functioning liver;
- ❖ Combined liver and intestinal transplantation, for patients with liver and intestinal failure but normal stomach and pancreas; and
- ❖ Multivisceral transplantation including the stomach, liver, pancreas, and intestine.

Because allograft rejection remains a serious risk, intestinal transplantation has largely been reserved for life-threatening conditions associated with total parenteral nutrition and liver failure. As advances in surgical technique, immunosuppressant drugs, and post-operative monitoring have significantly improved survival, earlier transplantation (before liver failure) has become a viable option. Approximately 70% of multivisceral transplant recipients now survive at one year.

Physicians should refer patients with short bowel syndrome for evaluation at the Center for Liver Disease and Transplantation as early as possible, and before the development of liver failure due to total parenteral nutrition (TPN).

## Research

A high priority of intestinal and multivisceral transplant research is expansion of the indications for transplantation to patients with tumors. The Hospital's research plans include trials investigating oncological indications for transplant, as well as studies on induction of tolerance after transplantation.



“Autotransplantation can also be used in place of traditional transplantation for some patients, precluding the need for a donor organ. This could save lives and make lifelong post-transplant immunosuppression unnecessary.”

—Jean C. Emond, MD, Vice Chair and Director of Transplantation,  
NewYork-Presbyterian Hospital/Columbia University Medical Center

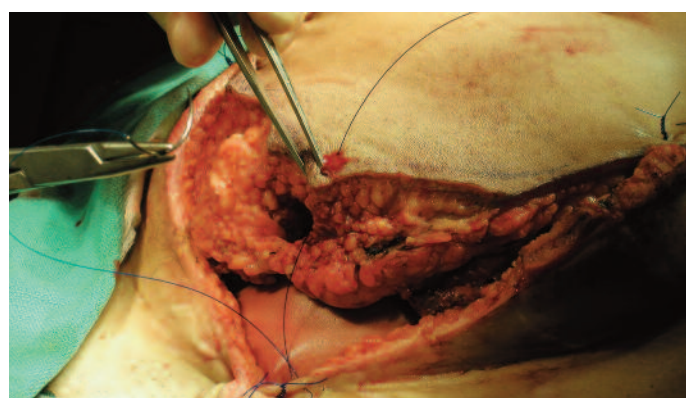
## Innovations

### *Autotransplantation for Ex Vivo Tumor Resection*

Columbia transplant surgeons at NewYork-Presbyterian have established a new method of performing ex vivo tumor resection for tumors involving the blood vessels that supply the major abdominal organs. Because of their inaccessibility and their location in or near the major vessels, such tumors are considered inoperable by most centers. The option of autotransplantation allows surgeons to remove the intestine, liver, or other abdominal organs as required in order to access the tumor resection. After excising the tumor, they reconstruct the blood vessel and then reimplant the patient's native organs. Patients undergoing autotransplantation need no immunosuppressant medications following surgery, and outcomes have been excellent.

### *Abdominal Wall Transplantation*

Abdominal wall transplantation is the reconstruction and closure of the abdominal compartment, which may be necessary after extensive abdominal resections, repeated laparotomies, tumor resection, wound infections or enterocutaneous fistulae. Abdominal wall transplantation may also be required to close the abdomen after small-bowel and multivisceral transplantation. NewYork-Presbyterian is one of the few centers in the country with experience performing this novel technique.



▲ Closure of the abdomen through abdominal wall transplantation.

## Indications for referral and evaluation

- ❖ Short bowel syndrome caused by mesenteric vascular thrombosis;
- ❖ Crohn's disease;
- ❖ Trauma;
- ❖ Volvulus;
- ❖ Functional disorders such as chronic intestinal pseudo-obstruction;
- ❖ Multiple or extensive desmoid tumors, including Gardner's syndrome, which necessitate extensive intestinal removal.

## Outcomes

Worldwide, the one-year survival rate for isolated intestinal transplantation is over 77%. Increased survival rates are associated with surgeons' experience in intestinal and multivisceral transplantation, patient volumes greater than 10 cases per year, and immunosuppression protocols that include induction therapy.\*

\*Source: 2003 Report of the International Intestine Transplant Registry

## Intestinal and Multivisceral Transplantation

NewYork-Presbyterian Hospital/  
Columbia University Medical Center  
Presbyterian Hospital Building, 14th floor  
622 West 168th Street  
New York, NY 10032  
Phone: 877.LIVER.MD

Emergency referrals and transfers: **800.NYP.STAT**



# Kidney Transplantation

Kidney transplantation is the optimal therapy for patients with end-stage renal disease, affording them healthy and productive lives free from dialysis.



Jada Fabrizio

▲ Preparation of a donor kidney before transplantation.

## Overview

The kidney transplantation programs at both NewYork-Presbyterian/Columbia and NewYork-Presbyterian/Weill Cornell are the oldest in the region and the largest in the nation. NewYork-Presbyterian/Weill Cornell works in conjunction with the Rogosin Institute, one of the top comprehensive renal centers in the nation. The multidisciplinary transplant team is composed of surgeons, nephrologists, social workers, financial coordinators, and other specialists, who rely routinely on the expertise of an unparalleled pathology unit at the Hospital, as well as its blood bank and apheresis unit.

Both programs are committed to increasing access to transplantation and returning patients to active lives. Living donor transplantation is done whenever possible in order to perform transplantation before patients require dialysis.

For those patients on the UNOS waiting list for a deceased donor organ, the renal transplantation programs use a highly effective method of managing their waiting lists. This aggressive approach ensures that those patients at the top of the list are ready to be transplanted as soon as a kidney is available. This approach is complemented by comprehensive protocols to evaluate all potential organs, including those in the 'extended criteria' category. These strategies have reduced the waiting time for deceased donor organs by an average of four years, reducing the number of patient deaths while on the waiting list and significantly improving outcomes after transplantation.

For patients with other co-morbidities, the programs offer comprehensive medical and surgical care in every field. Diabetic patients with end-stage renal failure may receive pancreatic transplantation, either simultaneously with the kidney or in a separate procedure following kidney transplantation. Patients with advanced cardiac or liver disease may be candidates for combined heart-kidney or liver-kidney transplantation.



Jada Fabrizio

▲ Donor kidney ready for transplantation at NewYork-Presbyterian Hospital.

## Innovations

Established in 1961 and 1969, respectively, the kidney transplant programs at NewYork-Presbyterian/Weill Cornell and NewYork-Presbyterian/Columbia have a long history of innovation. Both are dedicated to providing every possible opportunity for transplantation, and to overcoming the most significant challenges in kidney transplantation. They have developed innovative strategies to increase access to transplantation not only for average patients, but for people with difficult problems, and those with immunologic incompatibilities. The programs are national leaders in developing creative approaches including:

- ❖ ABO incompatible transplantation;
- ❖ Transplantation across positive cross-match;
- ❖ Desensitization of HLA antibodies in deceased donor operations; and
- ❖ Paired exchanges, including both simple and complex exchanges, and transplants involving both compatible and incompatible live donors.

NewYork-Presbyterian/Columbia is a national leader in the performance of multiple paired living donor kidney transplantation, a revolutionary approach that may dramatically improve the opportunity for patients in need of kidney transplants to find a compatible donor.

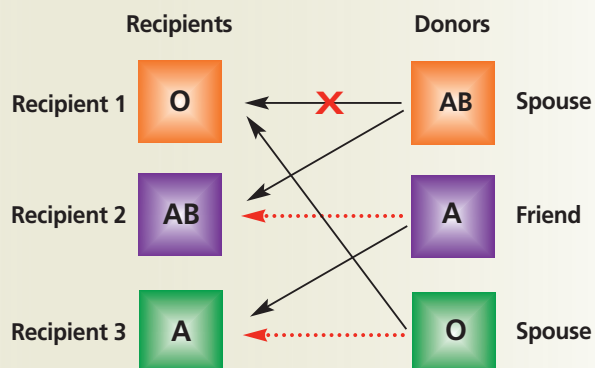
NewYork-Presbyterian/Weill Cornell was a pioneer in developing the Never Ending Altruistic Donation (NEAD), in which one altruistic (or “non-directed”) living kidney donor, willing to donate to any patient awaiting transplantation, can begin a chain of kidney transplants that otherwise would not be possible.

At NewYork-Presbyterian/Weill Cornell, physician scientists were the first to develop gene-expression-based assays to non-invasively detect organ rejection after kidney transplantation (published in 2001). Using biomarkers available in simple urine tests, this unique program allows for individualizing and minimizing the amount of immunosuppressive therapy that patients require.

The renal transplantation programs offer patients with end-stage kidney disease four transplant alternatives.

- **Compatible live donor transplants:** The gold standard of kidney transplant procedures. A kidney from a perfectly matched sibling donor can function for an average of 35 years, while less perfectly matched kidneys function for 20 years on average.
- **Paired donor exchanges:** Offer the benefits inherent in finding a compatible live donor, compared to waiting for a deceased donor. Paired donor exchanges have been performed at NewYork-Presbyterian Hospital since 2004. Several three-way exchanges (requiring six simultaneous operations), one four-way exchange, and a six-way exchange have also been successfully performed.

### Altruistic Unbalanced Paired Kidney Exchange



A donor-recipient pair that was compatible with one another (patient 3) participated in a paired kidney exchange in order to facilitate the transplantation of two other recipients who had incompatible donors (patients 1 and 2).

- **Incompatible live donors:** An option if the donor and recipient are either blood-group incompatible or incompatible due to antibodies against the transplant antigens. To accept a kidney from an incompatible donor, the recipient’s blood must be repeatedly “cleansed” of mismatched antibodies through plasmapheresis.
- **Deceased donor procedures:** Reserved for those patients who do not have any willing or medically suitable live donors. Deceased donor kidneys have a good chance of maintaining their function for 10 years post-transplant.



## Research

A major area of research focuses on overcoming immunologic incompatibilities in transplant recipients. In particular, the programs are researching ways to optimize paired kidney exchanges and to improve immunosuppressant protocols. Continued research is underway to perform both donor and transplant operations through minimally invasive techniques. At this time all donor operations are done laparoscopically. In recipients, smaller surgical incisions and laparoscopic operations are undergoing preclinical testing. Other research efforts include:

- ❖ investigations of live donor risk;
- ❖ research to further reduce the already low risk of hemorrhagic complications in donors;
- ❖ ways to expand the profile of suitable donors; and
- ❖ improving immunosuppression regimens.

## Incompatible Transplants and Paired Exchanges

Since the programs established their comprehensive incompatible renal transplant programs, over 90 patients have received kidney transplants when they did not have a compatible live donor, via ABO blood group incompatible transplants, transplants across a positive crossmatch, or paired kidney exchanges.

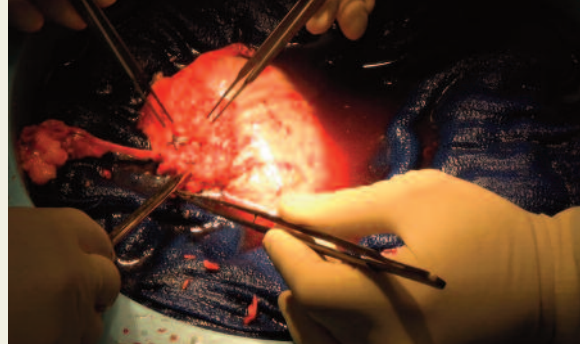
## Transplant Rate While on Waitlist

	NewYork-Presbyterian		OPO	Region	U.S.
	7/06-6/07	7/07-6/08	7/07-6/08	7/07-6/08	7/07-6/08
<b>Kidney Columbia University</b>	<b>0.41*</b>	<b>0.36*</b>	<b>0.19</b>	<b>0.20</b>	<b>0.20</b>
Deceased Donors Only	<b>0.23*</b>	<b>0.23*</b>	<b>0.12</b>	<b>0.13</b>	<b>0.14</b>
<b>Kidney Weill Cornell</b>	<b>0.37*</b>	<b>0.34*</b>	<b>0.19</b>	<b>0.19</b>	<b>0.20</b>
Deceased Donors Only	<b>0.25*</b>	<b>0.16*</b>	<b>0.12</b>	<b>0.12</b>	<b>0.14</b>

\*Statistically higher compared to U.S.

Source: SRTR Center and OPO Specific Reports, January 2009

**Patients at NewYork-Presbyterian Hospital are significantly more likely to receive a kidney transplant while on the waitlist than patients at other hospitals regionally and nationally.**



▲  
Suturing the anastomosis during kidney transplant surgery.

## Patient Care

Together, the two campuses perform over 450 kidney transplants per year. Trials of most new therapeutic options are available to NewYork-Presbyterian Hospital's patients due to their high volume and superb academic and research facilities.

Aggressive *extended criteria* protocols enable surgeons on both campuses to safely use more organs than ever for transplantation. These protocols are highly successful, especially among older recipients and those doing poorly on dialysis.

The programs are leaders in coordinating "donor swaps" to maximize the availability of compatible donor kidneys. Both centers actively encourage altruistic live organ donation and are prepared to perform multiple simultaneous donor and recipient operations.

Where compatible donors are not available, the programs are among the few worldwide to offer incompatible kidney transplantation. They use the latest immunologic strategies to cleanse mismatched antibodies from recipients' blood, allowing the transplantation of kidneys into recipients who would normally reject the graft. Long-term survival among incompatible recipients is equivalent to that for compatible transplants.

After transplantation, 90% of patients at NewYork-Presbyterian Hospital are able to avoid steroid use, as part of a highly successful steroid avoidance protocol in place since 2001. Molecular-based techniques, which are under continued research, now provide patients at both campuses with highly personalized immunosuppressant therapy in order to reduce or eliminate the use of steroids after transplantation. Over 700 transplanted patients remain completely free of steroid medications post-transplant, with an average rejection rate of just six percent.

“The challenges of immunologic incompatibility have been mitigated by our ability to perform multiple exchanges or incompatible transplants with antibody removal techniques, so that patients who were otherwise relegated to the waitlist are now receiving transplants far more quickly than ever before.”

— Lloyd E. Ratner, MD, Director, Kidney & Pancreas Transplantation,  
NewYork-Presbyterian Hospital/Columbia University Medical Center

## Partners in Care

Numerous specialty programs provide additional services to ensure the comprehensive depth and breadth of care:

A program with the Columbia University Department of Obstetrics and Gynecology provides women with specialized care in fertility and pregnancy after kidney transplantation.

A program with the Columbia University Department of Dermatology specializes in treating skin cancer and other dermatologic diseases in transplant patients.

The Live Donor Programs at both campuses are dedicated to the health and well-being of potential live donors. These programs advocate solely for donors and act completely independently of the needs of recipients.

The program at NewYork-Presbyterian/Weill Cornell works in seamless conjunction with the Rogosin Institute, one of the top comprehensive renal disease programs in the nation. Transplant operations take place in a dedicated transplant facility, while patients receive medical care at the Rogosin Institute.

At NewYork-Presbyterian/Columbia, patients receive pre- and post-surgical care at the Beverly and Arthur Shorin Comprehensive Outpatient Transplant Center.



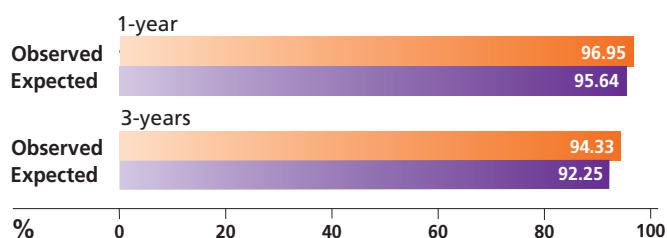
Valerie Beckford, left, received a kidney from friend and co-worker Jeanette Martinez, right.

## Outcomes

Since *U.S. News & World Report* began ranking nephrology, NewYork-Presbyterian Hospital has been ranked in the top ten in the nation every year. Even with a large volume of complex cases, its programs' outcomes surpass the national average.

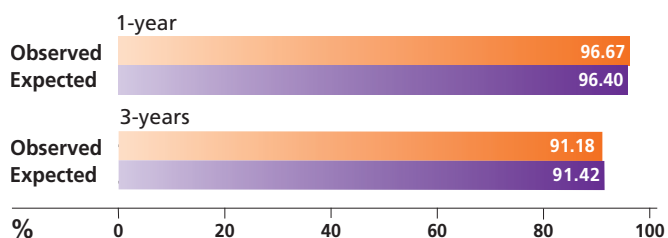
### Patient Survival Rate

NewYork-Presbyterian/Weill Cornell



### Patient Survival Rate

NewYork-Presbyterian/Columbia



Source: SRTR Center and OPO Specific Reports, January 2009

For the most current data regarding renal transplant outcomes, please visit [www.ustransplant.org](http://www.ustransplant.org).

## Kidney Transplantation

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Columbia University Medical Center  
Presbyterian Hospital Building, 12th Floor  
622 West 168th Street  
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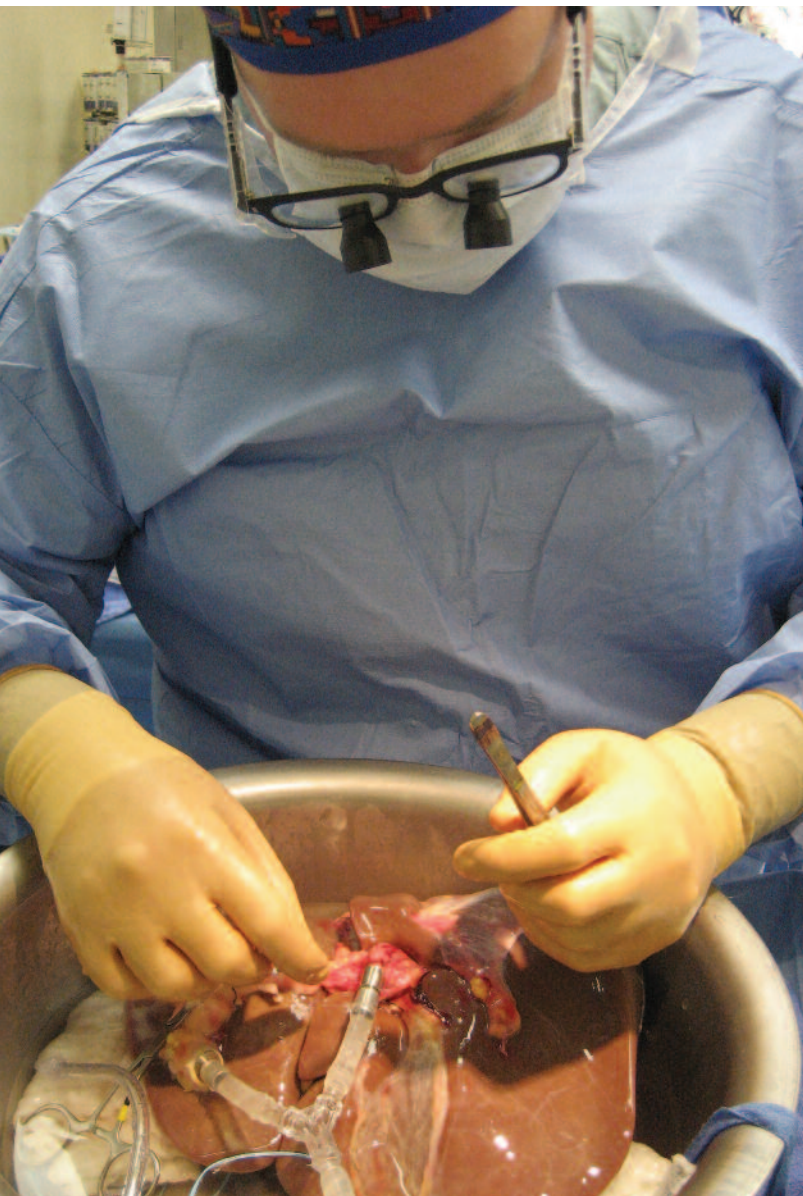
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# Liver Disease and Transplantation

For patients with advanced organ failure, the Center for Liver Disease and Transplantation provides comprehensive treatment including medical, radiologic, and surgical care for the most complex and serious diseases.



## Overview

Protocols for early intervention and prevention of decompensation are highly effective in treating many patients. Transplantation services are available for patients in whom all other efforts fail.

The Center for Liver Disease and Transplantation (CLDT) performed its 1000th transplant in 2008. The center's outcomes consistently meet or exceed the expected national average.

The center's uptown and downtown academic medical center locations are seamlessly integrated, with close collaboration among hepatologists, gastroenterologists, hepatobiliary surgeons, diagnostic and pathology experts, advanced practice nurses, social workers, and patient support staff.

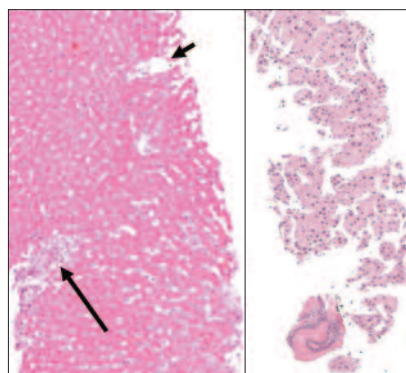
## Living Donor Liver Transplantation

By improving access to transplantation, particularly in regions such as New York that have longer waiting lists, living donor liver transplantation may reduce patients' risk of dying by 20-40%.

In living donor liver transplantation, up to 60% of a donor's liver may be removed for an adult transplant, and up to 20-25% for a child recipient. The donor's liver regenerates to its original size in several weeks, and donors return to normal activity within about a month.

The National Living Donor Assistance Center (NLDAC), established by the U.S. Health Resources and Services Administration (HRSA), provides financial assistance for travel, lodging, and meals to those who want to donate an organ and would otherwise not be able to afford these expenses.

▲ Examination of a donor liver that was stored with machine preservation.



▲ Microscopic comparison of normal liver biopsy (left) with hepatocellular carcinoma (right).

## Innovations

The Center for Liver Disease and Transplantation (CLDT) is committed to understanding and extending the limits of organ transplantation in order to provide the greatest number of transplants possible with a limited organ supply.

Numerous clinical trials have yielded methods to reduce the size of tumors, and in so doing, render patients eligible for transplantation. Among patients with unresectable localized cancer who have undergone transplantation, the five-year survival rate is 75-80%.

### *Living Donor Transplantation*

Dr. Emond was a member of the team that pioneered living donor liver transplantation, which is now considered one of the most important advances in the treatment of severe liver disease. Approximately 15-20% of the center's transplant patients currently receive a liver from a living donor.

### *Partial Liver Transplantation*

NewYork-Presbyterian Hospital was one of the first institutions to perform split liver transplantation. This procedure now accounts for a substantial proportion of liver transplants in the U.S., primarily in children.

### *Organ Preservation*

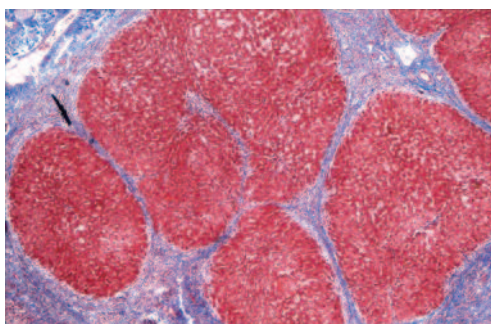
The CLDT has completed a pilot study in machine perfusion to improve organ preservation between procurement and transplantation. By better protecting the donor organ and preventing damage that can occur between harvesting and transplantation, surgeons can safely use a wider range of organs with excellent outcomes. The next step of this study involves repairing and transplanting organs that would otherwise have been considered unusable, but that are safe and effective after treatment.

### *Multi-Organ Transplantation*

The Hospital has extensive experience in performing combined liver-kidney transplantations. Approximately 5% of the transplant volume consists of combination procedures. In the summer of 2007, one pediatric patient received five organs in a rare multi-organ transplant operation, reflecting the Hospital's expert capabilities.

### *Transplantation for Patients with Liver and Bile Duct Cancer*

The CLDT has established a new protocol to perform transplantation in patients with hilar cholangiocarcinoma. In this experimental protocol, patients receive chemoradiation to eliminate systemic malignant cells, followed by transplant. Early results are promising, with no patients having tumor recurrence after orthotopic liver transplantation. This compares favorably with the recurrence rate of cholangiocarcinoma after medical or surgical therapy.



**Top:** Cirrhotic liver stained with trichrome stain. Diffuse scarring (excess collagen) appears blue; rounded regenerative nodules (hepatocytes) appear red.

**Bottom:** In auxiliary partial orthotopic liver transplantation (APOLT), a partial donor liver provides support while the native liver recovers.

### *Partial Liver Transplantation for Acute Liver Failure*

Patients with fulminant hepatic failure traditionally have had limited options: timely recovery of the native liver with medical management, or liver transplantation. Having revamped a procedure that was largely abandoned in the 1980's, transplant surgeons at NewYork-Presbyterian/Columbia are now able to offer patients an important alternative. In auxiliary partial orthotopic liver transplantation (APOLT), the surgeons resect part of the failing native liver and attach a partial donor liver to it. The donor liver supports the patient during recovery, clearing toxins and preventing brain injury. In the majority of patients, the native liver recovers with this support. Immunosuppressant medication can then be withdrawn, and the donor liver withers in most patients.

Although partial liver transplantation is particularly suited to children because the regenerative capacity of their livers is optimal, this technique may also be applied in young adults. In studies it has proven highly successful, with 100% of patients surviving at the time of this publication. Over half of patients have completely withdrawn from immunosuppression and the remainder are in the process of withdrawal. One patient required surgical removal of the donor liver. NewYork-Presbyterian Hospital is one of only a few hospitals worldwide with the expertise to perform partial liver transplantation.



## Research

Clinical innovation and scientific progress constitute the core of the Center for Liver Disease and Transplantation's mission. The CLDT participates in multiple government- and industry-funded clinical research studies at any given time. Patients at the CLDT have the opportunity to receive treatments that are available in few or no other centers. The Hospital is also a major center for the study of outcomes for liver disease treatment and liver transplantation.

Many of the CLDT's 40-plus studies address hepatitis C, which is the leading indication for transplantation and a major cause of organ failure after transplantation.

The CLDT is a leader in the multi-center Adult to Adult Living-donor Liver Transplant (A2ALL) study, a NIH sponsored trial to investigate the outcomes of living donor transplantation.



▲ Regina Williams with her son, Paul Mladineo, who donated part of his liver when his mother experienced liver failure due to autoimmune disease. "Paul and I are doing great. Our livers are functioning perfectly," says Williams.

## Current Clinical Trials:

- ❖ **Solid Organ Transplantation in HIV:** The primary aim of this observational trial is to evaluate the safety and efficacy of solid organ transplantation in patients with HIV disease;
- ❖ **Boceprevir (SPRINT 2):** A phase 3 safety and efficacy study of boceprevir in previously untreated patients with chronic hepatitis C genotype 1;
- ❖ **Telaprevir (Vertex 111):** A randomized study of stopping treatment at 24 weeks vs. continuing treatment to 48 weeks in treatment naive patients with genotype 1 hepatitis C who achieve an extended viral response (eRVR) while receiving telaprevir, pegylated interferon and ribavirin;
- ❖ **Rimonabant (NASH):** A placebo controlled trial to study rimonabant treatment in non-diabetic and type 2 diabetic patients with nonalcoholic steatohepatitis;
- ❖ **Adefovir Plus Vaccination:** Determining the efficacy of adefovir dipivoxil (ADV) and vaccination in recipients of livers testing positive for hepatitis B core antibody;
- ❖ **HBV Inflammatory Markers:** Assessment and clinical utility of non-invasive parameters of inflammatory activity in chronic hepatitis B;
- ❖ **Gilead-0108:** Double-blind, multi-center, randomized study comparing tenofovir disoproxil fumarate, emtricitabine plus tenofovir disoproxil fumarate, and entecavir in the treatment of chronic hepatitis B subjects with decompensated liver disease;
- ❖ **Live Donor Education:** Increasing liver donation through peer-developed education: baseline survey (HRSA);
- ❖ **ALF Adult:** A multi-center study of acute liver failure in adults;
- ❖ **Liver Perfusion:** Hypothermic machine preservation of liver grafts for transplantation;
- ❖ **A2ALL Cohort Study:** Adult-to-adult living donor liver transplantation cohort study;
- ❖ **A2ALL LADR:** Low accelerating dose regimen of pegylated interferon and ribavirin pretransplant, to eliminate post transplant hepatitis C virus recurrence;
- ❖ **ELAD:** A bioartificial liver assist device for patients with acute or chronic liver failure.



“Our surgical team has become expert at assessing the quality and properties of different types of organs — deceased standard criteria donor, deceased extended criteria organs, or living donor — and can determine which patient will most benefit from each one.”

— Dianne LaPointe-Rudow, DNP, Senior Transplant Coordinator and Clinical Director of the Living Donor Liver Transplant Program, NewYork-Presbyterian Hospital/Columbia University Medical Center

## Patient Care

The Center for Liver Disease and Transplantation offers the full spectrum of services to patients with liver disease, from consultations on all forms of benign and malignant liver disease, to antiviral therapies for hepatitis B and hepatitis C, to transplantation.

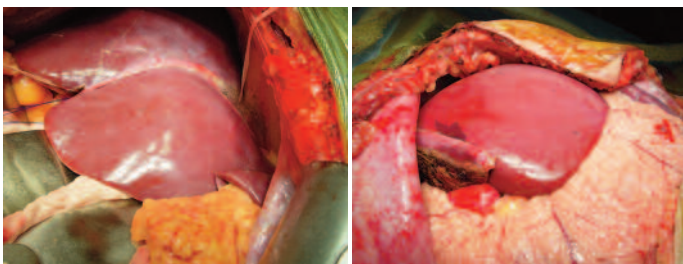
Patients co-infected with hepatitis C or HIV may also receive transplant services at the CLDT, as can patients with cancer of the bile ducts. NewYork-Presbyterian Hospital is one of very few institutions to provide these options.

The CLDT is committed to providing care to patients and will work to assist them with their financial needs.

## Living Donor Recipient Criteria:

A potential live donor liver transplant recipient must:

- ❖ Meet the current listing criteria for liver transplant;
- ❖ Be listed with OPTN/UNOS;
- ❖ Be informed of the risks/benefits, alternative treatments and outcomes for living donor and deceased donor transplantation;
- ❖ Sign consent to have potential donors evaluated for living donation.



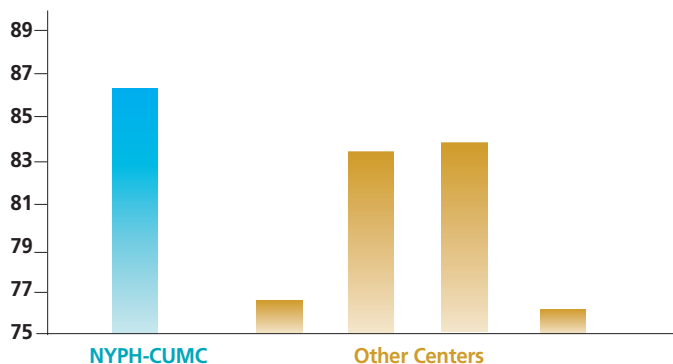
▲ Living donor liver transplantation

## Outcomes

The Center for Liver Disease and Transplantation has the highest survival rate while on the waiting list, and the shortest waiting time, in the New York State region. According to SRTR data from 2007, the Center's waiting list mortality rate is 7%, compared with 13% at the other four regional transplant centers. This is even better than expected when adjusted for the severity of patients' illness while on the waiting list.

From January 2004 to June 2006, the CLDT had a 98% survival rate for the 267 adults, and 97% survival rate for the 43 children on whom it performed liver transplants; the national rate was 96%. In that period, the one-year post-transplant survival rate was 88% for adults (87% nationally) and 94% for children.

### 2007 One-Year Patient Survival at New York Transplant Centers (percentage of patients surviving one year)



Source: OPTN/SRTR 2007 Annual Report

For the most current data regarding liver transplant outcomes, please visit [www.ustransplant.org](http://www.ustransplant.org).



### Liver Disease and Transplantation

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# Lung Transplantation

Lung transplantation can prolong and dramatically improve quality of life for patients with severe end-stage, non-malignant pulmonary disease and no alternative treatment options. The majority of patients return to work, school, and other activities within three to six months of surgery.



▲  
Chest X-ray showing chronic obstructive pulmonary disease (COPD).

## Overview

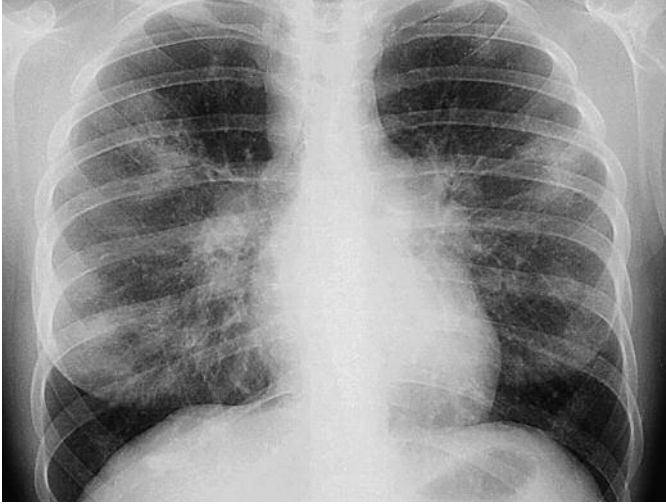
Widely regarded as the preeminent center for lung transplantation in the New York tri-state area, the Center for Lung Disease and Transplantation at NewYork-Presbyterian/Columbia University Medical Center has the highest three-year survival rate among the *U.S. News & World Report* Honor Roll Hospitals. Its patient volume has dramatically risen during the last seven years, earning the program a position in the top five programs in the nation in 2007.

Comprehensive, coordinated, multidisciplinary care is provided to patients with every type of lung disease. To avoid transplantation whenever feasible, patients are evaluated with second opinion consultations for eligibility in the interstitial lung disease program, the pulmonary hypertension program, adult cystic fibrosis program, lung volume reduction program, or for eligibility in new clinical trials. These options can effectively treat certain conditions with less invasive alternatives, or offer therapies that serve as a bridge to lung transplantation, delaying the need to perform this difficult treatment option.

Specialized programs within or affiliated with the Center for Lung Disease and Transplantation include:

- ❖ The Jo-Ann F. LeBuhn Center for Chest Disease;
- ❖ High Risk Lung Assessment Program;
- ❖ Thoracic Oncology Program;
- ❖ Interventional Bronchoscopy and Endobronchial Therapy Program, for the treatment of endobronchial tumors or tracheobronchial obstructions.

For patients who progress to end-stage lung failure, transplantation is offered when the expected survival with their native lungs is one to two years.



ISM/Phototake

▶ Chest X-ray, front view, of a 25-year-old woman with pulmonary sarcoidosis.

## Innovations

Since 1986, lung transplant research has been dedicated to improving outcomes in life-threatening lung diseases. Studies at the Center for Lung Disease and Transplantation continue to improve treatment options, prevent or delay the progression of serious lung diseases, and improve the quality of life and survival for patients. These achievements have been most notable in the areas of emphysema, idiopathic pulmonary fibrosis, pulmonary arterial hypertension, and cystic fibrosis.

The Center has pioneered the use of minimally invasive lung volume reduction (LVR) surgery as well as bronchoscopic LVR for patients with emphysema. It also uses video-assisted thoracic surgery (VATS) for both diagnostic and therapeutic interventions for a number of chest problems that previously required large, open surgical incisions.

Through laboratory research and participation in multi-center clinical trials, the Center's physicians continue to drive progress in lung transplantation. New immunosuppressive drugs and drug combinations are increasing the longevity of the transplanted organ, and decreasing side effects associated with therapy. Therapeutic regimens to prevent and treat infections are also being investigated. The researchers are investigating methods for preserving donor lungs for a longer period of time before they must be transplanted into the recipient. Additionally, lung transplant program clinical investigators are focusing on identifying specific factors in patients that may help determine the optimal timing of transplantation.

## Main Disease Indications For Transplantation

- ❖ Interstitial Lung Disease
- ❖ Cystic Fibrosis
- ❖ Chronic Obstructive Pulmonary Disease
- ❖ Pulmonary Hypertension and Sarcoidosis

## Understanding Rejection after Transplantation

The Lung Transplant Program is in the vanguard of addressing the most significant risks to lung transplantation patients: rejection of the donor organ and infections. Although medical regimens can successfully protect patients against acute organ rejection that occurs usually in the first year following transplant surgery, chronic rejection slowly and steadily undermines the health of over half of lung transplant patients during the first five years after transplantation.

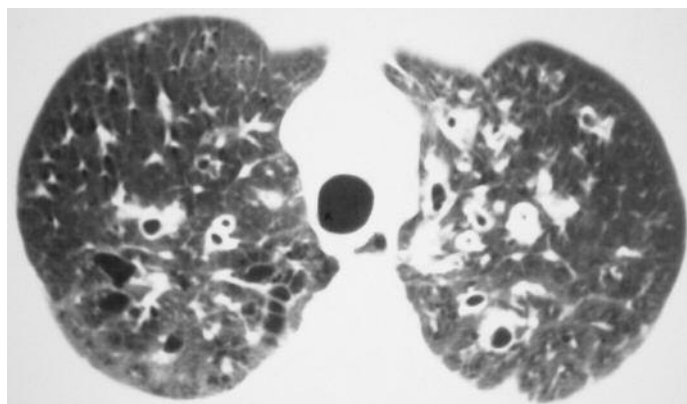
- ❖ Research at NewYork-Presbyterian/Columbia has shed light on the important role of gastro-esophageal reflux (GER) as one of the causes of chronic lung graft dysfunction, also known as chronic rejection.
- ❖ Researchers at the Center have recently discovered the role played by a pair of protein receptors in the immune system's ability to develop tolerance to a new organ. Their work is part of an ongoing investigation into why and how transplanted organs are rejected by the body so that new and improved methods for protecting a transplanted lung can evolve.
- ❖ The Center is testing new immunological surveillance techniques to enable the diagnosis of more subtle forms of rejection earlier than ever before, which ultimately could improve lung transplant patients' quality and length of life.



## Research

Current clinical studies in lung transplantation include:

- ❖ The use of inhaled cyclosporine versus placebo to prevent the development of chronic lung rejection after lung transplantation;
- ❖ Comparison of a Tacrolimus/Sirolimus/Prednisone Regimen versus Tacrolimus/Azathioprine/Prednisone Immunosuppressive Regimen in Lung Transplantation after Lung Transplantation;
- ❖ Genetic Analysis to Predict Rejection of Lung Transplants (LARGO Study): Utilizing microarray analysis techniques to determine peripheral blood gene expression, this study focuses on the prediction of acute rejection after lung transplantation;
- ❖ Lung Transplant and Hypogammaglobulinemia: Evaluating the safety and efficacy of intravenous immunoglobulin in patients with hypogammaglobulinemia after lung transplantation;
- ❖ Role of Activated Protein C in Early Acute Respiratory Distress Syndrome: Determining whether levels of activated protein C after lung transplantation are associated with lung allograft function;
- ❖ Molecular Monitoring after Solid Organ Transplantation: Examining which genes are active in patients undergoing lung transplantation;
- ❖ Pathogen Discovery in Chronic Lung Disease: Analyzing the microbes present in patients after lung transplantation;
- ❖ Genetic Predictors of Primary Graft Dysfunction after Lung Transplantation.



ISMPhototake

▲  
CT scan of the thorax, axial section, showing pulmonary cystic fibrosis. Opacities that are annular (ring-like) and dispersed in parallel lines (tram-lines) correspond to dilations of the bronchi.

## Indications for Referral

### Chronic Obstructive Pulmonary Disease

#### Guideline for Referral

- ❖ BODE index >5

#### Guidelines for Transplantation

- ❖ Patients with a BODE index of 7-10;
- ❖ Chronic progressive hypercapnia or hospitalization for exacerbation associated with acute hypercapnia;
- ❖ Pulmonary hypertension and/or cor pulmonale despite oxygen therapy;
- ❖ FEV1 <20% with DLCO <20% or homogeneous disease.

### Idiopathic Pulmonary Fibrosis

#### Guidelines for Referral

- ❖ Histologic or radiographic evidence of UIP irrespective of vital capacity in patients with idiopathic disease;
- ❖ Histologic evidence of fibrotic NSIP.

#### Guidelines for Transplantation

- ❖ Histologic or radiographic evidence of UIP in idiopathic disease or fibrotic NSIP and any of the following:
- ❖ A DLCO of <39% (UIP) or <35% (NSIP) predicted;
- ❖ A 10% or greater decrement in FVC or 15% decline in DLCO during six months of follow-up;
- ❖ A decrease in pulse oximetry below 88% during a 6MWT;
- ❖ Honeycombing on HRCT.

### Cystic Fibrosis

#### Guidelines for Referral

- ❖ FEV1 <30 percent of predicted or rapid decline in FEV1, particularly in young female patients;
- ❖ Increasing frequency of exacerbations or exacerbation requiring ICU hospitalization;
- ❖ Recalcitrant and/or recurrent pneumothorax;
- ❖ Recurrent hemoptysis not controlled by embolization.

#### Guidelines for Transplantation

- ❖ Oxygen-dependent respiratory failure;
- ❖ Progressive hypercapnia;
- ❖ Pulmonary hypertension.

### Pulmonary Arterial Hypertension

#### Guidelines for Referral

- ❖ NYHA functional class III-IV, irrespective of therapy;
- ❖ Rapidly progressive disease;
- ❖ Pulmonary veno-occlusive disease and PCH;
- ❖ Endarterectomy candidates.

#### Guidelines for Transplantation

- ❖ Persisting NYHA class III or IV on medical therapy;
- ❖ Failing therapy with IV epoprostenol or equivalent;
- ❖ Cardiac Index <2 L/min/m<sup>2</sup>;
- ❖ Right atrial pressure >15 mm Hg.

Reference: Orens, JB; Estenne, M; Arcasoy, S, et al. International Guidelines for the Selection of Lung Transplant Candidates: 2006 Update – A Consensus Report from the Pulmonary Scientific Council of the International Society for Heart and Lung Transplantation. *J Heart Lung Transplant* 2006;25:745-55.

“The exponential growth of the lung transplant program offers life-enhancing options to hundreds of critically ill patients each year. Their quality of life is immediately improved after transplantation.”

— Selim M. Arcasoy, MD, FCCP, FACP, Medical Director, Lung Transplantation Program, NewYork-Presbyterian Hospital/Columbia University Medical Center

## Patient Care

Specialized multidisciplinary programs are able to provide alternatives to transplantation for many patients as well as help treat other important medical problems that develop or co-exist in patients with advanced lung disease. Some examples include pulmonary hypertension and right heart failure, coronary artery disease, osteoporosis, and malnutrition.

Those who do undergo lung transplantation benefit from the breadth and depth of the Hospital's clinical and academic expertise and the Center's commitment to improved outcomes:

- ❖ Surgical refinements have reduced the size of the incision required during transplantation.
- ❖ Recent progress in anesthesia, surgical techniques and post-operative care have dramatically shortened the time patients spend in the hospital—an average of 12 to 14 days, down from an average of 20 days.
- ❖ Most transplant surgeries are now performed without using the heart-lung bypass machine, sparing patients from associated postoperative complications.
- ❖ The risk of postoperative rejection is minimized with the newest, most advanced anti-rejection regimens.

## Expertise in Cystic Fibrosis

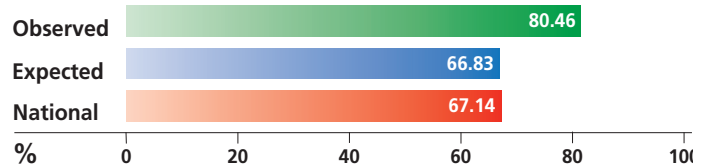
NewYork-Presbyterian Hospital has taken a leadership role in perfecting techniques and patient selection criteria for lung transplantation in patients with cystic fibrosis (CF). As a result, the Hospital is home to the largest CF lung transplant program in the New York metropolitan area. Although current management strategies reasonably control the disease into adulthood in most pediatric patients, lung transplantation offers extended survival in patients with advancing disease who have severe and irreversible airflow obstruction. The Hospital has also expanded the program to include patients under the age of 18 years. Transplanted patients with cystic fibrosis may now undergo subsequent transplantation if their grafts fail.

## Outcomes

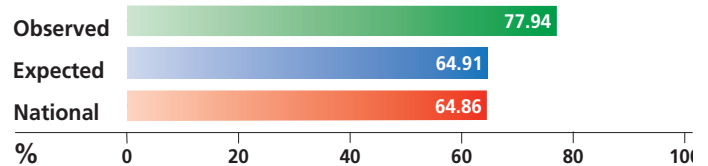
The Center for Lung Disease and Transplantation at NewYork-Presbyterian/Columbia has the highest three-year survival rate among the *U.S. News & World Report* Honor Roll Hospitals.

Between July 1, 2001 and December 31, 2007, the program performed 243 lung transplants, with a one-year survival rate of 92%, compared to 82% nationally, and a four-year survival rate of 72%. The program's 30-day survival rate for the same time period is 98%.

### 3 Year Patient Survival Rate



### 3 Year Graft Survival Rate



Source: SRTR January 2009 Report.

For the most current data regarding lung transplant outcomes, please visit [www.ustransplant.org](http://www.ustransplant.org).



### Lung Transplantation

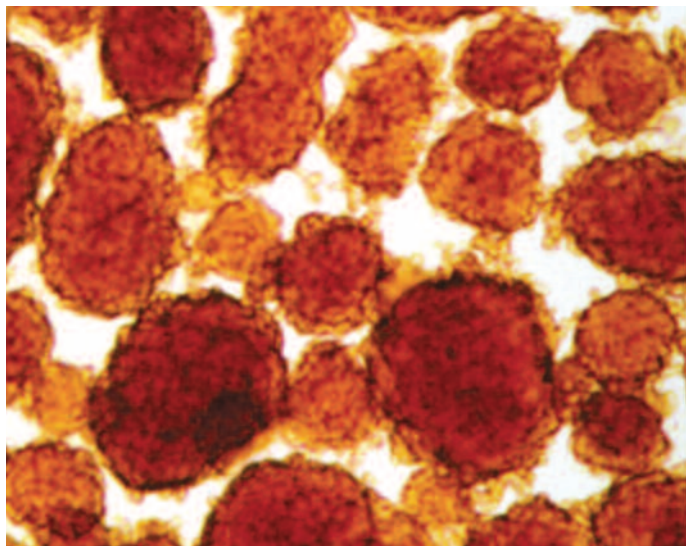
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# Pancreas Transplantation

Whole organ pancreas transplantation is a viable and preferred option for patients with type 1 diabetes and end-stage renal disease.



▲  
Islet cells

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## Indications for Pancreas Transplantation

### *Type 1 diabetes with renal failure*

- ❖ Pancreas after kidney transplantation (PAK);
- ❖ Simultaneous kidney/pancreas transplantation (SPK).

### *Type 1 diabetes without renal failure (PTA)*

- ❖ Extremely brittle;
- ❖ Hypoglycemic unawareness;
- ❖ Progressive secondary complications despite optimal insulin regimen.

### *Type 2 diabetes*

- ❖ Phenotypic Type 1;
  - Thin;
  - Early onset;
  - Persistent C-peptide;
- ❖ Decreased insulin production.

## Overview

Transplantation restores normal sugar control, allowing the majority of type 1 diabetic patients to stop using insulin. When performed in conjunction with renal transplantation, pancreas transplantation protects the new kidney from the damage caused by diabetes. In some patients, it slows the progression or even reverses some of the secondary complications of diabetes. Overall, when successful, pancreas transplantation is much better than insulin therapy in improving quality of life, and in prevention of morbidity and mortality.

Patients with hypoglycemic unawareness, or 'brittle diabetes,' may be appropriate candidates for pancreas transplantation regardless of the need for kidney transplantation, despite the potential complications of immunosuppression. In such cases, pancreas transplantation can "cure" their diabetes and protect the native kidney.

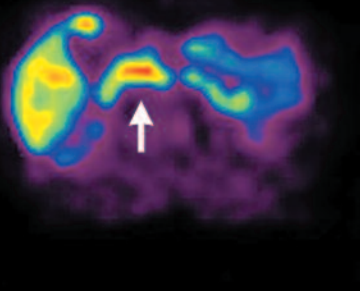
A small subset of patients with type 2 diabetes may also be candidates for pancreas transplantation.

During the last six years, outcomes in pancreas transplantation have improved markedly due to advancements in immunosuppressant regimens and the increased use of enteric drainage of pancreatic secretions. Enteric drainage allows the pancreas to be connected to the intestine instead of the bladder, where pancreatic secretions can cause significant inflammation and toxicity.

Surgeons at NewYork-Presbyterian/Weill Cornell have been performing pancreas transplantation since 1996. Outcomes have generally met or exceeded the national average. UNOS approved pancreas transplantation at NewYork-Presbyterian/Columbia in January 2008; it is expected that NewYork-Presbyterian/Columbia's premier kidney transplant program will facilitate rapid growth of the new pancreas transplantation program, which will overlap both in its patient population and its surgical and medical expertise.

“Pancreas transplantation can save lives, in particular for type 1 diabetics who have advanced secondary complications of diabetes such as renal impairment.”

— Sandip Kapur, MD, FACS, Chief, Division of Transplant Surgery, NewYork-Presbyterian Hospital/Weill Cornell Medical Center



▲  
Axial view of pancreas, which is marked by the arrow.

## Innovations

The first successful islet cell transplantation in the tri-state area was carried out at NewYork-Presbyterian/Weill Cornell in 2004.

### Tolerance

Both centers have been conducting research to promote immunologic tolerance in pancreas transplant recipients, working towards the goal of complete freedom from immunosuppressant medications after transplantation.

### Steroid Avoidance

With gene-based therapies and steroid-avoidance protocols now in place, patients at both centers receive highly personalized immunosuppressant therapies that permit lower steroid doses or steroid-free protocols.

## Research

- ❖ Tolerance induction to islet transplantation using primed or non-primed UVB irradiated dendritic cells (human antigen presenting cells) with brief peritransplant immunosuppression;
- ❖ The development of a new intramuscular site for islet transplants using an alginate scaffold impregnated with angiogenic, antiapoptotic, and immunosuppressant factors;
- ❖ Development of the use of PET techniques to visualize and evaluate the function and viability of pancreatic islets in humans and in experimental models for diagnostic and prognostic use.

### Candidates for solid organ pancreas transplant (but not islet)

- ❖ Patients with large body habitus (>180 lbs) or large insulin requirements;
- ❖ Patients with life threatening diabetes;
- ❖ Patients receiving a simultaneous kidney.

### Candidates for islet transplant (but not solid organ)

- ❖ Small BMI patients who do not want invasive procedure;
- ❖ Patients with life threatening diabetes with high cardiac risks.

## Patient Care

The northeast region of the U.S. has been consistently underserved as far as access to pancreas transplantation, with relatively few centers serving a disproportionately large metropolitan population. The expanding programs at NewYork-Presbyterian Hospital now provide much-needed access to patients with diabetes in the New York metropolitan area, particularly those with the most complex medical and surgical challenges. NewYork-Presbyterian/Columbia works in close collaboration with the Naomi Berrie Diabetes Center, the leading diabetes center in the metropolitan area.

In addition to its transplantation options, NewYork-Presbyterian/Weill Cornell offers a novel surgical alternative, an intestinal switch operation, and both centers maintain active metabolic surgery programs, which hold promise for reversing type 2 diabetes.



▲ After simultaneous kidney-pancreas transplants at NewYork-Presbyterian/Weill Cornell in 1999, Glenda Daggert has no symptoms of the diabetes that once threatened her life.



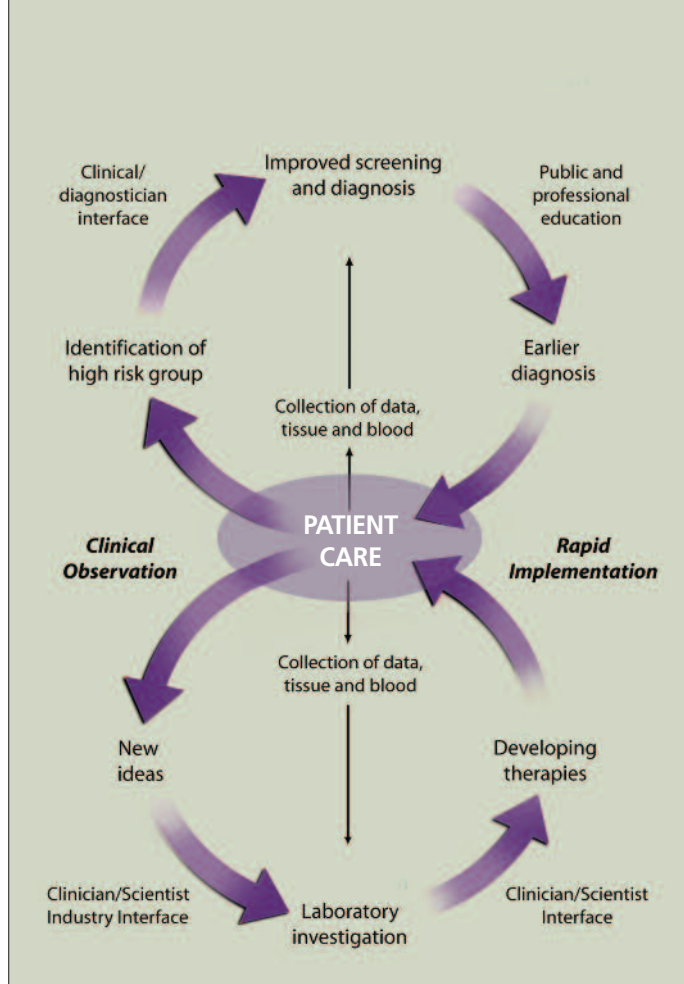
## Islet Transplantation

Transplantation of pancreatic islet cells into patients with type 1 diabetes offers the possibility of reversing the disease without the need for major surgery. Even partial islet function in patients with hypoglycemic unawareness, or “brittle diabetes,” can significantly improve the management of this disease and abolish hypoglycemic unawareness.

In this procedure, islet cells obtained from the pancreas of one or two deceased donors are infused via catheter into the recipient’s liver, where they act as a back-up pancreas, producing insulin and regulating blood sugar. When this is performed with the patient’s own cells (autotransplantation), the success is very high, and such patients avoid developing diabetes after pancreatic resection. This contributes significantly to their long-term prognosis.

Cutting-edge research at NewYork-Presbyterian/Weill Cornell has developed a systemic gene therapy that a) eliminates the need for immunosuppressant medications to protect islet grafts, b) restores tolerance, and c) facilitates regeneration, in animal models. To reduce the volume of islet cells needed for successful transplantation, the researchers developed a novel anti-oxidant therapy that optimizes islet isolation and improves their post-transplant function. The program has successfully reversed diabetes in animal models without the use of immunosuppressants after transplantation. Continued work on these therapies holds considerable promise for transcending challenges to pancreatic transplantation, and for extending the long-term durability of islet transplantation in people.

At NewYork-Presbyterian/Columbia, a team has been conducting islet transplantation research since 1976. It is one of ten regional islet resource centers in the U.S. that isolate and transplant islet cells to treat type 1 diabetes as part of a limited FDA protocol. At this time, the team is investigating a new method of islet cell transplantation by impregnating islets into pretreated, non-reactive scaffolds, along with agents to attract blood vessels and repel rejecting cells. When the treated scaffolds are placed into abdominal muscles and injected with pancreatic islets, experimentally induced diabetes is reversed in animal models. Both centers will perform autotransplantation for patients undergoing pancreatic resection for pancreatitis as part of a broad program in islet transplantation.



### Three types of whole organ pancreas transplantation:

- ❖ Pancreas transplantation alone as a cure for type 1 diabetes;
- ❖ Pancreas transplantation combined with kidney transplantation;
- ❖ Pancreas transplant following live-donor kidney transplantation.



### Pancreas Transplantation

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Weill Cornell Medical Center  
525 East 68th Street  
New York, NY 10065  
Phone: 212.517.3099

Emergency referrals and transfers: **800.NYP.STAT**



## **NewYork-Presbyterian Pediatric Transplantation Programs**

### **PEDIATRIC KIDNEY TRANSPLANTATION**

NewYork-Presbyterian  
Morgan Stanley Children's Hospital  
3959 Broadway, Suite 701  
New York, NY 10032  
Please call: **866.697.7755**

NewYork-Presbyterian  
Komansky Center for Children's Health  
525 East 68th Street  
New York, NY 10065  
Please call: **646.962.4324**

### **PEDIATRIC LIVER AND INTESTINAL REHABILITATION AND TRANSPLANT PROGRAM**

NewYork-Presbyterian  
Morgan Stanley Children's Hospital  
3959 Broadway – 7th Floor  
New York, NY 10032  
Please call: **866.697.7755**

### **PEDIATRIC CARDIAC TRANSPLANT PROGRAM**

NewYork-Presbyterian  
Morgan Stanley Children's Hospital  
3959 Broadway – 2 North  
New York, NY 10032  
Please call: **866.697.7755**

### **PEDIATRIC LUNG TRANSPLANT PROGRAM**

NewYork-Presbyterian  
Morgan Stanley Children's Hospital  
3959 Broadway, Suite 701  
New York, NY 10032  
Please call: **866.697.7755**

## **International Physicians and Patients Please visit [www.nyp.org/international](http://www.nyp.org/international)**

Each year, thousands of patients from all over the world travel to NewYork-Presbyterian Hospital.

Our International Services staff provides personalized attention and makes international patients and their families feel comfortable during their stay with us. Our managers, coordinators and financial counselors speak many languages and assist patients with a variety of details such as scheduling physician appointments, escorting patients to procedures, requesting second medical opinions, providing information about lodging and other medical and non-medical services. The first step to learning more about our services at NewYork-Presbyterian Hospital is to contact our International Services Office at:

### **INTERNATIONAL SERVICES**

NewYork-Presbyterian Hospital/Columbia University Medical Center  
177 Fort Washington Avenue  
Milstein Hospital Building 9 Central  
New York, NY 10032  
Phone: **+1 212.305.4900**  
Fax: **+1 212.342.5393**  
E-mail: [internationalservices@nyp.org](mailto:internationalservices@nyp.org)

NewYork-Presbyterian Hospital/Weill Cornell Medical Center  
525 East 68th Street  
Greenberg Pavilion 1-503  
New York, NY 10065  
Phone: **+1 212.746.4455**  
Fax: **+1 212.746.4777**  
E-mail: [internationalservices@nyp.org](mailto:internationalservices@nyp.org)

# NewYork-Presbyterian Hospital/Weill Cornell Medical Center



## Legend

- Visitor's Entrance
- Accessible Entrance
- Emergency
- Information Desk
- Visitor Parking
- Subway Entrance
- Bus

## Elevators

- Greenberg Pavilion
- Starr Pavilion, J Corridor & L Corridor
- K Wing & F Wing, floors 2-9
- Baker Pavilion / F Wing, floors 9-24
- Baker Pavilion / F Wing, floors 9-23
- Payson Pavilion
- Whitney Pavilion
- M Wing
- N Wing

## Additional Medical Offices

- Weill Cornell Medical Assoc. Eastside**  
201 East 80th Street
- Weill Cornell Medical Assoc. Westside**  
12 West 72nd Street
- Iris Cantor Women's Health Center**  
425 East 61st Street
- Weill Cornell Imaging at NewYork-Presbyterian**  
416 East 55th Street  
425 East 61st Street, 9th Floor  
520 East 70th Street, lobby level  
1305 York Avenue, 3rd Floor




**Hospital information:**  
**212.746.5454**




# NewYork-Presbyterian Hospital/Columbia University Medical Center

## Legend

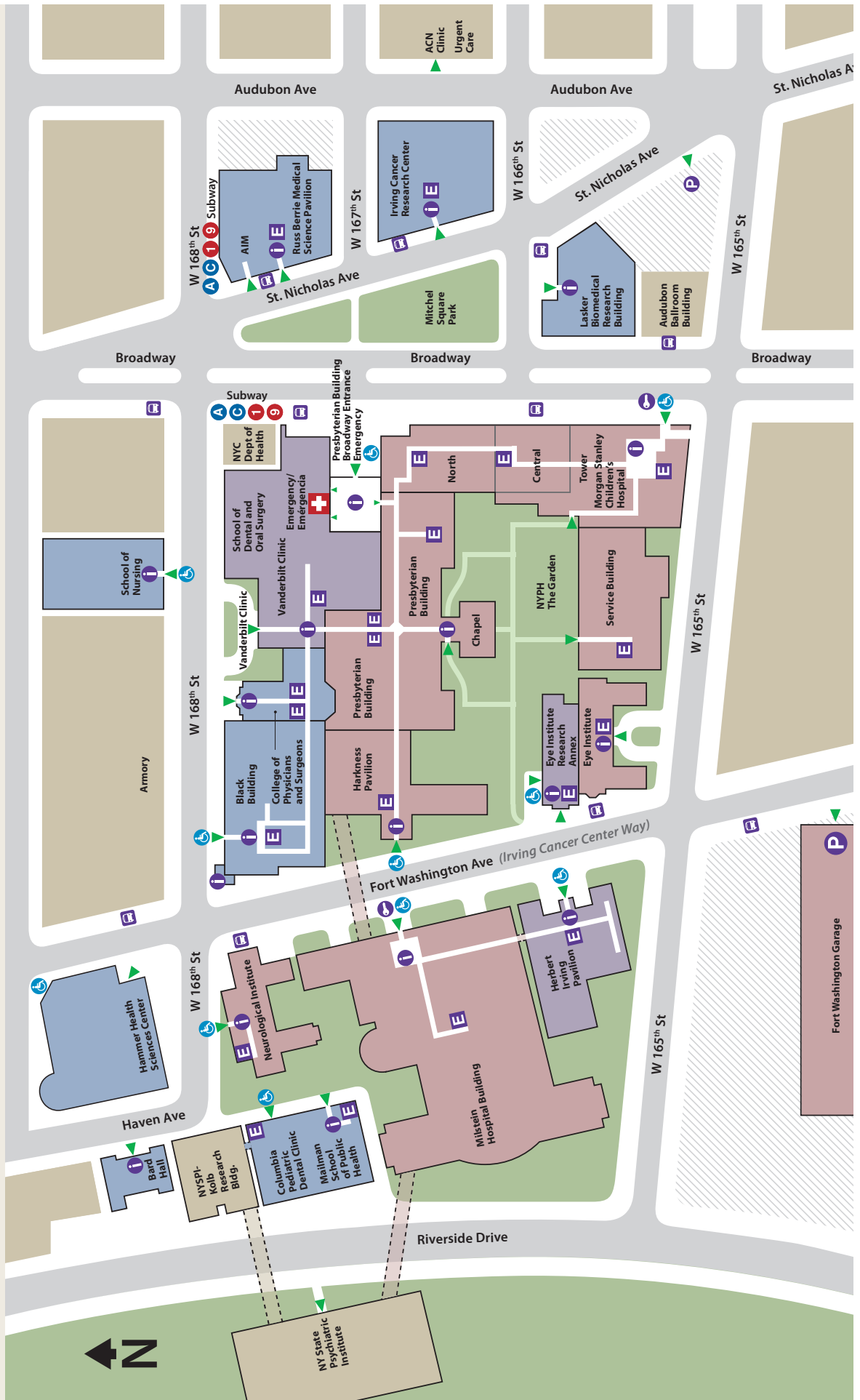
-  **Visitor's Entrance** | Entrada de las Visitas
-  **Accessible Entrance** | Entrada Accesible
-  **Emergency** | Emergencia

Hospital Information | 212.305.2500

-  **Information Desk** | Información
-  **Elevator** | Elevadores
-  **Restrooms** | Baños

-  **Visitor Parking** | Estacionamiento para las Visitas
-  **Valet Parking** | Estacionamiento Atendido
-  **Subway Entrance** | Subterráneo

Bus | Autobus



**NewYork-Presbyterian**  
The University Hospital of Columbia and Cornell  
333 East 38th Street  
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