ABOVE | Porter Lyons with his father, Doug, both heart transplant recipients

“I was more confident throughout this because of what my dad has been through.” — Porter Lyons, 18, Garrettsville, Ohio. Porter received a heart transplant at Cleveland Clinic on New Year’s Eve 2011 — 24 years after Cleveland Clinic surgeons transplanted a heart in Doug. The father and son, who share a heart condition with a suspected genetic component, are both doing well today.

ON THE COVER | Nicholas Smedira, MD (front), who performed Porter’s heart transplant, and Chanapong Kittayarak, MD, during surgery.
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In honor of organ, tissue, bone marrow and eye donors and their family members, THANK YOU for making the gift of life possible for our patients.
I am pleased to share the highlights of Cleveland Clinic's Transplant Center for 2011. Our staff values the opportunity to work with you and keep you abreast of our transplant efforts.

**INNOVATION** For the first time in Cleveland Clinic history, a living kidney donation made in Cleveland was transplanted in another state. In 2011, Cleveland Clinic enrolled its first patient in the National Kidney Registry, an organization that facilitates living kidney donation. A local man wished to donate his kidney altruistically and, with the registry's help, was able to direct it to a recipient in California. Cleveland Clinic staff look forward to continued cooperation with the registry to maximize use of donated kidneys.

Additionally, our liver transplant staff, in conjunction with Allogene Laboratories, developed a new protocol to rapidly diagnose and treat patients with graft vs. host disease. Over the past three years, five patients have been managed using the protocol, which has resulted in an 80 percent survival rate compared with 20 percent previously. A study detailing these results will be presented at meetings of the International Liver Transplantation Society and the American Transplant Congress in 2012.

In other research, Cleveland Clinic staff are engaged in a study of T-cell-targeting monoclonal antibody technology for immune modulation with broad application potential in T-cell-mediated disease, including transplant rejection. The technology delivers effective T-cell modulation without triggering T-cell proliferation, cytokine release or other common and serious adverse side effects. The study focuses on first-time kidney transplant recipients and uses a core laboratory to analyze kidney biopsy samples. The goal is to make transplantation of solid organs and vascular composite allografts safer and more widely available to victims of disease and traumatic injury.
QUALITY  In an effort to continue to provide high-quality, cost-effective care, Cleveland Clinic’s Transplant Center provides continuous oversight of outcomes, integrating information from our electronic medical record system with an internal transplant database to monitor outcomes on a real-time basis. Recently, the Transplant Center developed a forecasting method that combines a risk adjustment model with patient characteristics to predict outcomes. As a result, staff can proactively develop clinical protocols to improve outcomes. This quality assurance system also incorporates data from subgroups of the transplant population to identify patient populations where outcomes may be suboptimal and incorporate these findings into patient or donor selection evaluations. The quality assurance system facilitates strict evaluation of outcomes and early identification of opportunities for improvement.

EXCELLENCE  In 2011, we completed more than 600 organ and bone marrow transplants, including nine pediatric transplants, and used approximately 6,500 tissue segments in surgical reconstruction. We are proud to offer patients one of the most comprehensive transplant programs in the world. Our physicians continue to achieve outstanding outcomes while performing complex transplant procedures involving multiple organs and the most critically ill patients. Additionally, our physicians work to maximize the use of all available donor organs, including those considered to be from extended-criteria donors.

All of our efforts are aimed at a single goal — to help our patients lead the healthiest lives possible. We thank you for your continued collaboration in this undertaking.

John Fung, MD, PhD  
Director, Transplant Center; Chairman, Digestive Disease Institute
Transplantation Outcomes

We are pleased to present *Transplantation 2011*, a summary of outcomes and key data about Cleveland Clinic Transplant Center programs. The following data summarize our activities for the year.

### Number of evaluations in 2011

<table>
<thead>
<tr>
<th>Transplant Type</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone marrow</td>
<td>323</td>
</tr>
<tr>
<td>Heart</td>
<td>201</td>
</tr>
<tr>
<td>Intestine</td>
<td>9</td>
</tr>
<tr>
<td>Kidney</td>
<td>401</td>
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<tr>
<td>Liver</td>
<td>462</td>
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<tr>
<td>Lung</td>
<td>588</td>
</tr>
<tr>
<td>Pancreas</td>
<td>52</td>
</tr>
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</table>
### Number of patients on waiting lists

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Patients Waiting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td>101&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Intestine</td>
<td>4&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Kidney</td>
<td>632&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Liver</td>
<td>184&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Lung</td>
<td>138&lt;sup&gt;f&lt;/sup&gt;</td>
</tr>
<tr>
<td>Pancreas</td>
<td>42&lt;sup&gt;g&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> As of Dec. 31, 2011

<sup>b</sup> Includes 7 heart/kidney, 3 heart/lung and 1 heart/liver/kidney
<sup>c</sup> Includes 1 intestine/pancreas
<sup>d</sup> Includes 26 kidney/pancreas, 7 kidney/heart, 6 kidney/liver and 1 kidney/heart/liver
<sup>e</sup> Includes 6 liver/kidney, 2 liver/lung and 1 liver/heart/kidney
<sup>f</sup> Includes 3 lung/heart and 2 lung/liver
<sup>g</sup> Includes 26 pancreas/kidney and 1 pancreas/intestine

### Number of transplants in 2011

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Transplants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone marrow</td>
<td>167</td>
</tr>
<tr>
<td>Heart</td>
<td>58&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Intestine</td>
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<tr>
<td>Kidney</td>
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<tr>
<td>Liver</td>
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<tr>
<td>Lung</td>
<td>108&lt;sup&gt;d&lt;/sup&gt;</td>
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<tr>
<td>Pancreas</td>
<td>15&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Includes 3 heart/lung, 1 heart/liver and 1 heart/kidney
<sup>b</sup> Includes 11 kidney/pancreas, 4 kidney/liver and 1 kidney/heart
<sup>c</sup> Includes 4 liver/kidney and 1 liver/heart
<sup>d</sup> Includes 3 lung/heart
<sup>e</sup> Includes 11 pancreas/kidney
### Number of post-transplant patients seen at Cleveland Clinic in 2011a

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Patients</th>
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<tbody>
<tr>
<td>Heart</td>
<td>764b</td>
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<td>Intestine</td>
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<tr>
<td>Kidney</td>
<td>1,468d</td>
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<tr>
<td>Liver</td>
<td>1,025e</td>
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<tr>
<td>Lung</td>
<td>591f</td>
</tr>
<tr>
<td>Pancreas</td>
<td>203g</td>
</tr>
</tbody>
</table>

a Patients who had an encounter/visit to Cleveland Clinic during 2011

b Includes 16 heart/lung, 5 heart/liver and 3 heart/kidney

c Includes 1 intestine/pancreas

d Includes 120 kidney/pancreas, 39 kidney/liver and 3 kidney/heart

e Includes 39 liver/kidney, 5 liver/heart, 3 liver/pancreas and 3 liver/lung

f Includes 16 lung/heart and 3 lung/liver

g Includes 120 pancreas/kidney, 3 pancreas/liver and 1 pancreas/intestine

### Median time (months) to transplant for patients on waiting lista

<table>
<thead>
<tr>
<th>Organ</th>
<th>Cleveland Clinic</th>
<th>United States (overall)</th>
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<tbody>
<tr>
<td>Heart</td>
<td>4.7</td>
<td>5.3</td>
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<tr>
<td>Heart/lung</td>
<td>4.7</td>
<td>&gt;72.0</td>
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<tr>
<td>Intestine</td>
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<td>Kidney</td>
<td>39.7</td>
<td>50.0</td>
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<td>Kidney/pancreas</td>
<td>12.3</td>
<td>13.7</td>
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<tr>
<td>Liver</td>
<td>6.8</td>
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<tr>
<td>Lung</td>
<td>3.7</td>
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<tr>
<td>Pancreas</td>
<td>14.5</td>
<td>20.7</td>
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</table>

a For patients registered on waiting list between July 1, 2005, and Dec. 31, 2010

(Source: Scientific Registry of Transplant Recipients [SRTR], January 2012)
### State of residence of transplant patients in 2011

<table>
<thead>
<tr>
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Total: 167 | 53 | 1 | 1 | 3 | 3
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<th>Kidney Pancreas</th>
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<td>131</td>
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</table>

131 4 11 117 105 4 600
Cleveland Clinic Transplant Center History

1963
• Developed one of the first deceased-donor kidney transplant programs in the world
• First kidney transplant (January)
• First pediatric kidney transplant (April)

1968
• Allogen Laboratories established
• First heart transplant

1975
• Bone marrow transplant program established

1984
• Heart transplant program established (August)
• First liver transplant (November)

1985
• First pediatric heart transplant (March)
• First kidney/pancreas transplant (October)

1986
• First pediatric liver transplant (August)

1988
• World’s first successful laryngeal transplant (January)
• First pancreas transplant (March)

1990
• First lung transplant (February)

1998
• Fresh Osteochondral Graft Transplant Program established
2001
- First sacral bone transplant performed by neurospine surgeons
- First mosaicplasty performed by orthopaedic adult reconstruction and sports medicine surgeons

2005
- First hospital in America to implant the CardioWest Total Artificial Heart after its approval by the FDA

2007
- Heart, liver, lung and pancreas programs named as Best Practices in preparation for a Health Resources and Services Organization (HRSA) Transplant Center Growth and Management Collaborative
- First lung-liver transplant in Ohio (January)
- First double lung transplant with bronchial artery revascularization (December)

2008
- First intestinal transplant (June)
- Most complex facial transplant in the world (December)

2009
- New world record for lung transplant volume in a single year

2010
- Transplanted third patient in Ohio with EXCOR® Pediatric Heart Implant
- First adult kidney-intestine transplant in Ohio (October)

2011
- First living kidney donation made in Cleveland and transplanted in another state
Cleveland Clinic Children’s Hospital

Cleveland Clinic offers the full spectrum of pediatric transplants — cornea, bone/tissue, bone marrow/stem cell, heart, lung, liver, kidney and intestinal — along with more than 300 pediatric specialists with round-the-clock availability.

Genomic Medicine Institute

Cleveland Clinic’s Genomic Medicine Institute offers comprehensive genetic testing and counseling services to patients whose need for transplant may stem from a genetic condition, as well as to their family members. Our team of genetic experts helps patients determine whether genetic testing is appropriate for themselves or family members and offers education about specific inherited conditions, associated health risks and inheritance patterns. Our physicians and genetic counselors work closely with transplant patients’ primary physicians and specialists to develop a care plan and a plan for potential family evaluation when genetic risk factors may be at play.

Transplantation Facilities

Pre-Transplant Heart Failure Intensive Care Unit, 10 beds
Surgical Intensive Care Unit, 30 beds
Heart/Lung Post-Transplant Intensive Care, 14 beds
Cardiothoracic Intensive Care Unit, 76 beds
Transplant Special Care Unit, 34 beds
Heart/Lung Transplant Unit, 24 beds
Pediatric Intensive Care Unit, 25 beds
Bone Marrow Transplant Unit, 22 beds
Pediatric Medical/Surgical Floors, 80 beds
Transplant Hospitality Housing Unit

Alternatives to Transplantation

Making the decision that transplantation is the best or only option to treat an individual’s disease is a crucial phase of transplant evaluation. Transplantation is one option in an overall strategy for treating patients with advanced organ disease and some types of cancer. Before making the decision to go ahead with transplantation, physicians explore all choices available to the patient.
Transplantation is not always the most appropriate choice, even for people with end-stage disease. Successful transplantation depends in part on careful patient selection, and patients must meet certain medical criteria before they even can be considered for transplantation.

For more information on the Transplant Center, call 800.223.2273, ext. 42394, or 216.444.2394. Visit our website at clevelandclinic.org/transplant.

**A note on outcomes in this book**

Many factors influence a transplant center’s actual outcomes (survival rates). For example, some transplant centers perform transplants on much sicker patients than others do. A good measure is to look at a transplant center’s actual vs. expected rates, as “expected” survival takes into account such factors as the recipient’s condition and other characteristics, donor characteristics, and survival rates of all transplant patients in the United States. Cleveland Clinic’s transplant outcomes generally meet or exceed expected survival rates.

**To obtain comparisons of actual vs. expected outcomes, please visit srtr.org.**

Survival rates in this book are calculated by a third party, the Scientific Registry of Transplant Recipients (SRTR), and are from the January 2012 SRTR data release. Survival rates are based on single-organ transplants only.
**THE ORGAN TRANSPLANT PROCESS**

**Phase 1  Referral and Evaluation**

Patients can be referred for transplant evaluations at Cleveland Clinic by calling 800.223.2273, ext. 42394, or 216.444.2394. At the time of referral, a member of the team will collect a basic history of the patient's past medical conditions, results of any diagnostic studies performed and a description of the current clinical condition of the patient.

A transplant evaluation is scheduled, including tests and consults with a transplant physician and transplant surgeon, social worker, financial coordinator, nutritionist, transplant coordinator and other specialists.

Decisions regarding approval of candidates for transplantation are made by consensus, following review of each patient's case at a selection meeting. For heart, intestinal, liver, lung and pancreas transplants, the final step in the review process includes approval by the Ohio Solid Organ Transplant Consortium. For heart, intestinal, liver, lung, kidney and pancreas transplants, the final step after the evaluation process is complete is notification of the patient, referring physician and insurance carrier regarding the decision about transplantation.

**Phase 2  Ongoing Medical Therapy Review**

For those individuals not approved for transplantation, continuing medical therapy by a specialist is available.

The medical transplant team manages those patients approved for transplantation. Solid organ transplant patients are placed on the national transplant waiting list. Kidney and liver transplant patients may be considered for living donor transplantation.

**Phase 3  Transplantation**

When an organ is available for transplantation, the patient is notified by one of the transplant coordinators. The patient then reports to the hospital and is admitted to the transplant floor. Following transplantation, patients may be transferred to an intensive care unit, where their care is jointly managed by the transplant team and staff of the intensive care unit. The team assumes primary care at the time of transplant and during the hospital stay in the Transplant Special Care Unit and provides long-term follow-up.

* Note: This process applies to solid organ transplantation only and may vary as necessary according to the patient's condition and transplant type.
Phase 4 Follow-up

Following discharge, the patient’s progress is monitored during regular outpatient visits with the transplant team. All transplant patients return to the transplant clinic on a schedule as needed, for review and adjustment of their medications as necessary. Additional appointments and diagnostic studies are scheduled as needed. All patients are asked to return to Cleveland Clinic annually for follow-up. We communicate regularly with patients’ referring physicians throughout all phases of care.

For some patients outside the Greater Cleveland area, arrangements can be made with a local physician for routine follow-up after a period of time. In such cases, members of the transplant team will establish contact with the physician to continue to monitor the patient’s progress.
2011 Highlights

In 2011, technologists at Cleveland Clinic’s Allogene Laboratories performed 79,137 tests on transplant patients and potential donors to determine compatibility. These included tests to determine whether the patient and donor had compatible blood and tissue types, as well as whether antibodies that could cause rejection were present in the patient’s blood.

Blood test results are entered into a computer at the United Network for Organ Sharing (UNOS), which assists physicians in determining whether the patient is an appropriate candidate when an organ becomes available. (For more information on UNOS and the evaluation/waiting process, visit unos.org.)

New in 2011:

In 2011, Allogene Laboratories of Cleveland passed the following inspections:

- ASHI (American Society for Histocompatibility and Immunogenetics) On-Site Inspection
- Lifebanc Annual Inspection
- Cleveland Clinic Health System Pharmacy Inspection
- Cleveland Clinic Health System IRB Review and Audit

During the same year, Allogene Laboratories-WV of Charleston, W.Va., passed the following inspection:

- ASHI On-Site Inspection

In February 2011, Allogene Laboratories joined the MICA Antibody Project of the 16th International HLA and Immunogenetics Workshop.

In December 2011, killer immunoglobulin-like receptor (KIR) genotyping was added to the Allogene Laboratories testing repertoire.

In June 2011, Allogene Laboratories-WV completed validation of the Cylex ImmuKnow® Assay. It will add this assay in 2012 for service to the Charleston Area Medical Center Kidney Transplant Center.
Awards and Achievements

In May 2011, Allogen Laboratories was one of 50 labs that received the National Marrow Donor Program Certificate of Achievement for demonstrating 100 percent compliance with Form 22 submission.

Allogen Laboratories was noted 13 times for recognizing unusual characteristics of human leukocyte antigen (HLA) in the 2011 publications of the UCLA International Cell & Serum Exchange.

In 2011, 119 students, fellows, residents, nurses, coordinators, vendors and physicians visited Allogen Laboratories.

Research and Innovations

Principal Investigator — Dr. Medhat Askar
IRB 1213: Histocompatibility Lab Reagent Program

Principal Investigator — Dr. Maria Siemionow
IRB 6914: Protocol for Composite Facial Allograft Transplant

Principal Investigator — Dr. Medhat Askar

Principal Investigator — Dr. Medhat Askar
IRB 07-779: Exempt: The Impact of Killer Immunoglobulin-Like Receptors (KIR) Genotype Profile and KIR/HLA Combinations on Liver Transplant Outcomes

Principal Investigator — Dr. Robin Avery
IRB 08-034: Exempt: The Impact of Killer Immunoglobulin-Like Receptors (KIR) Genotype Profile and KIR/HLA Combinations on Primary CMV Infection in the CMV D+/R- Transplant Recipient

Principal Investigator — Dr. Sandeep Gupta
IRB 08-089: Exempt: Does the Presence of MICA Antibodies in Heart Transplant Recipients Increase the Risk of Acute Allograft Rejection and Mortality?

Principal Investigator — Dr. Medhat Askar
IRB 08-907: The Association of MICA Gene Polymorphism with the Incidence of Achieving HCV Sustained Virologic Response (SVR) and Other Post-Transplant Complications
**Principal Investigator — Dr. Medhat Askar**

IRB 08-988: Identifying Core Competencies for Problem-Based Learning (PBL) Facilitator’s Optimal Performance and Needs Assessment for a Faculty Development Program: Educational Research Study

**Principal Investigator — Dr. Medhat Askar**

IRB 09-241: MICA Gene Diversity and DMV Infection in Solid Organ Transplantation

**Principal Investigator — Dr. Medhat Askar**

IRB 09-528: Exempt: Immunogenetic Factors in Beta Herpesvirus Infections Post-Solid Organ Transplantation

**Principal Investigator — Dr. Medhat Askar**

IRB 09-591: Allogene registry/database was approved for the purpose of utilizing stored laboratory specimens and/or test results for internal clinical research, case studies, assay evaluation, assay validation and clinical research, often in conjunction with other Cleveland Clinic departments.

**Principal Investigator — Dr. Medhat Askar**

IRB 09-929: Exempt: Antibody Mediated Rejection (AMR) in Combined Liver Transplants

**Principal Investigator — Dr. Medhat Askar**

IRB 09-979: Chart Review: Clinical Outcomes of Combined Liver Transplants

**Principal Investigator — Dr. Medhat Askar**

IRB 10-042: Chart Review: HLA Antibody Kinetics Following Pre-Transplant Vaccination in Solid Organ Transplant Recipients

**Principal Investigator — Dr. Medhat Askar**

IRB 10-047: Chart Review: The Incidence and Significance of Positive Historic Donor HLA Specific Antibodies (DSA) in Lung Transplantation

**Principal Investigator — Dr. Medhat Askar**

IRB 10-1151: Registry: Adiponectin Bridges Metabolic and Immunologic Mechanisms in Cardiac Allograft Vasculopathy

**Principal Investigator — Dr. Robin Avery**

IRB 10-435: Exempt: EBV DNA Viral Loads, BOS/CLAD and Neutropenia in Lung Transplant Recipients with Greater than 5 Years of Follow-up

**Principal Investigator — Dr. Lara Danziger-Isakov**

IRB 10-471: Chart Review: Toll-Like Receptor Polymorphisms: Association with RSV Severity and Graft Outcomes in Adult Lung-Transplant Patients

**Principal Investigator — Dr. Garnett Smith**

IRB 10-597: Chart Review: The Role of Non-HLA Antibodies in Human Lung Transplantation
Principal Investigator — Dr. Medhat Askar
IRB 10-637: Chart Review: The Impact of HLA Antibodies on Liver Transplant Outcomes

Principal Investigator — Dr. Medhat Askar
IRB 10-778: Chart Review: Possible Role of Human Leukocyte Antigens (HLA) in the Susceptibility to Serious Drug Adverse Reactions: A Study in Transplant Recipients

Principal Investigator — Dr. Marie Budev
IRB 11-1050: Treatment of Anti-HLA Antibodies to Prevent BOS after Lung Transplantation (HALT) Study

Principal Investigator — Dr. Federico Aucejo
IRB 11-231: Impact of Basiliximab on Regulatory T-Cells after Liver Transplantation for Hepatocellular Carcinoma (HCC) Patients and Its Effect on Clinical Outcome

Principal Investigator — Dr. Ibrahim Hanouneh
IRB 11-288: Chart Review: Interferon Lambda Genotype and Metabolic Syndrome in Patients with Chronic HCV Infection vs. Non-Alcoholic Steatohepatitis

Principal Investigator — Dr. Binu John
IRB 11-302: Exempt: IL-28 B Receptor Polymorphism and Risk of Hepatocellular Carcinoma in Patients with Chronic Hepatitis C Cirrhosis

Principal Investigator — Dr. Daniel Urcuyo

Principal Investigator — Dr. Medhat Askar
IRB 11-734: Chart Review: HLA Haplotype Associations in Patients with Hereditary Hemochromatosis

Principal Investigator — Dr. Saul Kane
IRB 11-794: Chart Review: Immune Receptor Gene Polymorphisms and Susceptibility to Infection in Liver Cirrhosis Pre- and Post-Transplant: Association and Functionality

Principal Investigator — Dr. Sherif Mossad
IRB 11-816: Chart Review: Donor Cell Chimerism and Early Post-Transplantation CMV Viremia in Patients Treated with Myeloablative Chemotherapy and Allogeneic Stem-Cell Transplantation

Principal Investigator — Dr. Koji Hashimoto
IRB 11-966: The Role of Memory T-Cells in Graft Rejection in Intestinal Transplantation
Principal Investigator — Dr. Matt Kalaycio
IRB CC 00162: CBMT1Z11 (10 CBA) Cord Licensure Study

Principal Investigator — Dr. John Wagner

Expertise

Allogen Laboratories was one of the first tissue typing laboratories in the country and remains one of the largest in the United States today. It continues to develop, investigate and apply state-of-the-art histocompatibility techniques to support transplant centers nationwide.

In 2011, three employees performed a total of six lab inspections for ASHI.

Dr. Medhat Askar currently serves as a commissioner on the ASHI Accreditation Review Board.

Selected Publications


Leadership

Medhat Z. Askar, MD, PhD
Director, Allogen Laboratories

John Fung, MD, PhD
Medical Director, Allogen Laboratories

Phone number
216.444.6583

Fast facts
Initiated: 1968
Number of tests performed in 2011: 79,137

Special accreditations
Centers for Medicare & Medicaid Services (CMS)-certified laboratory
Fully accredited by the United Network for Organ Sharing (UNOS) and the American Society for Histocompatibility and Immunogenetics (ASHI)
Close collaboration with infectious disease specialists who have expertise in pre-transplant evaluations and post-transplant infections is essential to the success of any transplant program. This is primarily because many types of infections are common after transplantation due to the effects of immunosuppressive medications administered to prevent rejection.

**2011 Highlights**

Cleveland Clinic’s transplant infectious diseases group continues to meet regularly for internal updates from the various transplant programs and to discuss challenging cases. Individual liaisons are assigned to each transplant program for close collaboration on clinical guidelines and research activities.

Having established one of the few training programs for transplant infectious diseases, we continue to attract outstanding candidates who excel clinically and academically. We continue to mentor students, residents and fellows; in 2011, this resulted in nine oral or poster presentations at the American Transplant Congress, five presentations at the International Society for Heart & Lung Transplantation meeting and four presentations at the Infectious Diseases Society of America meeting. Members of our group also delivered numerous lectures at national and international meetings.

Eric Cober, MD, and Sherif Mossad, MD, established a treatment guideline for bone marrow transplant recipients with respiratory syncytial virus infections.

Belinda Yen-Lieberman, PhD, completed an in-house evaluation of the FilmArray® respiratory viral assay, and data were presented at the Association for Molecular Pathology 2011 Annual Meeting.

**Expertise**

Cleveland Clinic’s Department of Infectious Disease consists of 24 staff physicians, 11 of whom round on the transplant infectious disease hospital services.

The Section of Transplant Infectious Disease was established to provide expert support and excellent clinical care and consultation for the transplant teams. It
includes 10 physicians who care for adults, one pediatric physician and one nurse practitioner who rotate and perform inpatient and outpatient consultations on solid organ transplantation and bone marrow transplant services.

- Robin Avery, MD, founding member of this section and current senior advisor, was a co-editor of the infectious disease guidelines for the American Society of Transplantation (AST) and is a past chair of the AST Infectious Disease Community of Practice, a group of more than 75 clinicians involved in transplant infectious disease. Her research involves viral and fungal infections after transplant and the effects of infections on transplant function.
- Section Head Sherif Mossad, MD, specializes in bone marrow transplantation and respiratory viruses, including influenza.
- Steven Mawhorter, MD, is an expert in immunology, parasitic infections and travel medicine.
- David van Duin, MD, has expertise in research design, immunology, aging and donor/recipient screening for infection before transplantation.
- Eric Cober, MD, specializes in cytomegalovirus and fungal infections in hematopoietic stem cell transplant recipients.
- Christine Koval, MD, specializes in markers of infection in liver and kidney transplant recipients.
- Leia Johnson, MD, is an expert in tuberculosis and granulomatous infections.
- Nabin Shrestha, MD, is an authority on new molecular diagnostic tests for infections and on research methods.
- Rabin Shrestha, MD, is an HIV care provider.
- Dalia El Bejjani, MD, has extensive experience in HIV care and endocarditis.
- Lara Danziger-Isakov, MD, MPH, is chair of the Infectious Disease Council for the International Society for Heart & Lung Transplantation. Drs. Avery and Danziger-Isakov are members of several international guidelines committees.
- Alan Taege, MD, leads the HIV section’s efforts to provide clinical consultation and advice on transplantation for HIV-positive recipients.
- Cyndee Miranda, MD, is the former director of the section of ICU infectious disease and an expert on mycobacterial infections in lung transplant recipients.
- Steven Gordon, MD, and Drs. Avery, Mawhorter and Mossad are fellows of the Infectious Diseases Society of America.

The Section of Transplant Infectious Disease also provides rapid outpatient access for transplant recipients with symptoms of infection and for transplant candidates who require evaluation for previous infections that could have an impact after transplant. For pre-transplant patients, every effort is made to treat past infections, update vaccinations and devise individualized programs for infection prevention after transplantation.
We also advise all transplant teams on regimens for preventing infection after transplantation. This preventive approach involves close monitoring for viral infections with the goal of early treatment, if needed. It also helps to decrease hospitalizations and illnesses after transplant. Our staff also participate in patient education with the philosophy that better understanding of infectious risks can help transplant recipients avoid infections.

**Awards and Achievements**

Lara Danziger-Isakov, MD, is the current chair of the Infectious Disease Council for the International Society for Heart & Lung Transplantation. She also received the 2012 AST Clinical Science Career Development Award.

**Research**

*Principal Investigator — Dr. Lara Danziger-Isakov*

Betaherpesviruses in Pediatric Solid Organ Transplantation: A Prospective Longitudinal Evaluation. The goal of this project is to evaluate for association between primary infection or reactivation of betaherpesviruses and clinical syndromes in pediatric solid organ transplant recipients during the first two years after transplantation.

*Co-Investigator — Dr. Lara Danziger-Isakov*

Viral Triggers of Alloimmunity and Autoimmunity in Pediatric Lung Transplantation. The major goal of this project is to investigate the impact of viral infections on the development of alloimmunity and autoimmunity after pediatric lung transplantation by evaluating innate, humoral and cellular immune responses.

*Principal Investigator — Dr. Sherif Mossad*

A Double-Blind, Randomized, Stratified, Multicenter Trial Evaluating Conventional and High Dose Oseltamivir in the Treatment of Immunocompromised Patients with Influenza. Open for enrollment.

*Principal Investigator — Dr. Sherif Mossad*

A Phase I/IIa Randomized, Observer-Blind, Placebo-Controlled, Multicenter Study to Evaluate the Safety and Immunogenicity of the GSK Biologicals Herpes Zoster Vaccine, gE/AS01B, in Comparison to gE Combined with 1/2 Dose AS01B Adjuvant (gE/AS01E) and to Saline (Placebo) when Administered as 2 Doses or 3 Doses to Autologous Hematopoietic Stem Cell Transplantation (HCT) Recipients. (GlaxoSmithKline Biologicals). Enrollment completed.

*Principal Investigator — Dr. Sherif Mossad*

A Multicenter, Randomized, Double-Blind, Placebo-Controlled, Dose-Escalation Study of the Safety, Tolerability and Ability of CMX001 to Prevent or Control CMV Infection in R+ Hematopoietic Stem Cell Transplant Recipients.
Selected Publications


Leadership

Sherif Mossad, MD
Section Head, Transplant Infectious Disease

Lara Danziger-Isakov, MD, MPH
Leader, Pediatric Transplant Infectious Disease

Christine Koval, MD
Staff, Department of Infectious Disease

Staff

Robin Avery, MD
Eric Cober, MD
Dalia El Bejjani, MD
Steven Gordon, MD
Lucileia Teixeira Johnson, MD
Steven Mawhorter, MD, DTMH
Cyndee Miranda, MD
Nabin Shrestha, MD, MPH
Rabin Shrestha, MD, MPH
Alan Taege, MD
David van Duin, MD, PhD
Rodney Stone | Bone Marrow Transplant Recipient

“I feel like a new person.” — Rodney Stone, 16, Cleveland. After being diagnosed with aplastic anemia, a condition that results in reduced blood cell counts, Rodney experienced fatigue, difficulty climbing stairs and fainting. Following a bone marrow transplant in March 2011, Rodney has returned to his passion — playing basketball.
2011 Highlights

2011 marked a change in leadership for Cleveland Clinic’s bone marrow transplant (BMT) program. Brian Bolwell, MD, was named Chairman of the Taussig Cancer Institute and resigned as director of the BMT program, naming Matt Kalaycio, MD, as his successor in July 2011. The program also added Brian Hill, MD, PhD, that same month.

The BMT program performed 53 allogeneic hematopoietic cell transplants (HCT) in 2011. As one of the largest participants in the National Marrow Donor Program (NMDP), we report our outcomes to the NMDP, where they are publicly available. Our actual results are similar to the predicted range for our center, with a one-year survival rate of 56 percent across all the types of transplants we offer, including matched related donor, matched unrelated donor and cord blood unit transplants.

We also performed 114 autologous HCT. Our most common indications in 2011 were multiple myeloma/amyloidosis (n = 54) and non-Hodgkin lymphoma (n = 54), and our 100-day survival rate ranged from 98 to 100 percent.

The quality of the BMT program is reflected by our accreditation by the Foundation for the Accreditation of Cellular Therapy (FACT), but we also engaged in several quality improvement projects. These efforts resulted in a significant decrease in the risk of central line-associated bloodstream infections in our inpatient population. Our attention to quality is reflected in impressive patient satisfaction scores; for instance, 91 percent of our patients responded that they would recommend Cleveland Clinic.

Research and Innovation

The BMT program has a robust clinical research program with active plans to expand in the very near future. Not only did we make one oral and seven poster presentations at the annual meeting of the American Society of Hematology, but we also gave two oral and nine poster presentations at the annual BMT Tandem Meetings of the American Society for Blood and Marrow Transplantation and the Center for International Blood and Marrow Transplant Research.

The BMT program has focused its research in two major areas. The first is exploration of the role of busulfan as part of conditioning for both high- and low-
intensity regimens. Edward Copelan, MD, is a pioneer in busulfan research and leads this effort. As a result of this research, the following manuscripts were published in 2011:


Our second major research focus is in stem cell mobilization. This research is directed by Dr. Bolwell and Hien Duong, MD, and led to the following publications in 2011:


We are expanding our efforts in the study of busulfan by exploring doses individually targeted to clearance. Our work in stem cell mobilization has led to a novel algorithm to mobilize stem cells based on blood testing of circulating progenitor cells prior to leukapheresis to avoid unnecessary apheresis and to maximize yield. We are also accruing patients to a randomized trial of mobilization for patients previously exposed to lenalidomide, and to a trial exploring very high doses of mobilized stem cells to improve survival.
### Number of transplants in 2011

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autologous</td>
<td>114</td>
<td>68.3</td>
</tr>
<tr>
<td>Allogeneic — myeloablative</td>
<td>38</td>
<td>22.8</td>
</tr>
<tr>
<td>Allogeneic — reduced intensity</td>
<td>15</td>
<td>8.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>167</td>
<td></td>
</tr>
</tbody>
</table>

### Length of stay (in days) for primary transplants in 2011

<table>
<thead>
<tr>
<th>Type</th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>24</td>
<td>21</td>
<td>160</td>
</tr>
<tr>
<td>Autologous</td>
<td>20</td>
<td>20</td>
<td>114</td>
</tr>
<tr>
<td>Allogeneic (related donor)</td>
<td>31</td>
<td>31</td>
<td>12</td>
</tr>
<tr>
<td>Allogeneic (unrelated donor)</td>
<td>35</td>
<td>30</td>
<td>34</td>
</tr>
</tbody>
</table>

*Excluding outpatient reduced-intensity transplants

### Primary diagnoses for bone marrow patients transplanted in 2011

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myeloma/amyloidosis</td>
<td>54</td>
<td>32.3</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>54</td>
<td>32.3</td>
</tr>
<tr>
<td>Myelodysplastic syndrome</td>
<td>14</td>
<td>8.4</td>
</tr>
<tr>
<td>Acute myeloid leukemia (AML)</td>
<td>13</td>
<td>7.8</td>
</tr>
<tr>
<td>Hodgkin disease</td>
<td>11</td>
<td>6.6</td>
</tr>
<tr>
<td>Acute lymphoblastic leukemia (ALL)</td>
<td>8</td>
<td>4.8</td>
</tr>
<tr>
<td>Myeloproliferative disorders</td>
<td>4</td>
<td>2.4</td>
</tr>
<tr>
<td>Chronic lymphocytic leukemia (CLL)</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>Aplastic anemia</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Neuroblastoma</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>167</td>
<td></td>
</tr>
</tbody>
</table>
### Survival analysis: 100-day patient survival for primary transplants, 2010-2011

<table>
<thead>
<tr>
<th></th>
<th>100-Day Survival Percentage</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Autologous</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>98</td>
<td>90</td>
</tr>
<tr>
<td>Myeloma</td>
<td>100</td>
<td>88</td>
</tr>
<tr>
<td>Hodgkin disease</td>
<td>100</td>
<td>22</td>
</tr>
<tr>
<td><strong>Allogeneic — myeloablative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low risk</td>
<td>85.7</td>
<td>28</td>
</tr>
<tr>
<td>Intermediate risk</td>
<td>83.3</td>
<td>18</td>
</tr>
<tr>
<td>High risk</td>
<td>81.5</td>
<td>27</td>
</tr>
<tr>
<td>Other(^a)</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td><strong>Allogeneic — reduced intensity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low risk</td>
<td>75</td>
<td>12</td>
</tr>
<tr>
<td>Intermediate risk</td>
<td>100</td>
<td>13</td>
</tr>
<tr>
<td>High risk</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Other(^a)</td>
<td>60</td>
<td>5</td>
</tr>
</tbody>
</table>

\(^a\)Includes diseases not assigned a risk
Selected Publications


Leadership

Matt Kalaycio, MD
Director, Bone Marrow Transplant Program, Department of Hematologic Oncology and Blood Disorders; Professor of Medicine, Cleveland Clinic Lerner College of Medicine of Case Western Reserve University

Staff

Steven Andresen, DO
Brian Bolwell, MD
Edward Copelan, MD
Robert Dean, MD
Hien Duong, MD
Rabi Hanna, MD
Brian Hill, MD, PhD
Brad Pohlman, MD
Stephen Smith, MD
Ronald Sobecks, MD
John Sweetenham, MD

Phone number

216.445.5600

Fast facts

Initiated: 1975

National Marrow Donor Program approval: Nov. 22, 1988

As of Dec. 31, 2011, 3,802 bone marrow transplants have been performed at Cleveland Clinic

One of four Ohio centers belonging to the National Marrow Donor Program registry

Special accreditations

Foundation for the Accreditation of Cellular Therapy (FACT)

Collaboration

We continue successful collaboration with the Seidman Cancer Center as part of the Case Comprehensive Cancer Center
JOHN DEMARIE | Heart and Liver Transplant Recipient

“My life is much better knowing I have a future. It truly is a miracle.”
— John DeMarie, 59, Lemont, Ill. A congenital heart defect caused
John’s heart — and later his liver — to weaken over time. After spend-
ing nearly a year in the hospital awaiting his transplant, John is on the
road to recovery and enjoying time with his new baby granddaughter.
2011 Highlights

Cleveland Clinic’s Cardiac Transplant Program is a key component of the George M. and Linda H. Kaufman Center for Heart Failure. The clinical activity of the Cardiac Transplant Program remained robust in 2011. A total of 201 patients were formally evaluated for transplantation; 69 candidates were listed and 58 transplants were performed. Of these, three were heart/lung, one heart/kidney and one heart/liver.

The program also continued to achieve excellent outcomes. The Scientific Registry of Transplant Recipients (SRTR) demonstrates that for patients receiving their first transplant between July 1, 2008, and Dec. 31, 2010, 96 percent of adult recipients were alive one year after transplant, compared with the 89.7 percent that would be expected based on the characteristics of these patients. Moreover, the \( P \) value of 0.011 indicates that this difference is statistically significant. For patients receiving their first transplant between Jan. 1, 2006, and June 30, 2008, the three-year survival rate for our program is 82 percent, which is the expected survival based on national experience. These excellent results are testimony to the outstanding multidisciplinary care provided by our transplant program.

Sangjin Lee, MD, joined the Section of Heart Failure and Cardiac Transplantation in the Tomsich Family Department of Cardiovascular Medicine, Sydell and Arnold Miller Family Heart & Vascular Institute, in 2011. His specialty interests include cardiac transplantation, cardiac assist devices and the genetics of heart disease.

Mechanical Circulatory Support

The use of mechanical circulatory support, both for bridge to transplant and for destination therapy, continues to grow. Fifty-six support devices were implanted in 55 patients at the Kaufman Center for Heart Failure. Of these, 25 were implanted as a bridge to transplant and 31 as destination therapy. Access to and expertise with mechanical support devices (Thoratec’s HeartMate II®, SynCardia’s Total Artificial Heart®, Berlin Heart and HeartWare®) allow us to use the optimal device for each adult and pediatric patient.
Research and Innovations

Our program continues to participate in many clinical research studies. The goals of these trials are to manage acute heart failure, improve long-term survival, minimize postoperative morbidity in the transplant population, and evaluate the safety and effectiveness of mechanical circulatory support as a bridge to transplant and destination therapy.

**Principal Investigator — Dr. Nicholas Smedira**
The HeartMate II LVAS Pivotal Study Protocol IDE #G010230

**Principal Investigator — Dr. Randall Starling**
Clinical Trials in Organ Transplantation (CTOT) Protocol CTOT-05: Observational Study of Alloimmunity in Cardiac Transplant Recipients

**Principal Investigator — Dr. Edward Soltesz**
PROCEED II: Prospective, Multi-Center, Randomized Clinical Investigation of Transmedics, Inc.’s Organ Care System (OCS) for Cardiac Use

**Principal Investigator — Dr. Nicholas Smedira**
Evaluation of the HeartWare® Left Ventricular Assist Device System for the Treatment of Advanced Heart Failure

**Principal Investigator — Dr. Randall Starling**
Echocardiography Guided Cardiac Resynchronization Therapy Clinical Investigation (EchoCRT)

**Principal Investigator — Dr. Wilson Tang**
THAOS: Transthyretin-Associated Amyloidosis Outcomes Survey — A Global, Multi-Center, Longitudinal, Observational Survey of Patients with Documented Transthyretin (TTR) Mutations or Wild-Type TTR Amyloidosis

**Principal Investigator — Dr. Randall Starling**
A Multicenter, Randomized, Double-Blind, Parallel-Group, Active-Controlled Study to Evaluate the Efficacy and Safety of LCZ696 Compared to Enalapril on Morbidity and Mortality in Patients with Chronic Heart Failure and Reduced Ejection Fraction

**Principal Investigator — Dr. Eileen Hsich**
Immune Activation and Myocardial Recovery in Peripartum Cardiomyopathy

**Principal Investigator — Dr. Wilson Tang**
Left Atrial Pressure Monitoring to Optimize Heart Failure Therapy Study (LAPTOP-HF)

**Principal Investigator — Dr. David Taylor**
A Phase IIa, 3-Strata Dose-Defining Study Evaluating the Hemodynamic Effects, Safety and Tolerability of CXL-1020 in Patients with Systolic Heart Failure
Principal Investigator — Dr. Nicholas Smedira
SynCardia Freedom™ Driver System Study

Principal Investigator — Dr. Maria Mountis
MEDAMACS Pilot Study: Medical Arm for Mechanically Assisted Circulatory Support

Principal Investigator — Dr. Randall Starling
Prevention of Cardiac Allograft Vasculopathy Using Rituximab (Rituxan) Therapy in Cardiac Transplantation

Principal Investigator — Dr. Gonzalo Gonzalez-Stawinski
LVAD Therapy: Exploring the Effect of Intramyocardial Injection of Mesenchymal Precursor Cells on Myocardial Function

Principal Investigator — Dr. Nicholas Smedira
A Prospective, Randomized, Controlled, Unblinded, Multi-Center Clinical Trial to Evaluate the HeartWare® Ventricular Assist System (VAS) for Destination Therapy of Advanced Heart Failure

Principal Investigator — Dr. Eiran Gorodeski
Monitoring Adults with Heart Failure at Home Using an Under the Mattress Contact-Less Sensor: A Pilot Study

Principal Investigator — Dr. Eiran Gorodeski
INcrease Of vagal tone in chronic Heart Failure (iNOvate-hF) — A Randomized Study to Establish the Safety and Efficacy of CardioFit™ for the Treatment of Subjects with Heart Failure and Left Ventricular Dysfunction

Principal Investigator — Dr. Randall Starling
A Facilitated Access Program to Provide Everolimus (RAD) for Maintenance for Patients Completing Therapy in RAD Trials in Solid Organ Transplantation

Principal Investigator — Dr. Randall Starling
A 24-Month, Multi-Center, Randomized, Open-Label Non-Inferiority Study of Efficacy and Safety Comparing Two Exposures of Concentration-Controlled Certican with Reduced Neoral Versus 3.0 g MMF with Standard Dose Neoral in De Novo Heart Transplantation Recipients
Survival analysis: For patients receiving their first transplant of this type between July 1, 2008, and Dec. 31, 2010, for the one-month and one-year models, and between Jan. 1, 2006, and June 30, 2008, for the three-year model. Single-organ transplants only; re-transplants excluded.

(Source: Scientific Registry of Transplant Recipients [SRTR], January 2012)

<table>
<thead>
<tr>
<th>Adult survival</th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient survival (percent)</td>
<td>99.2</td>
<td>96.3</td>
<td>82.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pediatric survival</th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient survival (percent)</td>
<td>100.0</td>
<td>90.9</td>
<td>66.7</td>
</tr>
</tbody>
</table>

Heart transplant volume in 2011

<table>
<thead>
<tr>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart only</td>
</tr>
<tr>
<td>Heart/lung</td>
</tr>
<tr>
<td>Heart/kidney</td>
</tr>
<tr>
<td>Heart/liver</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Heart transplant mortality in 2011

| Hospital deaths only (within 30 days post-transplant) | 1 |
Days on waiting list and post-transplant length of stay (LOS) for heart transplant recipients in 2011

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>257.3</td>
<td>124.5</td>
<td>58</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>20.4</td>
<td>16.0</td>
<td>55(^a)</td>
</tr>
</tbody>
</table>

\(^a\) 2 patients not discharged as of Feb. 6, 2012, and 1 died during initial hospitalization

Median time to transplant for patients on waiting list\(^a\)

Heart

<table>
<thead>
<tr>
<th></th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic</td>
<td>4.7</td>
</tr>
<tr>
<td>United States (overall)</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Heart/lung

<table>
<thead>
<tr>
<th></th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic</td>
<td>4.7</td>
</tr>
<tr>
<td>United States (overall)</td>
<td>&gt;72</td>
</tr>
</tbody>
</table>

\(^a\) For patients registered on waiting list between July 1, 2005, and Dec. 31, 2010. Source for U.S. data is Scientific Registry of Transplant Recipients (SRTR).

UNOS status of patients transplanted in 2011

<table>
<thead>
<tr>
<th>Status</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>39</td>
<td>67.2</td>
</tr>
<tr>
<td>1B</td>
<td>14</td>
<td>24.1</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>8.6</td>
</tr>
</tbody>
</table>
### Primary diagnoses for cardiac patients transplanted in 2011

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiomyopathy</td>
<td>31</td>
<td>53.5</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>16</td>
<td>27.6</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>19.0</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td></td>
</tr>
</tbody>
</table>

### Number of transplants, 2007-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Heart Only</th>
<th>Heart/Kidney</th>
<th>Heart/Liver</th>
<th>Heart/Lung</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>60</td>
<td>1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>54</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2010</td>
<td>47</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>53</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>274&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2</td>
<td>4</td>
<td>14</td>
</tr>
</tbody>
</table>

<sup>a</sup> Includes re-transplants

### Number of transplants, 1984-2011

<table>
<thead>
<tr>
<th>Total</th>
<th>Heart Only</th>
<th>Heart/Kidney</th>
<th>Heart/Liver</th>
<th>Heart/Lung</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,579</td>
<td>1,541</td>
<td>5</td>
<td>5</td>
<td>28</td>
</tr>
</tbody>
</table>
Selected Publications


Leadership

Randall Starling, MD, MPH
Program and Medical Director, Heart Transplant Program; Vice Chairman, Department of Cardiovascular Medicine; Section Head, Heart Failure and Cardiac Transplant Medicine; Medical Director, Kaufman Center for Heart Failure

Nicholas Smedira, MD
Program and Surgical Director, Heart Transplant Program and Kaufman Center for Heart Failure; Polly and W. Neil Rossborough Chair in Cardiac Transplantation

Phone number
216.444.8351

Fast facts

Initiated: 1984
First adult heart transplant: Aug. 15, 1984
UNOS approval: March 21, 1988
CMS/Medicare approval: June 13, 1988
As of Dec. 31, 2011, 1,579 heart transplants have been performed at Cleveland Clinic
Cleveland Clinic has developed and tested temporary and permanent artificial heart devices

In 2005, Cleveland Clinic was the first in America to implant the CardioWest Total Artificial Heart after its approval by the FDA; the Total Artificial Heart can provide a bridge to transplantation for patients at risk of imminent death from nonreversible biventricular failure
Staff

Eugene Blackstone, MD
Corinne Bott-Silverman, MD
Gerard J. Boyle, MD
Eiran Gorodeski, MD, MPH
Mazen A. Hanna, MD
Robert Hobbs, MD
Eileen Hsich, MD
Karen James, MD
Sangjin Lee, MD
Tomislav Mihaljevic, MD
Christine Moravec, PhD
Maria Mountis, DO
Guilherme H. Oliveira, MD
Gustavo Rincon, MD
Rene Rodriguez, MD
Edward Soltesz, MD
Robert Stewart, MD, MPH
Carmela Tan, MD
W.H. Wilson Tang, MD, FACC, FAHA
David Taylor, MD
James Young, MD
“Going from no vision to 75 percent was more than we expected.” — Christina Marshall, Matthew’s mother, Berlin Center, Ohio. Matthew, now 18 months old, was born with Peter’s anomaly, a rare disorder that blocks vision, in his right eye. At 7 months old, he underwent a partial corneal transplant procedure called Descemet stripping automated endothelial keratoplasty (DSAEK). Soon the haze over his right eye cleared and he now has 75 percent vision in that eye. Today, Matthew is enjoying normal development and his biggest challenge is keeping his glasses on.
CORNEAL TRANSPLANTATION

2011 Highlights

In 2011, Cole Eye Institute surgeons continued to be at the forefront of corneal surgery and research. Team members performed 208 corneal transplants at Cleveland Clinic’s main campus and our Lorain, Ohio, ambulatory surgery center. Cole Eye Institute transplant surgeons also have implanted the Boston Keratoprosthesis (artificial cornea) as a mode of restoring vision in patients with end-stage corneal disease, including those with corneal blindness from severe chemical trauma.

In 2011, Jeff Goshe, MD, joined the corneal transplant team.

Research and Innovations

Cole Eye Institute corneal surgeons were among the first in the country to perform a new transplant procedure, Descemet stripping automated endothelial keratoplasty (DSAEK). This procedure involves transplanting only the posterior side of the cornea in eyes with endothelial dysfunction, which greatly accelerates visual recovery, reduces surgically induced astigmatism and entails a smaller wound with less risk of complications from an “open-sky” penetrating keratoplasty. Cole Eye Institute surgeons have introduced several technique modifications to improve surgical outcomes, and a clinical study is exploring the optimal tissue preparation techniques for visual outcomes and graft survival. Fuchs’ endothelial disease is among the leading indications in the United States for corneal transplantation.

Additional research efforts include a prospective study of intraoperative optical coherence tomography (OCT) for image-guided corneal surgery being conducted by William Dupps, MD, PhD; David Meisler, MD; Jeff Goshe, MD; Sunil Srivastava, MD; and Justis Ehlers, MD.
Expertise

Cole Eye Institute surgeons are experts in performing all types of transplantation procedures to treat anterior segment diseases. These procedures include:

**Corneal transplantation**
- Penetrating keratoplasty
- Anterior lamellar keratoplasty
- Intracorneal ring segments for keratoconus
- Descemet stripping automated endothelial keratoplasty (DSAEK)

**Limbal stem cell transplantation**

**Amniotic membrane grafting**

**Artificial corneas**

Approximately 35,000 corneal transplants are performed in the United States every year. Medical histories of all corneal tissue donors are reviewed carefully, and blood tests are performed to check for infections. Corneal tissue is scrutinized by specular microscopy to ascertain viability. Corneal transplant success rates are high and rejection rates are low (with the use of only topical immunosuppressive medications).

Awards and Achievements

William J. Dupps, MD, PhD, was recognized as one of Cleveland’s Top Doctors in Cleveland Magazine in 2011. He also received an Achievement Award from the American Academy of Ophthalmology.

Steven Wilson, MD, received a “Best of Show” Video Award at the American Academy of Ophthalmology’s 2011 Annual Meeting as one of the submitters of “Mitomycin C in Refractive Surgery: Why, When, and for How Long? The Quest for Optimal Parameters” (Marcony R. Santhiago, Marcelo Netto, Brian K. Armstrong, Beatriz De Abreu Fiuza Gomes, David Smadja, Steven E. Wilson). Dr. Wilson also was listed as a U.S. News & World Report Top Doctor, which recognizes him as one of the top 1 percent of clinicians in ophthalmology in the United States in 2011.

Selected Publications


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**Staff**

William J. Dupps, MD, PhD

Jeff Goshe, MD

Roger H.S. Langston, MD

David M. Meisler, MD

Allen Roth, MD

Elias Traboulsi, MD

Steven Wilson, MD

**Phone number**

216.444.2030

**Fast facts**

In 2011, 208 corneal transplants were performed at Cleveland Clinic
PATRICIA WINLAND | Intestinal Transplant Recipient

“Cleveland should be proud that it has an intestinal transplant team that is dedicated to helping people.” — Patricia Winland, 41, Hillsboro, Ohio. Almost a year after gastric bypass surgery, Patricia began experiencing the symptoms of severe bowel ischemia. After spending six months in a nursing home receiving total parenteral nutrition, Patricia underwent an intestinal transplant and is now able to eat normally. She looks forward to having her ileostomy reversed in 2012.
2011 Highlights

The Intestinal Rehabilitation and Transplant Program (IRTP) completed three intestinal transplants in 2011, bringing to 20 the total number of intestinal transplants since the program’s inception in June 2008. The program received Centers for Medicare & Medicaid Services (CMS) certification for Adult Intestinal/Multivisceral Transplantation effective Dec. 15, 2010.

In addition to an increase in intestinal transplant activity, the program has experienced a dramatic increase in the number of patients with complex intestinal failure treated under the comprehensive care of dedicated gastroenterologists, surgeons, dietitians, psychiatrists and social workers. Some of these patients were treated conservatively by intervention with intestinal rehabilitation measures; others required major surgical intervention. The majority of these patients were transferred from other institutions and were from outside Ohio.

To accommodate the increase in out-of-state patient interest and referrals, the IRTP now offers MyConsult Online Medical Second Opinion for adult and pediatric patients. Following a thorough review of a patient’s medical records and diagnostic tests, staff can render a medical second opinion that includes treatment options or alternatives, as well as recommendations regarding future therapeutic considerations. Additionally, IRTP staff members have already participated in telemedicine videoconferencing — a technology that enables them to interact with patients via Skype™ to avoid unnecessary patient travel.

To better serve potential patients, both adult and pediatric, the IRTP offers a 24-hour referral line (216.312.0308) that enables prospective patients and referring physicians to reach an IRTP member at any time.

Patients with irreversible intestinal failure in whom total parenteral nutrition (TPN) has failed may be candidates for isolated small bowel, combined small bowel and liver, or multivisceral transplantation, depending on how many organs have been affected by the original disease and TPN. Other common indications for intestinal transplant in adults include dysmotility disorders and benign intra-abdominal tumors (such as desmoid tumors) that require an extensive intra-abdominal evisceration.
In the last 10 years, the outcomes of intestinal transplant have been dramatically influenced by the use of newer and more effective anti-rejection drugs. Currently, Cleveland Clinic is the only hospital in Ohio to perform adult intestinal transplants and is among only a few in the United States to do so.

**Expertise**

Cleveland Clinic consistently ranks as one of the top two hospitals in gastroenterology in *U.S. News & World Report’s “America’s Best Hospitals”* survey. In the 2011 survey, it was the top-ranked hospital in the gastroenterology category that offers intestinal transplant. Additionally, the American Society for Parenteral and Enteral Nutrition recognizes Cleveland Clinic as a program of excellence in nutrition support.

**Awards**

- Jeff Arnovitz, BSN, NP, CCTC, completed a second term as Marketing Director of the International Transplant Nurses Society.
- Renee Bennett, BSN, CCTN, CCTC, was named President of the International Transplant Nurses Society.
- Chris Shay-Downer, BSN, CCTC, was named President-Emeritus of the International Transplant Nurses Society.

**Clinical Activities**

Patients with intestinal failure are evaluated by a team of experts in nutrition that includes gastroenterologists, intestinal rehabilitation and transplant surgeons, colorectal surgeons, anesthesiologists, intensivists, dietitians, psychiatrists, pharmacists, nurses, social workers and ethicists.

When conservative measures fail, intestinal transplant is considered. Three types of intestinal transplantation are performed: isolated small bowel transplantation, combined liver and small intestine transplantation, and multivisceral transplantation.

A total of 381 patients underwent consults with the IRTP staff in 2011. Of those, 34 were screened for intestinal transplant and nine were evaluated for transplant. A total of three patients underwent intestinal transplant. The remaining patients were treated with dietary interventions and medical therapy.
**Number of consults, screenings and evaluations by IRTP, 2004-2011**

<table>
<thead>
<tr>
<th>Year</th>
<th>Consults</th>
<th>Patients Screened</th>
<th>Patients Evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>107</td>
<td></td>
<td></td>
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<tr>
<td>2006</td>
<td>112</td>
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<td></td>
</tr>
<tr>
<td>2007</td>
<td>151</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008a</td>
<td>228</td>
<td>66</td>
<td>15</td>
</tr>
<tr>
<td>2009</td>
<td>259</td>
<td>75</td>
<td>18</td>
</tr>
<tr>
<td>2010</td>
<td>515</td>
<td>105</td>
<td>9</td>
</tr>
<tr>
<td>2011</td>
<td>381</td>
<td>34</td>
<td>9</td>
</tr>
</tbody>
</table>

*a Cleveland Clinic surgeons began performing intestinal transplants in June 2008*

**Number of intestinal transplants, 2008-2011**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008a</td>
<td>4</td>
</tr>
<tr>
<td>2009</td>
<td>3</td>
</tr>
<tr>
<td>2010</td>
<td>10</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
</tr>
</tbody>
</table>

*a Cleveland Clinic surgeons began performing intestinal transplants in June 2008*

**Research**

*Principal Investigator — Dr. Cristiano Quintini*

IRB 08-879: Outcomes of Intra-Abdominal Desmoid Tumors

*Principal Investigator — Dr. Donald Kirby*

IRB 09-079: A 24 Week Study of the Efficacy and Safety of Teduglutide in Subjects with Parenteral Nutrition-Dependent Short Bowel Syndrome

*Principal Investigator — Dr. Cristiano Quintini*

IRB 09-333: Parenteral Nutrition Associated Liver Disease in Patients with TPN Dependent Intestinal Failure
Principal Investigator — Dr. Ezra Steiger
IRB 09-1067: Prospective 5 Year Follow Up of Patients on Home Parenteral Nutrition for Chronic Intestinal Failure

Principal Investigator — Dr. Ezra Steiger
IRB 06-261: Plasma Citrulline Levels Predict Home Parenteral Nutrition Dependence in Patients with Short Bowel Syndrome

Principal Investigator — Dr. Ezra Steiger
IRB 5248: Registry: Intestinal Rehabilitation Program Database

Principal Investigator — Dr. Koji Hashimoto
IRB 09-971: New desensitization protocol for human intestinal transplant candidates with high panel reactive antibodies

Selected Publications


Parekh NR, Lennon EA. Intestinal transplantation: steps to timely referral and successful outcome. ASPEN Dietetics Practice Section Newsletter. 2011(Fall):3-7.


National/International Presentations
Quintini C. Small bowel transplantation: state-of-the-art [George Rankin Honorary Lecture]. Presented at: Cleveland Clinic 47th Annual Gastroenterology Update; November 17, 2011; Cleveland, OH.

Barco K. Intestinal rehabilitation: tricks of the trade prior to intestinal transplant. Presented at: Cleveland Clinic 47th Annual Gastroenterology Update; November 17, 2011; Cleveland, OH.


Parekh NR. Post-transplant management of chyle leak. Presented at: XII International Small Bowel Transplant Symposium; September 15, 2011; Washington, DC.

Shay-Downer C. Easing patient transition through the transplant process: what are we doing to help? Presented at: International Transplant Nurses Society University webinar.

Shay-Downer C. “Certification for transplant nurses in the United States” and “Evidence-based practice in intestinal transplantation.” Presented at: Latin American Transplant Nurses Congress; March 2011; Cartagena, Colombia.
Leadership

Cristiano Quintini, MD
Program Director, Intestinal Transplant; Director, Intestinal Rehabilitation and Transplant Program

Donald Kirby, MD
Medical Director, Intestinal Rehabilitation and Transplant Program

Phone number
216.445.1748

24-Hour Referral Line
216.312.0308

Fast facts

Initiated: 2008

Performed first adult intestinal transplant in Ohio: June 2008

As of Dec. 31, 2010, 20 intestinal transplants have been performed at Cleveland Clinic

Performed first sequential split liver/isolated intestinal transplant in Ohio: 2009

Performed first kidney/intestine transplant in Ohio: 2010

CMS/Medicare approval: Dec. 15, 2010
SARAH SAGANES | Liver Transplant Recipient

“I woke up feeling like a new person.” — Sarah Saganes, 27, Lakewood, Ohio. Sarah was diagnosed with Caroli disease, a rare inherited disorder of the bile ducts that caused her to battle exhaustion, itching, abdominal pain and severe malnutrition, resulting in her weight dropping to 80 pounds. After undergoing a split liver transplant, Sarah, who is a patient service representative, says she is better able to empathize with patients and encourage them to hope for healing.
2011 Highlights

In 2011, we performed 122 liver transplants, with improved outcomes and survival rates. Our liver transplant program is the largest in the region, finishing in the top 10 for volume in the United States.

We completed our first adult liver transplant on Nov. 8, 1984. Since then, we have completed more than 1,692 liver transplants, including the first lung-liver transplant in Ohio, performed in 2007. Wait-list deaths at six and 12 months have been below regional and national norms. Moreover, our program maintains graft and patient survival above the national averages.

2011 was a year of continued growth and adjustment for the hepatology team as we experienced an increased demand for our services and changes in staff. A total of 462 patients underwent liver transplant evaluation, and 184 patients were listed for transplantation.

The multidisciplinary Liver Tumor Clinic, under the direction of Federico Aucejo, MD, continues to offer state-of-the-art medical care to patients with hepatic tumors through a multidisciplinary team of experienced healthcare professionals in the fields of hepatic surgery, hepatology, radiology and oncology.

The Liver Tumor Clinic enables patients, within a single visit, to be seen by a board-certified hepatologist, oncologist, surgeon and interventional radiologist. During 2011, the Liver Tumor Clinic reported the following activity:

- 995 visits
- 565 total patients
- 259 new patients, with 153 internally referred, 86 externally referred and 20 self-referred

With the large number of patients on the waiting list for liver transplantation and the relative scarcity of organs for transplantation, liver transplant programs have focused on the use of organs from donors who were once considered not suitable/high-risk as “expanded criteria donors.” One group of these donors is non-heart-beating donors (donation after cardiac death, or DCD), who are not brain-dead, as donation occurs after the withdrawal of support and complete arrest of the cardiac and circulatory system. One of the main complications following use of the liver from these donors is biliary strictures, which are thought to be secondary to formation of thrombi in the peribiliary vascular system at the time of lack of perfusion of the organs. Under a new center protocol to lower the risk of ischemic-type biliary stricture after DCD transplant, we have injected tissue plasminogen...
activator into the donor hepatic artery on the back table. Our initial results show patient and graft survival rates comparable to those with livers from standard brain-dead donors.

**Awards and Achievements**

- Cristiano Quintini, MD, received a $25,000 grant for research on normothermic ex vivo perfusion of the liver in collaboration with University Hospitals’ transplant program.
- Charles Miller, MD, was elected Secretary of the American Society of Transplant Surgeons (ASTS) Council.
- Bijan Eghtesad, MD, was appointed Fellowship Director, American Society of Transplant Surgeons.
- Srinivasan Dasarathy, MD, is the recipient of an NIH RO1 award for the study of sarcopenia in cirrhosis.
- Charles Winans, MD, was awarded the 2011 Nightingale Physician Collaboration Nursing Award.
- Nizar Zein, MD, was awarded the 2011 Ana G. Mendez University System Presidential Medal.

**Survival analysis:** For patients receiving their first transplant of this type between July 1, 2008, and Dec. 31, 2010, for the one-month and one-year models, and between Jan. 1, 2006, and June 30, 2008, for the three-year model. Single-organ transplants only; re-transplants excluded.

(Source: Scientific Registry of Transplant Recipients [SRTR], January 2012)

<table>
<thead>
<tr>
<th></th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient survival (percent)</strong></td>
<td>96.6</td>
<td>89.0</td>
<td>82.9</td>
</tr>
<tr>
<td><strong>Graft survival (percent)</strong></td>
<td>94.8</td>
<td>87.0</td>
<td>77.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient survival (percent)</strong></td>
<td>90.9</td>
<td>90.9</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Graft survival (percent)</strong></td>
<td>83.3</td>
<td>83.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Number of liver transplants in 2011

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>117</td>
</tr>
<tr>
<td>Liver/kidney</td>
<td>4</td>
</tr>
<tr>
<td>Liver/heart</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>122&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Includes 7 re-transplants

Types of liver transplants in 2011

<table>
<thead>
<tr>
<th>Type</th>
<th>Number&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole</td>
<td>111</td>
<td>91.0</td>
</tr>
<tr>
<td>Split</td>
<td>10</td>
<td>8.2</td>
</tr>
<tr>
<td>Reduced/partial</td>
<td>1</td>
<td>0.8</td>
</tr>
</tbody>
</table>

<sup>a</sup> All from deceased donors

Liver transplant mortality in 2011

Hospital deaths only (within 30 days post-transplant) 1

Days on waiting list and post-transplant length of stay (LOS) for liver transplant recipients in 2011

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>166.4</td>
<td>67.5</td>
<td>122</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>13.2</td>
<td>10.0</td>
<td>119&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> 1 patient died during initial hospitalization, and 2 patients were re-transplanted during initial hospitalization, in which cases only the second graft was used to calculate post-transplant LOS
Median time to liver transplant for patients on waiting list

<table>
<thead>
<tr>
<th></th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic</td>
<td>6.8</td>
</tr>
<tr>
<td>United States (overall)</td>
<td>11.8</td>
</tr>
</tbody>
</table>

a For patients registered on waiting list between July 1, 2005, and Dec. 31, 2010. Source for U.S. data is Scientific Registry of Transplant Recipients (SRTR).

Primary diagnoses for liver patients transplanted in 2011

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatoma, hepatocellular carcinoma</td>
<td>28</td>
<td>22.9</td>
</tr>
<tr>
<td>Nonalcoholic steatohepatitis (NASH)</td>
<td>17</td>
<td>13.9</td>
</tr>
<tr>
<td>Chronic active hepatitis with cirrhosis</td>
<td>16</td>
<td>13.1</td>
</tr>
<tr>
<td>Alcoholic cirrhosis</td>
<td>11</td>
<td>9.0</td>
</tr>
<tr>
<td>Alcoholic cirrhosis with hepatitis C</td>
<td>6</td>
<td>4.9</td>
</tr>
<tr>
<td>Alpha-1-antitrypsin deficiency</td>
<td>6</td>
<td>4.9</td>
</tr>
<tr>
<td>Primary biliary cirrhosis</td>
<td>6</td>
<td>4.9</td>
</tr>
<tr>
<td>Hepatoma and cirrhosis</td>
<td>5</td>
<td>4.1</td>
</tr>
<tr>
<td>Benign tumor: polycystic liver disease</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td>Amyloidosis</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Cryptogenic cirrhosis (idiopathic)</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Metabolic disease: Wilson's disease</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Re-transplant: primary graft failure</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Other</td>
<td>16</td>
<td>13.1</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td></td>
</tr>
</tbody>
</table>
Research

Principal Investigator — Dr. John Fung  
Co-investigator — Dr. Bijan Eghtesad  
A 24-Month Multicenter, Randomized, Open-Label Study to Evaluate the Efficacy and Safety of Concentration-Controlled Everolimus with Corticosteroids in Combination with Minimization or Elimination of Tacrolimus in De Novo Transplant Recipients Compared to Tacrolimus and Corticosteroid

Principal Investigator — Dr. Srinivasan Dasarathy  
Co-investigator — Dr. Bijan Eghtesad  
Patient Perception of Nutritional Counseling During Evaluation for Liver Transplantation: A Prospective Study

Principal Investigator — Dr. Srinivasan Dasarathy  
Co-investigator — Dr. Bijan Eghtesad  
Prevalence and Outcome of Malnutrition in Cirrhotic Patients Undergoing Evaluation for Liver Transplantation: A Prospective Study

Principal Investigator — Dr. Bijan Eghtesad  
A Randomized Controlled Clinical Trial of Low-Dose Thymoglobulin and Extended Delay of Calcineurin Inhibitor Therapy for Renal Protection After Liver Transplantation

Principal Investigator — Dr. Bijan Eghtesad  
Enhancing DCD Utilization with Thrombolytic Therapy Focusing on Liver and Kidney Transplantation

Principal Investigator — Dr. Bijan Eghtesad  
A Phase II Randomized, Double-Blind, Placebo-Controlled Study of the Clinical Effectiveness of a Human Monoclonal Antibody Against Hepatitis C Virus E2 Glycoprotein (MBL-HCV1) in Hepatitis C-Infected Patients Undergoing Liver Transplantation

Principal Investigator — Dr. Bijan Eghtesad  
Graft Versus Host Disease (GVHD) After Liver Transplantation: Does Immunomodulation Work?

Principal Investigator — Dr. Bijan Eghtesad  
Renal-Preserving Role of Thymoglobulin Induction in Patients with Renal Failure and on Hemodialysis Undergoing Liver Transplantation

Principal Investigator — Dr. Dympna Kelly  
Hepatic Artery (HA) Infusion of Adenosine Increases Arterial Blood Flow in Adult Liver Transplant Recipients: A Pilot Study

Principal Investigator — Dr. Bijan Eghtesad  
Chart Review: Survival Rates and Biliary Complications in Recipients of Partial and Graft Liver Transplants Recovered from Cardiac Death Donors
Principal Investigator — Dr. Srinivasan Dasarathy
Registry: Impact of Malnutrition in Outcomes of Patients with Cirrhosis of the Liver

Principal Investigator – Dr. Charles Miller
A Prospective, Multicenter Comparison of Multiphase Contrast-Enhanced CT and Multiphase Contrast-Enhanced MRI for Diagnosis of Hepatocellular Carcinoma and Liver Transplant Allocation

Principal Investigator — Dr. Koji Hashimoto
Chart Review: Prospective Study of Ischemia/Reperfusion Injury in Liver Transplantation

Principal Investigator — Dr. John Fung
Solid Organ Transplantation in HIV: Multisite Study

Selected Publications


Leadership

Charles Miller, MD
Program and Surgical Director, Liver Transplant

Nizar N. Zein, MD
Medical Director, Liver Transplant; Chief, Section of Hepato-biliary Diseases

Vera Hupertz, MD
Director, Pediatric Liver Transplantation

Phone number

216.444.8770

Fast facts

Initiated: 1984

First adult liver transplant: Nov. 8, 1984

UNOS approval: March 21, 1988

CMS/Medicare approval: Oct. 14, 1992

Performed first lung-liver transplant in Ohio (2007)

Active living donor program established for liver transplants

As of Dec. 31, 2011, 1,692 liver transplants have been performed at Cleveland Clinic
Staff

Talal Adhami, MD
Naim Alkhouri, MD
Maded Argalious, MD
Federico Aucejo, MD
Robin Avery, MD
David Barnes, MD
Ana Bennett, MD
Mary Bronner, MD
William Carey, MD
Dian-Jung Chiang, MD
Kathy Coffman, MD
Jacek Cywinski, MD
Srinivasan Dasarathy, MD
Bijan Eghtesad, MD
Kyrsten Fairbanks, MD
John J. Fung, MD, PhD
Michael Geisinger, MD
John Goldblum, MD
Koji Hashimoto, MD, PhD
Robert Helfand, MD
Samuel Irefin, MD
John Jerabek, MD
Binu John, MD
Lucileia Johnson, MD
Allen Keebler, MD
Dymphna Kelly, MD
Jia Lin, MD, PhD
Kamal Maheswari, MD
Theodore Marks, MD, PhD
Arthur McCullough, MD
Narayanan Menon, MD
Sherif Mossad, MD
Robert O’Shea, MD, MSCE
Brian M. Parker, MD
Mauricio Perilla, MD
Cristiano Quintini, MD
Kadakkal Radhakrishnan, MD
Mangalakaraipudur Ramachandran, MD
Carlos Romero-Marrero, MD
Mark Sands, MD
John Seif, MD
Marty Smith, STD
Wolf Stapelfeldt, MD
Ralph Tuthill, MD
David van Duin, MD
Claudene Vlah, MD
Jamile Wakim-Fleming, MD
Sivan Wexler, MD
Charles Winans, MD
Lisa Yerian, MD
Eli Zisman, MD
MEGAN WELKER | Lung Transplant Recipient

“My daughter says I can be a ‘regular mommy’ now.” — Megan Welker, 30, Canton, Ohio. Megan experienced constant exhaustion and frequent hospital stays due to cystic fibrosis and an ensuing lung collapse. After undergoing a double lung transplant, Megan says she is no longer just “surviving day to day” but instead has “a ton of energy” and is “always on the go.”
2011 Highlights

The Lung and Heart/Lung Transplant team at Cleveland Clinic performed 108 lung transplants in 2011, which marks the third consecutive year of performing more than 100 transplants annually. We completed our 1,070th transplant since the program’s inception in 1990. We attribute the high numbers and excellent outcomes to many factors, including more aggressive donor utilization, teamwork and strong institutional support. The Lung and Heart/Lung Transplant program has achieved consistent volume while maintaining outcomes that are comparable to national averages year after year. We have received national and international recognition for our commitment to accepting many high-risk patients who would be declined as lung transplant candidates at other centers.

Our program has established a reputation for accepting challenging, complex cases, which has led to a high referral rate. In 2011, our team evaluated 588 patients with various forms of end-stage lung disease from across the United States as well as other countries. We have an established and streamlined referral and evaluation process that allows for rapid evaluation and listing for transplantation. High-risk patients are invited to complete an inpatient evaluation process. Fifty percent of our patients receive a transplant in about 3.7 months, compared with a national average of 50 percent receiving a lung in 4.7 months or less. The majority of our patients spent an average of about 161 days on the waiting list in 2011 before they were transplanted.

Our hospital and 30-day mortality rates remain low despite heightened case severity. Median and long-term outcomes continue to exceed national averages for lung transplantation, with a one-year survival rate of 80.3 percent and a three-year survival rate of 72.9 percent. A continued emphasis on quality assurance and quality improvement remains central to the program, reflected by a median post-transplant length of stay of 17.0 days.

Research and Innovations

A premier component of our program is our commitment to advancing the field of lung transplantation. Ours was the only center to receive both NIH R34 grants offered for the first time in 2010 focusing on the incidence of and treatments for antibody-mediated rejection and effects of gastroesophageal reflux on lung
function after lung transplantation. The results of both these studies will be available in summer 2012 and will form the foundation for another, larger trial.

Currently, Kenneth McCurry, MD, is the North American principal investigator for a Phase II study using the TransMedics® portable warm blood perfusion system that allows a new type of transplant called a living organ transplant. This trial was set to start in early 2012 with Cleveland Clinic heading up the study.

Our program continues to participate in many national and international trials addressing important issues affecting lung transplantation, including infectious issues, harvesting techniques and other factors impacting early graft dysfunction, and medical regimens that may reduce the incidence of chronic rejection. Our surgical team is currently one of the most experienced teams in the country in donation after cardiac death (DCD) and is involved in research with ex vivo perfusion and soon with the warm blood perfusion system. Ours is the only center in the country currently performing bronchial artery revascularization (BAR) in an effort to reduce impaired airway healing after lung transplantation. In a lung transplant using BAR, surgery includes an additional connection between a recipient artery and the diminutive donor lung bronchial arteries to restore normal bronchial blood supply.

**Expertise**

Our highly experienced physicians are frequently sought for their opinions and advice. They have served on the advisory boards of various organizations that advance lung transplantation, including the American Thoracic Society, the International Society for Heart & Lung Transplantation, the United Network for Organ Sharing, the American College of Chest Physicians, the World Transplant Congress and the World Association for Bronchology.

As part of a statewide quality assurance program, we continue to actively participate in the State of Ohio Solid Organ Transplantation Consortium, providing educational programs and hosting site visits for other programs in the state.
Survival analysis: For patients receiving their first transplant of this type between July 1, 2008, and Dec. 31, 2010, for the one-month and one-year models, and between Jan. 1, 2006, and June 30, 2008, for the three-year model. Single-organ transplants only; re-transplants excluded.

(Source: Scientific Registry of Transplant Recipients [SRTR], January 2012)

**Types of lung transplants in 2011**

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double</td>
<td>62</td>
<td>57.4</td>
</tr>
<tr>
<td>Single</td>
<td>46a</td>
<td>42.6</td>
</tr>
<tr>
<td>Total</td>
<td>108b</td>
<td></td>
</tr>
</tbody>
</table>

^a 24 left and 22 right  
^b Includes 1 re-transplant

**Lung transplant mortality in 2011**

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital deaths only (within 30 days post-transplant)</td>
<td>2</td>
</tr>
</tbody>
</table>
### Days on waiting list and post-transplant length of stay (LOS) for lung transplant recipients in 2011

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>161.1</td>
<td>65.0</td>
<td>108</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>25.5</td>
<td>17.0</td>
<td>99&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> 5 patients had not been discharged as of Feb. 6, 2012, and 4 died during initial hospitalization.

### Median time to lung transplant for patients on waiting list<sup>a</sup>

<table>
<thead>
<tr>
<th></th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic</td>
<td>3.7</td>
</tr>
<tr>
<td>United States (overall)</td>
<td>4.7</td>
</tr>
</tbody>
</table>

<sup>a</sup> For patients registered on waiting list between July 1, 2005, and Dec. 31, 2010. Source for U.S. data is Scientific Registry of Transplant Recipients (SRTR).

### Primary diagnoses for lung patients transplanted in 2011

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiopathic pulmonary fibrosis</td>
<td>54</td>
<td>50.0</td>
</tr>
<tr>
<td>COPD/emphysema</td>
<td>21</td>
<td>19.4</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>11</td>
<td>10.2</td>
</tr>
<tr>
<td>Primary pulmonary hypertension</td>
<td>5</td>
<td>4.6</td>
</tr>
<tr>
<td>Pulmonary veno-occlusive disease</td>
<td>4</td>
<td>3.7</td>
</tr>
<tr>
<td>Sarcoidosis</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>108</strong></td>
<td></td>
</tr>
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</table>
Number of lung transplants, 1990-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Single</th>
<th>Double</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>1990</td>
<td>556</td>
<td>482</td>
<td>1,038</td>
</tr>
<tr>
<td>1991</td>
<td>28</td>
<td>29</td>
<td>57</td>
</tr>
<tr>
<td>1992</td>
<td>46</td>
<td>111</td>
<td>157</td>
</tr>
<tr>
<td>1993</td>
<td>51</td>
<td>71</td>
<td>122</td>
</tr>
<tr>
<td>1994</td>
<td>46</td>
<td>62</td>
<td>108</td>
</tr>
<tr>
<td>Total</td>
<td>186</td>
<td>330</td>
<td>516</td>
</tr>
</tbody>
</table>

*a* Includes 3 heart/lung and 1 lung/liver  
*b* Includes 3 heart/lung and 3 lung/liver  
*c* Includes 5 heart/lung  
*d* Includes 3 heart/lung

Number of lung transplants, 2007-2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Single</th>
<th>Double</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>15</td>
<td>57*</td>
<td>72</td>
</tr>
<tr>
<td>2008</td>
<td>28</td>
<td>29</td>
<td>57</td>
</tr>
<tr>
<td>2009</td>
<td>46</td>
<td>111*</td>
<td>157</td>
</tr>
<tr>
<td>2010</td>
<td>51</td>
<td>71*</td>
<td>122</td>
</tr>
<tr>
<td>2011</td>
<td>46</td>
<td>62*</td>
<td>108</td>
</tr>
<tr>
<td>Total</td>
<td>186</td>
<td>330</td>
<td>516</td>
</tr>
</tbody>
</table>

*a* Includes 3 heart/lung and 1 lung/liver  
*b* Includes 3 heart/lung and 3 lung/liver  
*c* Includes 5 heart/lung  
*d* Includes 3 heart/lung

Selected Publications


Leadership

Marie M. Budev, DO, MPH, FCCP
Program and Medical Director, Lung and Heart/Lung Transplant

Kenneth McCurry, MD
Program and Surgical Director, Lung and Heart/Lung Transplant

Phone number
216.444.8282

Fast facts
Set world record for number of lung transplants performed in a single year (2009)

Initiation date: 1990


First liver/lung transplant: Jan. 31, 2007

First double lung transplant with bronchial artery revascularization performed Dec. 15, 2007, at Cleveland Clinic

Performed first lung/liver transplant in Ohio (2007)

UNOS approval: March 3, 1993

CMS/Medicare approval: Oct. 22, 1997

As of Dec. 31, 2011, 1,070 lung transplants have been performed at Cleveland Clinic

Staff

Olufemi Femi Akindipe, MD
Medhat Askar, MD, PhD
Robin Avery, MD
Kathy Coffman, MD
Lara Danziger-Isakov, MD, MPH
Carol Farver, MD
Thomas R. Gildea, MD
Douglas Johnston, MD
Leih Johnston, MD
Charles Randy Lane, MD
Michael Machuzak, MD

David P. Mason, MD
Steve Mawhorter, MD
Atul C. Mehta, MD
Omar A. Minai, MD
Sherif Mossad, MD
Sudish Murthy, MD, PhD
Thomas Olbrych, MD
Gösta Pettersson, MD, PhD
Nicholas Smedira, MD
Alan Taege, MD
CAROLYN SPIOTTA | Pancreas/Kidney Transplant Recipient

“I feel so fortunate and thankful that I have received a second chance at life.” — Carolyn Spiotta, 44, Pittsburgh. Carolyn needed a new pancreas and kidney after suffering from type 1 diabetes and developing end-stage renal disease. Despite dialysis for several hours each week, Carolyn’s diabetes continued to spiral out of control, leaving her exhausted and, at times, unconscious. Following a pancreas and kidney transplant, Carolyn spent just eight days in the hospital and remains, in her words, “eternally grateful” to her donor and her donor’s family.
2011 Highlights

In 2011, a total of 15 pancreas transplants were performed, including 11 kidney/pancreas transplants and four pancreas-alone transplants. This brings the total number of transplants performed since the beginning of the program to 314. Clinical outcomes continue to be excellent. For patients receiving a pancreas/kidney or pancreas-alone transplant in 2011, survival was 100 percent.

The majority of pancreas transplants at Cleveland Clinic are performed to address diabetes.

Research and Innovations

Cleveland Clinic’s Kidney and Pancreas Transplant Program actively participates in clinical and translational research activities and contributes significantly to the transplant scientific community with work presentations at national and international meetings, as well as through staff participation at academic and scientific conferences.

Our research activities can be broadly divided into two major areas:

1) Translational research. There is a continuous need to develop novel biomarkers that will help clinicians better take care of patients so as to improve their outcomes. The National Institutes of Health (NIH) has dedicated significant funding to investigate novel tools that can predict transplant outcomes in various multicenter studies. Cleveland Clinic has been actively participating in the Clinical Trials in Organ Transplantation (CTOT) studies since 2005. Emilio Poggio, MD, and Robert Fairchild, PhD, are the principal investigators at Cleveland Clinic for the following CTOT studies:

Principal Investigators — Dr. Emilio Poggio, Dr. Titte Srinivas and Dr. Robert Fairchild

Clinical Trial in Organ Transplantation (CTOT-09): Immune Monitoring and CNI Withdrawal in Low Risk Recipients of Kidney Transplants. This is an NIH-sponsored multicenter trial (PI: Dr. Peter S. Heeger) with the goal of developing a strategy of immune monitoring that will allow safe withdrawal of calcineurin inhibitors in kidney transplant recipients perceived to be at relatively low risk for immune injury.
Principal Investigators — Dr. Emilio Poggio and Dr. Richard Fatica
Immune Tolerance Network (ITN524ST)/Clinical Trials in Organ Transplantation (CTOT-12): Associating Renal Transplantation with the ITN Signature of Tolerance (ARTIST Study). This is a multicenter NIH-ITN–funded observational study to assess the prevalence of a tolerance signature in renal transplant recipients.

Principal Investigator — Dr. Emilio Poggio
Clinical Trial in Organ Transplantation (CTOT-08): Discovery and Validation of Proteogenomic Biomarker Panels in a Prospective Serial Blood and Urine Monitoring Study of Kidney Transplant Recipients. This is an NIH-sponsored multicenter study (PI: Dr. Michael Abecassis, Northwestern University, Chicago) aimed at validating specific proteogenomic biomarker panels for acute and chronic rejection using prospective serial blood and urine monitoring in kidney transplant recipients.

Principal Investigators — All Cleveland Clinic Kidney and Pancreas Transplant Staff
Kidney and pancreas transplant program Bio-Repository. In collaboration with Cleveland Clinic’s Lerner Research Institute, the Kidney and pancreas transplant Program has initiated collection and storage of biospecimens (blood, urine, biopsy tissue) from kidney and pancreas transplant recipients who receive an organ at Cleveland Clinic. These biospecimens are intended for use in developing and testing novel biomarkers that will eventually improve patient care. This is one of the most important endeavors currently ongoing in the research aspect of our program.

2) Clinical research. Clinical research has always been the backbone of scientific activities at Cleveland Clinic, including those in transplantation. Some of the most important ongoing research projects are listed below.

Principal Investigator — Dr. Stuart Flechner
A Randomized Placebo-Controlled Double-Blind Comparative Study to Evaluate the Effect of Ramipril on Urinary Protein Excretion in Maintenance Renal Transplant Patients Converted to Sirolimus. The purpose of this study is to learn whether ramipril, an ACE inhibitor drug, is safe and effective in minimizing the risk of proteinuria in subjects in whom the immunosuppressive regimen is switched from a calcineurin inhibitor to sirolimus (a noncalcineurin inhibitor medication).

Principal Investigators — Dr. Titte Srinivas, Dr. Stuart Flechner, Dr. Emilio Poggio
Renal Allograft Function and Histology Following Switching from Tacrolimus- to Sirolimus (SRL)-Based Immunosuppression — Clinical and Mechanistic Impact. This study will test the hypothesis that switching from a calcineurin inhibitor (tacrolimus) to sirolimus (Rapamune) in a triple-therapy regimen with MMF and steroids in living and/or deceased donor renal transplant recipients leads to improvement in allograft structure and function at two years post-transplantation.
**Principal Investigator — Dr. Titte Srinivas**
A Prospective Cohort Study to Describe the Evolution of Persistent Hyperparathyroidism in Kidney Transplant Recipients. This is a corporate-funded multicenter study to estimate the proportion of subjects with persistent hyperparathyroidism post-transplantation among those who remain undertreated over time.

**Principal Investigator — Dr. Stuart Flechner**
A Two-Part, Phase 1/2, Safety, PK and PD Study of TOL-101, an Anti-TCR Monoclonal Antibody for Prophylaxis of Acute Organ Rejection in Patients Receiving Renal Transplantation. TOL-101 is a murine-derived IgM monoclonal antibody directed against the alpha-beta T-cell receptor on human lymphocytes. It is being developed for use as an induction agent in kidney transplantation. This multicenter U.S. trial will begin by determining the safe potential therapeutic dose of the drug, and then follow with a randomized controlled comparison with Thymoglobulin. It is hoped that TOL-101 will have a shorter effective half-life than current agents and that recipients will repopulate with tolerogenic gamma-delta T-cells.

**Principal Investigator — Dr. Bijan Eghtesad**
Enhancing DCD Kidney Utilization with Thrombolytic Therapy. This is an HRSA-sponsored study to determine if the potential for post-transplant complications due to delayed kidney function can be prevented or reduced by treating the donated kidney with a clot-dissolving medication.
**Survival analysis:** For patients receiving their first transplant of this type between July 1, 2008, and Dec. 31, 2010, for the one-month and one-year models, and between Jan. 1, 2006, and June 30, 2008, for the three-year model. Single-organ transplants only; re-transplants excluded.

(Source: Scientific Registry of Transplant Recipients [SRTR], January 2012)

---

### Pancreas: Adult survival

<table>
<thead>
<tr>
<th></th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient survival (percent)</td>
<td>100.0</td>
<td>100.0</td>
<td>93.1</td>
</tr>
<tr>
<td>Graft survival (percent)</td>
<td>95.8</td>
<td>85.5</td>
<td>83.4</td>
</tr>
</tbody>
</table>

### Pancreas/kidney: Adult survival

<table>
<thead>
<tr>
<th></th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient survival (percent)</td>
<td>100.0</td>
<td>97.4</td>
<td>83.3</td>
</tr>
<tr>
<td>Pancreas graft survival (percent)</td>
<td>97.4</td>
<td>88.8</td>
<td>73.7</td>
</tr>
<tr>
<td>Kidney graft survival (percent)</td>
<td>100.0</td>
<td>94.5</td>
<td>78.6</td>
</tr>
</tbody>
</table>

### Number of pancreas transplants in 2011

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreas</td>
<td>4</td>
<td>26.7</td>
</tr>
<tr>
<td>Pancreas/kidney</td>
<td>11</td>
<td>73.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>73.3</strong></td>
</tr>
</tbody>
</table>

*Includes 3 re-transplants*

### Pancreas transplant mortality in 2011

| Hospital deaths only (within 30 days post-transplant) | 0 |
### Days on waiting list and post-transplant length of stay (LOS) for pancreas transplant recipients in 2011

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>471.9</td>
<td>345.0</td>
<td>15</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>7.0</td>
<td>7.0</td>
<td>15</td>
</tr>
</tbody>
</table>

### Median time to transplant for patients on waiting list

#### Pancreas

<table>
<thead>
<tr>
<th></th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic</td>
<td>14.5</td>
</tr>
<tr>
<td>United States (overall)</td>
<td>20.7</td>
</tr>
</tbody>
</table>

#### Pancreas/kidney

<table>
<thead>
<tr>
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<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic</td>
<td>12.3</td>
</tr>
<tr>
<td>United States (overall)</td>
<td>13.7</td>
</tr>
</tbody>
</table>

*a For patients registered on waiting list between July 1, 2005, and Dec. 31, 2010. Source for U.S. data is Scientific Registry of Transplant Recipients (SRTR).

### Primary diagnoses for patients transplanted in 2011

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>12</td>
<td>80.0</td>
</tr>
<tr>
<td>Re-transplant/graft failure</td>
<td>3</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
Selected Publications

Refer also to the list of publications on page 91 (Renal Transplantation).


Leadership

Venkatesh Krishnamurthi, MD
Program and Surgical Director, Pancreas Transplant

Emilio Poggio, MD
Medical Director, Pancreas Transplant; Director, Renal Function Laboratory

Staff

Robin Avery, MD
Richard Fatica, MD
Sherif Mossad, MD
Saul Nurko, MD
John Rabets, MD
Titte Srinivas, MD
Brian Stephany, MD
Alvin Wee, MD
Charles Winans, MD

Phone numbers

Pre-transplant
216.444.6996

Post-transplant
216.444.8949

Fast facts

Initiated: 1985
First kidney/pancreas transplant: Oct. 23, 1985
First pancreas transplant: March 22, 1988
As of Dec. 31, 2011, 185 kidney/pancreas, 121 pancreas, 4 liver/pancreas, 3 pancreas/intestine/liver and 1 pancreas/intestine transplants have been performed at Cleveland Clinic
DAPHNE BONNER | Kidney Transplant Recipient

“I feel better than I have in years. I have no pain, am stronger and have started doing things I haven’t done in years.” — Daphne Bonner, 46, Niles, Ohio. Due to polycystic kidney disease, Daphne’s kidneys failed, requiring her to undergo dialysis. Following a kidney transplant, Daphne was able to return to her job as an occupational therapist and enjoy a vacation to Disney World with her family — a trip that would have been impossible before her transplant.
2011 Highlights

Clinical activity in renal transplantation remained strong at Cleveland Clinic’s Glickman Urological & Kidney Institute in 2011, as we performed 147 transplants, including 11 kidney/pancreas, four kidney/liver and one kidney/heart.

Transplantation, more than other clinical endeavors, is carried out with significant regulatory oversight. All Cleveland Clinic programs were among the first to be recertified by the Centers for Medicare & Medicaid Services (CMS). The kidney program also participated in a United Network for Organ Sharing (UNOS) pilot directed at developing guidelines for living donor programs.

For the first time in Cleveland Clinic history, a living kidney donation made in Cleveland was transplanted in another state. In 2011, Cleveland Clinic enrolled its first patient in the National Kidney Registry, an organization that facilitates living kidney donation. A local man wished to donate his kidney altruistically and, with the registry’s help, was able to direct it to a recipient in California. Cleveland Clinic staff look forward to continued cooperation with the registry to maximize use of donated kidneys.

Research and Innovations

Cleveland Clinic’s Kidney and Pancreas Transplant Program actively participates in clinical and translational research activities and contributes significantly to the transplant scientific community with work presentations at national and international meetings, as well as through staff participation at academic and scientific conferences.

Our research activities can be broadly divided into three major areas:

1) Translational research. There is a continuous need to develop novel biomarkers that will help clinicians better take care of patients so as to improve their outcomes. The National Institutes of Health (NIH) has dedicated significant funding to investigate novel tools that can predict transplant outcomes in various multicenter studies. Cleveland Clinic has been actively participating in the Clinical Trials in Organ Transplantation (CTOT) studies since 2005. Emilio Poggio, MD,
Principal Investigators — Dr. Emilio Poggio, Dr. Titte Srinivas and Dr. Robert Fairchild
Clinical Trial in Organ Transplantation (CTOT-09): Immune Monitoring and CNI Withdrawal in Low Risk Recipients of Kidney Transplants. This is an NIH-sponsored multicenter trial (PI: Dr. Peter S. Heeger) with the goal of developing a strategy of immune monitoring that will allow safe withdrawal of calcineurin inhibitors in kidney transplant recipients perceived to be at relatively low risk for immune injury.

Principal Investigators — Dr. Emilio Poggio and Dr. Richard Fatica
Immune Tolerance Network (ITN524ST)/Clinical Trials in Organ Transplantation (CTOT-12): associating Renal transplantation with the ITN Signature of Tolerance (ARTIST Study). This is a multicenter NIH-ITN–funded observational study to assess the prevalence of a tolerance signature in renal transplant recipients.

Principal Investigator — Dr. Emilio Poggio
Clinical Trial in Organ Transplantation (CTOT-08): Discovery and Validation of Proteogenomic Biomarker Panels in a Prospective Serial Blood and Urine Monitoring Study of Kidney Transplant Recipients. This is an NIH-sponsored multicenter study (PI: Dr. Michael Abecassis, Northwestern University, Chicago) aimed at validating specific proteogenomic biomarker panels for acute and chronic rejection using prospective serial blood and urine monitoring in kidney transplant recipients.

Principal Investigators — All Cleveland Clinic Kidney and Pancreas Transplant Staff
Kidney and pancreas transplant program Bio-Repository. In collaboration with Cleveland Clinic's Lerner Research Institute, the Kidney and Pancreas Transplant Program has initiated collection and storage of biospecimens (blood, urine, biopsy tissue) from kidney and pancreas transplant recipients who receive an organ at Cleveland Clinic. These biospecimens are intended for use in developing and testing novel biomarkers that will eventually improve patient care. This is one of the most important endeavors currently ongoing in the research aspect of our program.

2) Clinical research. Clinical research has always been the backbone of scientific activities at Cleveland Clinic, including those in renal transplantation. Some of the most important ongoing research projects are listed below.

Principal Investigator — Dr. Stuart Flechner
A Randomized Placebo-Controlled Double-Blind Comparative Study to Evaluate the Effect of Ramipril on Urinary Protein Excretion in Maintenance Renal Transplant Patients Converted to Sirolimus. The purpose of this study is to learn whether ramipril, an ACE inhibitor drug, is safe and effective in minimizing...
the risk of proteinuria in subjects in whom the immunosuppressive regimen is switched from a calcineurin inhibitor to sirolimus (a noncalcineurin inhibitor medication).

Principal Investigators — Dr. Titte Srinivas, Dr. Stuart Flechner, Dr. Emilio Poggio
Renal Allograft Function and Histology Following Switching from Tacrolimus- to Sirolimus (SRL)-Based Immunosuppression — Clinical and Mechanistic Impact. This study will test the hypothesis that switching from a calcineurin inhibitor (tacrolimus) to sirolimus (Rapamune) in a triple-therapy regimen with MMF and steroids in living and/or deceased donor renal transplant recipients leads to improvement in allograft structure and function at two years post-transplantation.

Principal Investigator — Dr. Titte Srinivas
A Prospective Cohort Study to Describe the Evolution of Persistent Hyperparathyroidism in Kidney Transplant Recipients. This is a corporate-funded multicenter study to estimate the proportion of subjects with persistent hyperparathyroidism post-transplantation among those who remain undertreated over time.

Principal Investigator — Dr. Stuart Flechner
A Two-Part, Phase 1/2, Safety, PK and PD Study of TOL-101, an Anti-TCR Monoclonal Antibody for Prophylaxis of Acute Organ Rejection in Patients Receiving Renal Transplantation. TOL-101 is a murine-derived IgM monoclonal antibody directed against the alpha-beta T-cell receptor on human lymphocytes. It is being developed for use as an induction agent in kidney transplantation. This multicenter U.S. trial will begin by determining the safe potential therapeutic dose (PTD) of the drug, and then follow with a randomized controlled comparison with Thymoglobulin. It is hoped that TOL-101 will have a shorter effective half-life than current agents and that recipients will repopulate with tolerogenic gamma-delta T-cells.

Principal Investigator — Dr. Bijan Eghtesad
Enhancing DCD Kidney Utilization with Thrombolytic Therapy. This is an HRSA-sponsored study to determine if the potential for post-transplant complications due to delayed kidney function can be prevented or reduced by treating the donated kidney with a clot-dissolving medication.

3) Epidemiological research. Cleveland Clinic has an active epidemiological research program focusing on outcomes for end-stage renal disease patients, including transplant recipients. Research is focused on issues including improving access to care, measuring quality of care of healthcare providers, comparing cost-effectiveness and efficacy of medical interventions, prediction models, and identifying novel risk factors that may be treated to enhance care. Our team works with internal hospital data from our electronic medical record system as well as several national registries that collect data from the U.S. population.
**Survival analysis:** For patients receiving their first transplant of this type between July 1, 2008, and Dec. 31, 2010, for the one-month and one-year models, and between Jan. 1, 2006, and June 30, 2008, for the three-year model. Single-organ transplants only; re-transplants excluded.

(Source: Scientific Registry of Transplant Recipients [SRTR], January 2012)

### Kidney: Adult survival

<table>
<thead>
<tr>
<th></th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient survival (percent)</td>
<td>99.7</td>
<td>96.4</td>
<td>90.3</td>
</tr>
<tr>
<td>Graft survival (percent)</td>
<td>99.4</td>
<td>95.4</td>
<td>86.8</td>
</tr>
</tbody>
</table>

### Kidney: Pediatric survival

<table>
<thead>
<tr>
<th></th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient survival (percent)</td>
<td>100.0</td>
<td>100.0</td>
<td>80.0</td>
</tr>
<tr>
<td>Graft survival (percent)</td>
<td>100.0</td>
<td>100.0</td>
<td>72.7</td>
</tr>
</tbody>
</table>

### Kidney/pancreas: Adult survival

<table>
<thead>
<tr>
<th></th>
<th>1 Month</th>
<th>1 Year</th>
<th>3 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient survival (percent)</td>
<td>100.0</td>
<td>97.4</td>
<td>83.3</td>
</tr>
<tr>
<td>Pancreas graft survival (percent)</td>
<td>97.4</td>
<td>88.8</td>
<td>73.7</td>
</tr>
<tr>
<td>Kidney graft survival (percent)</td>
<td>100.0</td>
<td>94.5</td>
<td>78.6</td>
</tr>
</tbody>
</table>

### Number of transplants in 2011

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number</th>
<th>Deceased</th>
<th>Living/Related</th>
<th>Living/Unrelated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>131</td>
<td>84</td>
<td>27</td>
<td>20</td>
</tr>
<tr>
<td>Kidney/pancreas</td>
<td>11</td>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney/liver</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney/heart</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>147a</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Includes 17 re-transplants*
Kidney transplant mortality in 2011

| Hospital deaths | 1 |

Days on waiting list and post-transplant length of stay (LOS) for kidney transplant recipients in 2011

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting (deceased donor)</td>
<td>972.6</td>
<td>1,021.5</td>
<td>84</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>7.2</td>
<td>6.0</td>
<td>146a</td>
</tr>
</tbody>
</table>

a 1 patient died during initial hospitalization

Median time to transplant for patients on waiting list

Kidney

<table>
<thead>
<tr>
<th></th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic</td>
<td>39.7</td>
</tr>
<tr>
<td>United States (overall)</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Pancreas/kidney

<table>
<thead>
<tr>
<th></th>
<th>Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland Clinic</td>
<td>12.3</td>
</tr>
<tr>
<td>United States (overall)</td>
<td>13.7</td>
</tr>
</tbody>
</table>

a For patients registered on waiting list between July 1, 2005, and Dec. 31, 2010. Source for U.S. data is Scientific Registry of Transplant Recipients (SRTR).
## Primary diagnoses for kidney patients transplanted in 2011

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive nephrosclerosis</td>
<td>21</td>
<td>14.3</td>
</tr>
<tr>
<td>Diabetes mellitus, type 2</td>
<td>18</td>
<td>12.2</td>
</tr>
<tr>
<td>Polycystic kidneys</td>
<td>17</td>
<td>11.6</td>
</tr>
<tr>
<td>Re-transplant/graft failure</td>
<td>17</td>
<td>11.6</td>
</tr>
<tr>
<td>Diabetes mellitus, type 1</td>
<td>15</td>
<td>10.2</td>
</tr>
<tr>
<td>Focal glomerulosclerosis</td>
<td>8</td>
<td>5.4</td>
</tr>
<tr>
<td>IgA nephropathy</td>
<td>6</td>
<td>4.1</td>
</tr>
<tr>
<td>Chronic glomerulonephritis (unspecified)</td>
<td>5</td>
<td>3.4</td>
</tr>
<tr>
<td>Chronic glomerulosclerosis</td>
<td>4</td>
<td>2.7</td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>4</td>
<td>2.7</td>
</tr>
<tr>
<td>Calcineurin inhibitor nephrotoxicity</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>Congenital obstructive uropathy</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Obstructive uropathy</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Rapid progressive glomerulonephritis</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Other</td>
<td>20</td>
<td>13.6</td>
</tr>
<tr>
<td>Unknown</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>147</strong></td>
<td></td>
</tr>
</tbody>
</table>
Selected Publications


Leadership

David A. Goldfarb, MD
Program and Surgical Director, Renal Transplant

Richard Fatica, MD
Medical Director, Renal Transplant

Phone numbers

Pre-transplant
216.444.6996

Post-transplant
216.444.8949

Fast facts

Initiated: 1963

First adult kidney transplant: Jan. 9, 1963

CMS/Medicare approval: July 1, 1966

UNOS approval: March 21, 1988

As of Dec. 31, 2011, 3,772 kidney, 185 kidney/pancreas, 55 kidney/liver, 4 kidney/heart and 1 kidney/intestine transplants have been performed at Cleveland Clinic.

Cleveland Clinic developed and refined dialysis techniques in the 1950s to enable survival of patients with kidney failure.

We developed one of the first deceased donor kidney transplant programs in the world, established in 1963.

We established active living donor programs for kidney (laparoscopic live donor nephrectomy) transplant.
Staff

William Baldwin, MD, PhD
William Braun, MD
Shih-Chieh Chueh, MD, PhD
Robert Fairchild, PhD
Stuart M. Flechner, MD
Jihad Kaouk, MD
Venkatesh Krishnamurthi, MD
Charles Kwon, MD
Charles Modlin, MD, FACS
Joseph Nally, MD
Saul Nurko, MD
Georges Pascal Haber, MD
Emilio Poggio, MD
John Rabets, MD
Bashir Sankari, MD
Martin Schreiber Jr., MD
Daniel Shoskes, MD
Titte Srinivas, MD
Brian Stephany, MD
Alvin Wee, MD
“Though my bike trip across America was a solo ride, I sensed that the donor and I were riding tandem and that it took both of us to get to the finish line.” — Ken Dockery, 43, South Euclid, Ohio. Ken was born with a defect in his bicuspid aortic valve, making it difficult to climb stairs or carry heavy objects without chest pain. Just three months after an aortic and pulmonary valve transplant, Ken was back on his bike. Today he competes in marathons and triathlons and raises funds through a cycling event he created, the Inspire Hope Tour.
2011 Highlights

Some 20 disciplines across 11 of Cleveland Clinic’s institutes and ambulatory surgery centers utilize bone and soft tissue during surgical reconstruction. In 2011, Cleveland Clinic used approximately 6,500 tissue segments and obtained hundreds of oocytes and sperm donations for in vitro fertilization.

Research and Innovations

Cleveland Clinic has established activities in musculoskeletal stem cell research, tissue engineering and musculoskeletal tissue healing at our Orthopaedic Research Center. Cleveland Clinic physicians also have been active in the American Association of Tissue Banks, the American Academy of Orthopaedic Surgeons Committee on Biological Implants and the American Society of Testing and Materials, as well as with the U.S. Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention in promoting safety of tissues.

The tissue transplant program includes cardiology/cardiothoracic surgery, bone transplant (including adult and pediatric orthopaedics, spine and neurology), urology, colorectal surgery, vascular surgery, dentistry, plastic surgery, obstetrics and gynecology, andrology and in vitro fertilization, general surgery and dermatology. See below for overviews of many of these specific program offerings.

Cleveland Clinic’s Musculoskeletal Tissue Storage facility, directed by Michael Joyce, MD, is a model tissue management program that monitors the safety, effectiveness and availability of musculoskeletal tissue grafts. The program ensures that Joint Commission standards are met by qualifying all vendors; tracing tissues from receipt through storage, preparation and use; identifying and reporting recipient adverse events; and handling tissue recalls successfully. At Cleveland Clinic, the storage facility requires a swipe badge for entry and has a carbon dioxide tank backup system in case of electrical failure.

Cardiology/Cardiothoracic Surgery

Cleveland Clinic’s cardiology and heart surgery program has been ranked No. 1 in the nation for the past 17 years in U.S. News & World Report’s “America’s Best Hospitals” survey. Cleveland Clinic has the largest heart valve surgery practice
in the United States, having performed 2,816 procedures on our main campus in 2011, including 967 valve repairs and 1,849 valve replacements. Of those replacements, 1,714 represented bioprosthesis, 199 mechanical, 81 homograft and three autograft.

**Bone Transplant**

**Adult and Pediatric Orthopaedics:** Adult and pediatric procedures are performed to address trauma, bone healing problems and congenital deformities. Large bone replacement for reconstruction after cancer resection is also performed. To provide support, donor bone is used to fill in defects secondary to fractures and joint replacement. The pediatric service uses allograft tissue that is size-matched to the recipient, with the intent that the allograft eventually will be replaced by normal living host tissue.

**Sports Medicine:** Knee and ankle soft tissue injuries can be surgically repaired using tendons and ligaments from tissue donors. These donated soft tissues also can be used in partial or total joint replacement. Tissue also is used in repairing rotator cuff injuries.

Cleveland Clinic offers a fresh-tissue osteochondral allograft program via Lifebanc for cartilage defects in the knee. Our team members also perform autologous cell-cultured chondrocyte transplantation for cartilage surface defects of the knee, as well as allograft meniscal transplants.

**Spine/Neurology:** Cleveland Clinic spine surgeons are experienced in the surgical management of spinal stenosis, disc herniation, spinal tumors, spinal trauma, scoliosis and other complex deformities and disorders of the cervical, thoracic and lumbar spine. These disorders may require bone transplants to help alleviate pain and to enhance the patient’s quality of life.

**Urology**

*U.S. News & World Report* has ranked Cleveland Clinic's urology program one of the top in the United States every year since 1990. Our urology program utilizes tissue as a treatment option for incontinence and for the reinforcement of soft tissue after surgery. Tissue allografts also are used in urethroplasties and pubovaginal sling procedures.

**Colorectal Surgery**

Cleveland Clinic's gastroenterology program was ranked second in the nation in the 2011 *U.S. News & World Report* “America’s Best Hospitals” survey. Our Department of Colorectal Surgery utilizes tissue in specialized procedures, including anal fistula repair and ventral hernia repair.
Vascular Surgery

The Department of Vascular Surgery performed more than 2,476 procedures in 2011 (limited to Cleveland Clinic’s main campus, and excluding conscious sedation cases). The department uses tissue allografts for repair and reconstruction of weak or severely diseased blood vessels. One-third of all procedures performed by the department are for atherosclerosis, peripheral arterial disease and peripheral vascular disease. Other conditions treated surgically include aneurysms, carotid artery disease and venous disease.

Dentistry

The Department of Dentistry uses tissue in the surgical repair of extraction sockets and periodontal defects, as well as during dental implantation. Bone allografts in these procedures promote additional bone growth to strengthen the various implants used.

Plastic Surgery

The Department of Plastic Surgery uses tissue (primarily skin grafts) for a variety of procedures and surgeries. These include facial cosmetic surgery, reconstruction of pediatric craniofacial defects, wound coverage, and cosmetic and reconstructive breast surgery.

Andrology and In Vitro Fertilization

Cleveland Clinic’s Andrology Laboratory and Reproductive Tissue Bank, which has provided therapeutic sperm banking services since 1980, conducts sperm counts and a variety of tests on semen. The Fertility Center, part of the Ob/Gyn & Women’s Health Institute, offers a wide range of procedures including in vitro fertilization, intracytoplasmic sperm injection, sperm aspiration, assisted hatching, blastocyte transfer and embryo cryopreservation. The center also obtains egg and sperm donations and offers an in vitro fertilization surrogate program.

Focus on Quality

To ensure safety and the best possible results, allograft donors are thoroughly screened via an in-depth medical history and tested for viruses and bacteria. Safety procedures follow published rules, standards and guidelines of the FDA and the American Association of Tissue Banks. Our tissue transplant program also adheres to Joint Commission standards established in 2005. These standards are meant to provide higher quality assurance and patient safety through the ability to trace all tissues from the donor or source facility to all recipients or other final disposition.
Throughout 2011, the Transplant Center used software developed specifically to track tissue implants, ensure compliance and enhance patient safety. The web-based system, Tissue TrackCore, provides an electronic record for all actions associated with tissues received until final disposition. It is currently implemented in more than 125 operating and procedure rooms. In 2010 the system was responsible for handling the tracking of 5,839 tissue segments. It also has electronic interfaces with the Cleveland Clinic Operating Room Information System and receives product and donor information from vendor systems.

Selected Publications


Leadership

Michael Joyce, MD  
Medical Director,  
Musculoskeletal Tissue Storage Facility

Staff

Steven Lietman, MD
George Muschler, MD
Maria Siemionow, MD, PhD

Phone number

216.444.4282

Fast facts

Initiated: 1983

Fresh Osteochondral Graft Transplant Program established in 1998 by the Department of Orthopaedic Surgery, Adult Reconstruction Section

First sacral bone transplant performed by neurospine surgeons in 2001

First mosaicplasty performed by Orthopaedic Adult Reconstruction and Sports Medicine surgeons in 2001

Performed first near-total facial transplant in the United States (2008)
Bioethics
Eric Kodish, MD, Chairman
Anne Lederman Flamm, JD
Paul Ford, PhD
Carmen Paradis, MD
Richard Sharp, PhD
Martin Smith, STD
Anthony Thomas, MD, MA
Kathryn Weise, MD, MA

Endocrinology
Angelo A. Licata, MD, PhD

Immunology
Thomas Hamilton, PhD

Psychiatry and Psychology
Kathy Coffman, MD, FAPM

Quantitative Health Sciences
Jesse Schold, PhD
THANKS TO OUR DONATION AND PROCUREMENT AGENCIES

Cleveland Eye Bank

Founded in 1958, the Cleveland Eye Bank is a nonprofit organization dedicated to restoring sight by providing tissue for transplantation, research and teaching. Donated eyes are retrieved, evaluated and distributed by the Eye Bank. The Cleveland Eye Bank serves almost 5 million people and 60 area hospitals. Last year nearly 700 corneas were provided for sight-restoring corneal transplants.

For more information, please call 216.844.EYES or visit clevelandeyebank.org.

Lifebanc

Lifebanc is Northeast Ohio’s federally designated, nonprofit organ procurement organization (OPO). Increasing organ and tissue donation for those awaiting transplant is one of Lifebanc’s main goals. Working with more than 80 hospitals, Lifebanc is responsible for all aspects of the organ and tissue recovery and donation processes, public and professional education programs, and bereavement services for donor families. Lifebanc is a member of the United Network of Organ Sharing (UNOS) and an accredited member of the Association of Organ Procurement Organizations (AOPO) and the American Association of Tissue Banks (AATB).

For more information, please call 216.752.LIFE (5433) or toll-free 888.558.LIFE (5433), or visit lifebanc.org.
Cleveland Minority Organ Tissue Transplant Education Program

The Cleveland Minority Organ Tissue Transplant Education Program (MOTTEP) is a nonprofit organization that seeks to increase awareness through education and advocacy about organ and tissue donation, disease prevention and wellness within minority communities of Greater Cleveland.

For more information, or to schedule educational programs, please call 216.229.6170 or visit clevelandmottep.org.

National Marrow Donor Program

The National Marrow Donor Program (NMDP) is a nonprofit organization that manages the world’s largest register of volunteer stem cell donors and cord blood units. It facilitates lifesaving blood stem cell transplants for patients fighting diseases such as leukemia, aplastic anemia, and other blood and marrow diseases.

For more information, please call 800.MARROW2 or visit marrow.org.
Cleveland Clinic is an integrated healthcare delivery system with local, national and international reach. At Cleveland Clinic, 2,800 physicians represent 120 medical specialties and subspecialties. We are a main campus, 18 family health centers, eight community hospitals, Cleveland Clinic Florida, the Cleveland Clinic Lou Ruvo Center for Brain Health in Las Vegas, Cleveland Clinic Canada, Sheikh Khalifa Medical City, and Cleveland Clinic Abu Dhabi.

In 2011, Cleveland Clinic was ranked one of America’s top four hospitals in U.S. News & World Report’s annual “America’s Best Hospitals” survey. The 2011 survey also marked the 17th straight year that Cleveland Clinic was ranked as having the No. 1 cardiology and heart surgery program in the nation. The survey ranks Cleveland Clinic among the nation’s top 10 hospitals in 13 specialty areas, and among the top 2 in four of those areas.

Cleveland Clinic Transplant Center
216.444.2394
800.223.2273, ext. 42394
Fax: 216.444.9375

Desk A110
9500 Euclid Ave.
Cleveland, Ohio 44195

On the Web at clevelandclinic.org/transplant

Managing Editor: Glenn Campbell
Writer: Charmaine Jones
Designer: Amy Buskey-Wood
Photographers: Tom Merce, Don Gerda and Russell Lee
CME Opportunities: Live and Online
The Cleveland Clinic Center for Continuing Education's website offers convenient, complimentary learning opportunities. Physicians can manage CME credits using the myCME.com Web portal available 24/7. Visit ccfcme.org.

Executive Education
Cleveland Clinic has two education programs for healthcare executive leaders — the Executive Visitors’ Program and the two-week Samson Global Leadership Academy immersion program. Visit clevelandclinic.org/executiveeducation.

RESOURCES FOR PATIENTS

Medical Concierge
For complimentary assistance for out-of-state patients and families, call 800.223.2273, ext. 55580, or email medicalconcierge@ccf.org.

Global Patient Services
For complimentary assistance for national and international patients and families, call 001.216.444.8184 or visit clevelandclinic.org/gps.

MyChart®
Cleveland Clinic MyChart is a secure, online personal healthcare management tool that connects patients to their medical record. Patients can register for MyChart through their physician's office or by visiting clevelandclinic.org/mychart.

MyConsult
Cleveland Clinic offers online medical second opinions for more than 1,000 diagnoses. Visit clevelandclinic.org/myconsult or call 800.223.2237, ext. 43223.

Outcomes Data
View clinical Outcomes Books from all Cleveland Clinic institutes at clevelandclinic.org/outcomes.

Clinical Trials
We offer thousands of clinical trials for qualifying patients. Visit clevelandclinic.org/clinicaltrials.
Every life deserves world class care.

9500 Euclid Avenue, Cleveland, OH 44195

Cleveland Clinic is an integrated healthcare delivery system with a main campus, 18 family health centers, eight community hospitals and locations in Ohio, Florida, Nevada, Toronto and Abu Dhabi. It is a not-for-profit group practice where nearly 3,000 staff physicians and scientists in 120 medical specialties collaborate to give every patient the best outcome and experience. Cleveland Clinic is ranked among America’s top hospitals overall, and among the nation’s leaders in every major medical specialty (U.S. News & World Report).

clevelandclinic.org