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.

ON THE COVER: Gösta Pettersson, MD, PhD, performs lung transplant surgery. In 2009, Cleveland Clinic surgeons performed 157 lung transplants, setting the world record for the number of lung transplants performed in a single year.
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2009 Transplant Center Highlights

- Cleveland Clinic set the world record for lung transplant volume in a single year with 157 lung transplants in 2009.

- In February, Cleveland Clinic collaborated with St. Vincent Hospital in Indianapolis to establish a Renal Transplant Program. The Renal Transplant Program was led by Bashir Sankari, MD, surgical director; Alvin Wee, MD, attending surgeon; and Mahendra Govani, MD, medical director. Drs. Sankari and Wee are both fellowship-trained in kidney and pancreatic transplantation and are employed by Cleveland Clinic.

- While the first official heart transplant at Cleveland Clinic was performed in 1968, Cleveland Clinic’s Cardiac Transplant Program team began regular heart transplantation services in 1984. 2009 marked the 25th anniversary of these services.

- In November, Cleveland Clinic celebrated its 25th anniversary of performing liver transplants.

- The Intestinal Rehabilitation and Transplant Program performed its first multivisceral transplant – a sequential split liver followed by an isolated intestinal transplant.

- For patients receiving a pancreas/kidney or pancreas-alone transplant in 2009, survival was 100 percent. The program continues to rank among the 10 busiest transplant programs in the country while maintaining excellent clinical outcomes.

- The Bone Marrow Transplant team moved to a new inpatient facility that features centralized HEPA-filtered air for the entire unit, private rooms and an exercise room.
Cleveland Clinic offers the full spectrum of pediatric transplants — bone marrow, heart, lung, liver, kidney and intestinal — along with more than 200 pediatric specialists with round-the-clock availability.

**Continued History of High Volumes, High Quality**

From 1963, when physicians here performed the first kidney transplant in Ohio, to 2009, when our staff set a world record in lung transplant volume, Cleveland Clinic has been a leader in the field of transplantation.

In 2009, we completed more than 730 organ and bone marrow transplants, and 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.

New this year, we are featuring online videos of the transplant patients profiled in this report. To learn more about their transplant experiences, please visit clevelandclinic.org/transplant.

**A Year of Milestones**

**A world record.** On Oct. 13, 2009, our lung and heart-lung transplant teams performed our 129th lung transplant (124 single-lung or double-lung transplants, two heart-lung transplants and three liver-lung transplants), setting the world record for number of lung transplants performed in a single year. The previous annual record in lung transplants was 128 in 2007. Cleveland Clinic staff closed the year with 157 lung transplants.

The increasing number of lung transplants has resulted in part from a concerted effort to expand patient eligibility guidelines, improve collaboration among Cleveland Clinic institutes and accept patients with complex cases who are among the sickest of the sick.

More patients enlisted into the transplant program means that the need for organs has increased as well. To meet the demand, Cleveland Clinic has broadened its reach, traveling up to 3,000 miles to secure lungs. Cleveland Clinic is also accepting and improving lungs that other centers may have otherwise turned down, and streamlining the entire process, from evaluation to listing to transplantation.

**Leadership**

John Fung, MD, PhD  
Director, Transplant Center; Chairman, General Surgery; Chairman, Hepatopancreato-biliary and Transplant Surgery
As the program has expanded, it continues to have wait times well below the national average. According to the Scientific Registry of Transplant Recipients, 33.7 percent of Cleveland Clinic patients received a new lung within 30 days of being placed on the waiting list, compared with 8.4 percent nationally. Within one year, 90.3 percent of Cleveland Clinic patients received a transplant, compared to 40.9 percent nationally.

Marie Budev, DO, was designated the UNOS Primary Physician and Medical Director for the Lung Transplant Program in 2009.

Anniversaries. While the first official heart transplant at Cleveland Clinic was performed in 1968, Cleveland Clinic's Cardiac Transplant Program team began regular heart transplantation services in 1984. 2009 marked the 25th anniversary of these services. Since that date, the program has completed 1,469 heart transplants. The first pediatric heart transplant at Cleveland Clinic was performed March 30, 1985. And, in 2005, Cleveland Clinic was the first in the United States to implant the CardioWest Total Artificial Heart after its approval by the FDA.

Also in 2009, Cleveland Clinic celebrated 25 years of liver transplantation since completing its first adult liver transplant on Nov. 8, 1984. Since that date, we have completed 1,437 liver transplants, including the first lung-liver transplant in Ohio in 2007. The first pediatric liver transplant was performed on August 26, 1986. Currently, Cleveland Clinic is the fourth-largest provider of liver transplants in the United States.

In 2009, Cleveland Clinic's liver transplant team performed 141 liver transplants. Additionally, the Liver Transplant Program expanded its services with the addition of the Liver Tumor Clinic under the direction of Federico Aucejo, MD. The mission of the Liver Tumor Clinic is to offer state-of-the-art medical care to patients with hepatic tumors through a multidisciplinary team composed of a transplant surgeon/hepatobiliary surgeon, hepatologist, interventional radiologist, oncologist, nurse manager, research manager and scheduler.

Promoting Collaboration

“Contentious Issues in Organ Transplantation — A Colloquium” was held at Cleveland Clinic, October 8-9, 2009, and, due to positive feedback, will occur as a biennial forum for policy issues impacting transplantation. The co-chairs of this conference were Titte Srinivas, MD, and Jesse Schold, PhD. Dr. Srinivas, a staff transplant nephrologist at Cleveland Clinic and a researcher in the medi-
cal and ethical issues surrounding outcomes in transplantation, has published numerous articles on the subject. Dr. Schold is an internationally renowned expert on outcomes, disparity and allocation issues in renal transplantation. Dr. Schold was Assistant Professor in the Division of Nephrology at the University of Florida, and recently joined Cleveland Clinic as the Director of Outcomes Research and Medical Informatics, Transplant Center.

The meeting was attended by those with an interest in policy, economic, regulatory, financial and outcomes issues related to transplantation, including researchers, journal editors and government representatives/contractors from organizations such as the Centers for Medicare & Medicaid Services (CMS), the Health Resources and Services Administration (HRSA), the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), and the Scientific Registry of Transplant Recipients (SRTR). The purpose of the meeting was to facilitate nonpartisan debate on contentious medical and ethical issues regarding transplantation. The event successfully enabled collaboration among stakeholders with diverging viewpoints and furthered goodwill between regulatory authorities and transplant centers in the United States.

**Advancing Research**

Cleveland Clinic is committed to determining disease causation in an effort to better serve patients and their families in preventing illness. The Cleveland Clinic Genomic Medicine Institute (GMI) studies patients’ DNA to determine the genetic causes of disease and treat them accordingly. The GMI, launched three years ago and led by Charis Eng, MD, PhD, is composed of physicians and researchers who work in the Cleveland Clinic Lerner Research Institute.

In addition, during 2009, several federally funded projects were awarded to other investigators in the Transplant Center. Robert Fairchild, PhD, Department of Immunology, received a program project grant to investigate acute humoral rejection of renal allografts. Bijan Eghtesad, MD, and John Fung, MD, PhD, received a HRSA grant to improve outcomes in donation after cardiac death involving kidneys and livers. Maria Siemionow, MD, PhD, Director of Composite Tissue Transplantation, also received a grant from the U.S. Department of Defense for further work in the area. Numerous ongoing clinical trials within the Transplant Center help to further the progress in transplantation.
Awards and Achievements

Several members of the Transplant Center have been acknowledged for their leadership in transplantation.

Emilio Poggio, MD, was selected to join the editorial board of Transplantation – the official journal of the Transplantation Society.

Matt Kalaycio, MD, was elected to a five-year term as Co-Chairman of the Chronic Leukemia Committee of the Center for International Bone Marrow Transplant Research.

Randall Starling, MD, was recently selected to the United Network for Organ Sharing (UNOS) board of directors and was named Chair of the International Society for Heart & Lung Transplantation Program.

Charles Miller, MD, was selected as a Councilor to the American Society of Transplant Surgeons.


John Fung, MD, PhD, was elected to serve as Secretary of the Transplantation Society and has been appointed to the Advisory Committee on Organ Transplantation in the Health Resources and Services Administration. Dr. Fung also received the International Liver Transplantation Society Distinguished Service Award and the Chinese American Medical Society Scientific Achievement Award.

Robin Avery, MD, and Steven Gordon, MD, received advancement to Fellows of the Infectious Diseases Society of America (IDSA), and Steven Mawhorter, MD and Sherif Mossad, MD, are Fellows of the IDSA.

Additionally, Robin Avery, MD, is Associate Editor, Liver Transplantation.

Art Thomson, Transplant Administrator, began a two-year term as Treasurer and Board Member for UNOS in July 2009.
Continued Excellence

All Cleveland Clinic staff transplant physicians are board-certified in a related medical specialty, and all transplant surgeons are board-certified in a related surgical specialty or have the international equivalent of board certification.

Cleveland Clinic is accredited by The Joint Commission and meets the United Network for Organ Sharing (UNOS) standards as a center for heart, heart/lung, kidney, kidney/pancreas, liver, lung, intestinal and pancreas transplants.

Cleveland Clinic also meets Ohio Department of Health and Ohio Solid Organ Transplant Consortium requirements for extra-renal organs.

We also meet standards set by the National Marrow Donor Program and the Foundation for the Accreditation of Cellular Therapy as a center for bone marrow transplantation, and the Eye Bank Association of America standards for corneal transplants. Our tissue transplantation program meets standards set by the American Association of Tissue Banking, the FDA, the American Association of Orthopaedic Surgeons and The Joint Commission.

Allogen Laboratories remains in compliance with all mandatory American Society for Histocompatibility & Immunogenetics standards and is accredited by the Centers for Medicare and Medicaid Services.

Cleveland Clinic was one of the first hospitals in the United States to become certified by Medicare under the new Conditions of Participation by the Centers for Medicare & Medicaid Services for heart, heart/lung, kidney, kidney/pancreas, liver, lung and pancreas transplantation.
Transplantation Outcomes

We are pleased to present Transplantation 2009, 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 2009

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone marrow</td>
<td>354</td>
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<tr>
<td>Heart</td>
<td>291</td>
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<tr>
<td>Intestine</td>
<td>41</td>
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<tr>
<td>Kidney</td>
<td>541</td>
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<tr>
<td>Liver</td>
<td>464</td>
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<tr>
<td>Lung</td>
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<tr>
<td>Pancreas</td>
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### Number of patients on waiting lists†

<table>
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<tr>
<th>Organ</th>
<th>Number of Patients Waiting</th>
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</thead>
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<tr>
<td>Heart</td>
<td>99 *</td>
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<tr>
<td>Intestine</td>
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<tr>
<td>Kidney</td>
<td>743 ***</td>
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<tr>
<td>Liver</td>
<td>214 ****</td>
</tr>
<tr>
<td>Lung</td>
<td>99 *****</td>
</tr>
<tr>
<td>Pancreas</td>
<td>67 *****</td>
</tr>
</tbody>
</table>

† As of December 31, 2009

* (includes 5 heart/kidney and 3 heart/lung and 1 heart/liver)
** (includes 1 intestine/pancreas)
*** (includes 34 kidney/pancreas, 7 kidney/liver and 5 kidney/heart)
**** (includes 7 liver/kidney, 1 liver/heart and 1 liver/lung)
***** (includes 3 lung/heart and 1 lung/liver)
****** (includes 34 pancreas/kidney and 1 pancreas/intestine)
### Number of solid organ transplants in 2009

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Transplants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td>60 *</td>
</tr>
<tr>
<td>Intestine</td>
<td>3 **</td>
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<tr>
<td>Kidney</td>
<td>161 ***</td>
</tr>
<tr>
<td>Liver</td>
<td>141 ****</td>
</tr>
<tr>
<td>Lung</td>
<td>157 *****</td>
</tr>
<tr>
<td>Pancreas</td>
<td>28 ******</td>
</tr>
</tbody>
</table>

* (includes 3 heart/liver and 3 heart/lung)
** (includes 1 intestine/pancreas/liver and 1 intestine/pancreas)
*** (includes 19 kidney/pancreas and 6 kidney/liver)
**** (includes 6 kidney/liver, 3 liver/heart, 3 liver/lung and 1 liver/intestine/pancreas)
***** (includes 3 lung/heart and 3 lung/liver)
****** (includes 19 pancreas/kidney, 1 pancreas/intestine/liver and 1 pancreas/intestine)

### Number of post-transplant patients followed during 2009

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Patients</th>
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</tr>
<tr>
<td>Intestine</td>
<td>7 **</td>
</tr>
<tr>
<td>Kidney</td>
<td>1914 ***</td>
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<tr>
<td>Liver</td>
<td>934 ****</td>
</tr>
<tr>
<td>Lung</td>
<td>479 *****</td>
</tr>
<tr>
<td>Pancreas</td>
<td>217 ******</td>
</tr>
</tbody>
</table>

* (includes 12 heart/lung, 4 heart/liver and 2 heart/kidney)
** (includes 1 intestine/pancreas and 1 intestine/pancreas/liver)
*** (includes 34 kidney/liver, 2 kidney/heart 121 kidney/pancreas)
**** (includes 34 liver/kidney, 4 liver/heart, 4 liver/pancreas and 3 liver/lung)
***** (includes 12 lung/heart and 3 lung/liver)
****** (includes 121 pancreas/kidney and 4 pancreas/liver)
### State of residence of transplant patients in 2009

<table>
<thead>
<tr>
<th>State</th>
<th>Bone Marrow</th>
<th>Heart</th>
<th>Heart, Liver</th>
<th>Heart, Lung</th>
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<tr>
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<td>IA</td>
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<td>INTL</td>
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<td>Intestine</td>
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<td>Kidney</td>
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<tr>
<td>Kidney</td>
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<tr>
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<tr>
<td>Kidney, Pancreas</td>
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<tr>
<td>Liver</td>
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<td>1</td>
</tr>
<tr>
<td>Liver, Lung</td>
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<tr>
<td>Lung</td>
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<td>1</td>
</tr>
<tr>
<td>Pancreas</td>
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</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
</tbody>
</table>

**Total Transplantations:** 19

**Total Interventions:** 6

**Total Survivors:** 1

**Total Deaths:** 1

**Total Failed Transplants:** 1

**Total Revisions:** 1

**Total Rejection:** 1

**Total Complications:** 1

**Total Hospitalizations:** 1

**Total ICU Visits:** 1

**Total Emergency Room Visits:** 1

**Total Outpatient Visits:** 1

**Total Medical Consults:** 1

**Total Surgical Procedures:** 1

**Total Radiology Procedures:** 1

**Total Pathology Procedures:** 1

**Total Laboratory Procedures:** 1

**Total Pharmacy Procedures:** 1

**Total Physical Therapy Procedures:** 1

**Total Occupational Therapy Procedures:** 1

**Total Speech Therapy Procedures:** 1

**Total Social Work Services:** 1

**Total Mental Health Services:** 1

**Total Rehabilitation Services:** 1

**Total Nutrition Services:** 1

**Total Genetic Counseling:** 1

**Total Psychological Counseling:** 1

**Total Social Work:** 1

**Total Nutrition:** 1

**Total Physical Therapy:** 1

**Total Occupational Therapy:** 1

**Total Speech Therapy:** 1

**Total Rehabilitation:** 1

**Total Genetic Counseling:** 1

**Total Psychological Counseling:** 1

**Total Social Work:** 1

**Total Nutrition:** 1

**Total Physical Therapy:** 1

**Total Occupational Therapy:** 1

**Total Speech Therapy:** 1

**Total Rehabilitation:** 1

**Total Genet...
Transplantation Facilities

Pre-Transplant Heart Failure Intensive Care Unit, 10 beds
Surgical Intensive Care Unit, 38 beds
Heart/Lung Post-Transplant Intensive Care, 14 beds
Cardiothoracic Intensive Care Unit, 76 beds
Transplant Special Care, 34 beds
Heart/Lung Transplant Unit, 24 beds
Pediatric Intensive Care Unit, 15 beds
Pediatric Stepdown Unit, 22 beds
Bone Marrow Transplant Unit, 22 beds
Transplant Hospitality Housing Unit, 37 rooms

Transplant Center Historical Highlights

• Formation of the Department of Biomedical Engineering (formerly known as Artificial Organs), one of five research facilities in the United States funded by the National Heart, Lung and Blood Institute

• The first adult intestinal, kidney, lung, heart/lung and heart/liver transplants performed in Ohio

• Medicare certification for the heart, kidney, liver, lung and pancreas transplant programs

• World’s first successful laryngeal transplant performed in January 1998

• Most complex facial transplant in the world performed in December 2008

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

• Enrolled our first patient in a multicenter trial of the Organ Care System in 2007; this new technology increases the amount of time that an organ can be maintained outside the body in a condition suitable for transplantation

• Cleveland Clinic heart, liver, lung and pancreas transplant programs named as Best Practices in preparation for a Health Resources and Services Organization (HRSA) Transplant Center Growth and Management Collaborative in 2007
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 of the 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 go to ustransplant.org.
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.
Detailed information regarding studies, consults, specific protocols and tests performed during the transplant and post-transplant hospitalization are outlined.

Patient and family education begins several days after the transplant and is viewed as a key ingredient in a patient’s successful recovery.

**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 where the medications are reviewed and adjusted 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 the 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 this case, members of the transplant team will establish contact with the physician to continue to monitor the patient’s progress.
2009 Highlights

In 2009, technologists at Cleveland Clinic’s Allogen Laboratories performed 86,906 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 2009:

- MIC-A Genotyping was added as a routine clinical test and is being utilized by the Bone Marrow Transplant Program.
- Chimerism Testing (STR) was added as a routine clinical test and is being utilized by the solid organ transplant programs.
- Test Descriptions and Rates were updated to conform to new CPT coding and NMDP requirements.

Both the Allogen Laboratories in Cleveland and our satellite lab in Charleston, W. Va., had an on-site inspection by ASHI (American Society for Histocompatibility and Immunogenetics) and accreditation was renewed. ASHI is the accrediting agency that we use to renew our certification with CMS and to renew our accreditation with UNOS and NMDP.

Additionally, Allogen Laboratories received a Travel Grant Award from the American Society for Blood and Marrow Transplantation for an oral abstract titled “Can HistoCheck Algorithm Predict High-risk HLA Allele Mismatch Combinations Responsible for Severe Acute Graft-versus-Host Disease?” The abstract was submitted to the BMT Tandem Meetings, Feb 24-28, 2010 in Orlando, Fla.
Research and Innovations

Our current IRB-approved studies include:

**Principal Investigator – Dr. Diane J. Pidwell**
IRB 1213: Histocompatibility Lab Reagent Program.

**Principal Investigator – Dr. Medhat Z. Askar**
IRB 06-918: The association of killer immunoglobulin-like receptors (KIR) gene polymorphism on the incidence of BK viremia and viruria in posttransplant kidney and kidney/pancreas recipients.

**Principal Investigator – Dr. Medhat Z. Askar**

**Principal Investigator – Dr. Medhat Z. Askar**
IRB 08-432: MICA typing and antibody screening in lung transplants.

**Principal Investigator – Dr. Medhat Z. Askar**
IRB 3131: MICA typing for myeloablative allo HSCT for AML/MDS and outcomes in addition to a correlation with KIR typing.

**Principal Investigator – Dr. Medhat Z. Askar**
IRB 3311: MICA typing for reduced intensity conditioning allogeneic bone marrow transplants.

New studies for 2009:

**Principal Investigators – Dr. Diane J. Pidwell and Dr. Medhat Z. Askar**
IRB 09-591: Allogen 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 Z. Askar**
IRB 09-979: Chart Review: Clinical outcomes of Combined Liver Transplants.

**Principal Investigator – Dr. Medhat Z. Askar**
IRB 09-929: Antibody Mediated Rejection (AMR) in Combined Liver Transplants.

**Principal Investigator – Dr. Medhat Z. Askar**
IRB 09-528: Immunogenetic factors in Beta Herpes Virus Infections Post-Solid Organ Transplantation.
**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. Six of our employees performed a total of 18 lab inspections for ASHI.

**Selected Publications**


Close collaboration with infectious disease (ID) physicians who have expertise in 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.

**2009 Highlights**

- Use of novel investigational therapies for complex CMV infections: maribavir and CMX001 (Robin Avery, MD, and Sherif Mossad, MD).
- Description of novel pandemic H1N1 influenza in solid organ transplant recipients. Abstract accepted for a plenary oral presentation at American Transplant Congress 2010. Deepali Kumar, MD, is the primary investigator, Robin Avery, MD, is the senior author, and Lara Danziger-Isakov, MD, MPH, is a Cleveland Clinic investigator.
- Assisted in design of ID protocols and participation in clinical ID care of the first near-total face transplant recipient in the United States.
- Continued close collaboration with Clinical Microbiology, transplant teams, Allogen Labs and Pharmacy in projects to improve risk stratification and therapy of infections before and after transplant.

**Expertise**

Cleveland Clinic's Department of Infectious Disease consists of 22 staff physicians. 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 adult physicians, one pediatric physician and one nurse practitioner who rotate and perform inpatient consultations on solid organ transplantation and bone marrow transplant services.

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 immunology, aging and donor/recipient screening for infection before transplantation. Nabin Shrestha, MD, is an authority on new molecular diagnostic tests for infections.

Robin Avery, MD, was a co-editor of the infectious disease guidelines for the American Society of Transplantation (AST) and is a past chair of the AST ID 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. Lara Danziger-Isakov, MD, MPH, is a member of the Executive Committee of the AST’s ID Community. Dr. Avery and Dr. Danziger-Isakov are members of several international guidelines committees.

Drs. Avery, Gordon, Mawhorter, and Mossad are Fellows of the Infectious Diseases Society of America.

Under the leadership of Alan Taege, MD, the HIV section provides clinical consultation and advice on transplantation for HIV-positive recipients.

The transplant ID group 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.

The transplant ID group advises 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. Members of the transplant ID group also participate in patient education with the philosophy that better understanding of infectious risks can help transplant recipients avoid infections.

**Awards and Achievements**

Robin Avery, MD, and Steven Gordon, MD, received advancement to Fellow of the Infectious Diseases Society of America. Steven Mawhorter, MD and Sherif Mossad, MD, are fellows of the IDSA as well.

Robin Avery, MD, is Associate Editor, *Liver Transplantation*.

Additionally, staff members serve as national guidelines committee members/ authors for the following:

- Immunization of the Immunocompromised Host – IDSA Guidelines Committee (Robin Avery, MD)
• American Society of Transplantation ID Guidelines, Second Edition (Lara Danziger-Isakov, MD, and Robin Avery, MD)

• ISHLT Guidelines for BOS/CLAD – Infection Section (Robin Avery, MD)

Additionally, Lara Danziger-Isakov, MD, serves on the AST ID Community of Practice Executive Committee.

Research

Pediatric Transplant ID:

*Principal Investigator – Dr. Lara Danziger-Isakov*

AST/Roche Clinical Science Faculty Development Grant, 7/1/08-6/30/10.

American Society of Transplantation 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.

*Principal 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.

Adult Transplant ID:

*Principal Investigator – Dr. Sherif Mossad*

Incidence of rhinovirus infection in autologous and allogeneic myeloablative bone marrow transplantation in adults.

*Principal Investigators – Dr. Sherif Mossad and Dr. Robin Avery*

Clinical and virological outcomes of adding leflunomide in patients with refractory CMV viremia while on ganciclovir or foscarnet.

*Principal Investigator – Dr. Sherif Mossad*

A double-blind, randomized, placebo-controlled, multicenter trial of oseltamivir for the seasonal prophylaxis of influenza in immunocompromised patients (NV20235).

*Principal Investigator – Dr. Robin Avery*

Leflunomide therapy for BK virus infection in kidney and kidney-pancreas transplant recipients.
Principal Investigator – Dr. Robin Avery
Organ transplant infection prevention and detection project 1.0. CDC-sponsored cohort study of transplant recipients at “ultra high” risk for invasive fungal infections.

Principal Investigators – Dr. Kathleen Jade Lim and Dr. Sherif Mossad
Viral upper respiratory infection among bone marrow transplant recipients.

Principal Investigator – Dr. Sherif Mossad
Influenza vaccine failures in transplant recipients.

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 (NV20234).

Principal Investigator – Dr. Sherif Mossad
Review of CMV prophylaxis in allogeneic HSCT recipients.

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).

Principal Investigators – Dr. Joshua Lukenbill and Dr. Sherif Mossad
Serologic investigation of autologous hematologic stem cell recipients concerning the validity of pneumococcal immunization post-transplant.

Principal Investigators – Dr. Deepali Kumar (Cleveland Clinic PIs: Dr. Robin Avery and Dr. Lara Danziger-Isakov)
Chart review: Pandemic H1N1 in solid organ transplant recipients.

Principal Investigators – Dr. Joshua Lukenbill and Dr. Sherif Mossad
Chart review: Factors predicting acute bacterial meningitis in bone marrow transplant recipients.

Principal Investigator – Dr. Sherif Mossad
Emergency IND for compassionate use of CMX001 for a single patient with recurrent CMV infection and BKV infection.

Principal Investigators – Dr. David van Duin and Dr. Medhat Askar
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 Investigators: Dr. Kristin Prock and Dr. David van Duin

Infectious disease risk assessment in liver transplant candidates.

Selected Publications


“I was just very, very thankful for some good doctors and a whole lot of prayers going up on my behalf.” — Matthew Bogard, 32, Parkersburg, W.Va. Struggling with the sudden onset of fatigue and pneumonia, Matthew was diagnosed with Hodgkin lymphoma and leukemia. A few months later, he underwent a successful bone marrow transplant. Thankful for renewed energy, Matthew is teaching classes at a local Christian college and pursuing an information technology career.

To watch a videotaped interview with this patient, visit clevelandclinic.org/transplant.
BONE MARROW TRANSPLANTATION

2009 Highlights

The Bone Marrow Transplant Program team performed 180 bone marrow/stem cell/umbilical cord blood transplants in 2009. We performed 56 autologous transplants for multiple myeloma.

The most common disease indication for transplantation was myeloma/amyloidosis. This was followed by non-Hodgkin lymphoma, acute leukemias and Hodgkin lymphoma.

Our 100-day survival rate for autologous transplantation was 96 percent. Our 100-day survival rate for related allogeneic transplantation was 85 percent and for all non-myeloablative allogeneic transplantation was 95 percent.

A major highlight of 2009 was our move to our new inpatient facility in August. We now have centralized HEPA-filtered air for the entire unit. The unit has been remodeled, and the result is a more positive patient experience for both our bone marrow transplant patients as well as our acute leukemia patient population. All rooms on the floor are private with reclining chairs for family and visitors. The floor features an exercise room, nourishment room, a washer and dryer and is fully wired for telemetry.

Research and Innovations

We continue to have a program that is driven by clinical and translational investigation.

We have our new landmark autologous stem cell study for non-Hodgkin lymphoma up and running. It is a phase II feasibility study of the use of lenolidamide and rituximab after autologous transplantation for patients with B cell lymphomas. This study is FDA-approved and is also part of our unique partnership with the Leukemia and Lymphoma Society of America. The partnership provides infrastructure support for clinical research in hematologic malignancies at Cleveland Clinic’s Taussig Cancer Institute and our affiliated cancer treatment centers within the Cleveland Clinic health system.

Additionally, our state-of-the-art BMT cell processing laboratory, located with the rest of the blood bank in the Glickman Tower, is unmatched.
**Fast facts**

Initiated: 1975

NMDP Approval: November 22, 1988

As of December 31, 2009, 3,449 bone marrow transplants have been performed at Cleveland Clinic.

One of four Ohio centers belonging to the National Marrow Donor Registry

**Special Accreditations**

Foundation for the Accreditation of Cellular Therapy (FACT)

**Collaboration**

We continue successful collaboration with the Ireland Cancer Center as part of the Case Comprehensive Cancer Center.

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**Awards and Achievements**

Matt Kalaycio, MD, was elected to a five-year term as Co-Chairman of the Chronic Leukemia Committee of the Center for International Bone Marrow Transplant Research.

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**Number of transplants 2009**

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autologous</td>
<td>108</td>
<td>60.0</td>
</tr>
<tr>
<td>Allogeneic</td>
<td>49</td>
<td>27.2</td>
</tr>
<tr>
<td>Non-myeloablative Allogeneic</td>
<td>23</td>
<td>12.8</td>
</tr>
<tr>
<td>Total</td>
<td>180*</td>
<td></td>
</tr>
</tbody>
</table>

* Excluding 6 Tandems

**Length of stay from admission to discharge for patients transplanted in 2009***

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>23</td>
<td>21</td>
<td>156</td>
</tr>
<tr>
<td>Autologous</td>
<td>19</td>
<td>20</td>
<td>108</td>
</tr>
<tr>
<td>Allogeneic (related donor)</td>
<td>37</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Allogeneic (unrelated donor)</td>
<td>38</td>
<td>27</td>
<td>29</td>
</tr>
</tbody>
</table>

### Primary diagnoses for bone marrow patients transplanted in 2009

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myeloma</td>
<td>51</td>
<td>28.3</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>50</td>
<td>27.8</td>
</tr>
<tr>
<td>AML</td>
<td>28</td>
<td>15.5</td>
</tr>
<tr>
<td>Hodgkin disease</td>
<td>13</td>
<td>7.2</td>
</tr>
<tr>
<td>Myelodysplastic syndrome</td>
<td>12</td>
<td>6.7</td>
</tr>
<tr>
<td>ALL</td>
<td>6</td>
<td>3.4</td>
</tr>
<tr>
<td>Aplastic Anemia</td>
<td>6</td>
<td>3.4</td>
</tr>
<tr>
<td>CML</td>
<td>5</td>
<td>2.8</td>
</tr>
<tr>
<td>CLL</td>
<td>3</td>
<td>1.7</td>
</tr>
<tr>
<td>Neuroblastoma</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>180</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Survival analysis: 100-day patient survival for primary transplants 2007-2008

<table>
<thead>
<tr>
<th></th>
<th>100-Day Survival (%)</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>95.8</td>
<td>97</td>
</tr>
<tr>
<td>Myeloma</td>
<td>98.2</td>
<td>56</td>
</tr>
<tr>
<td>Hodgkin disease</td>
<td>93.9</td>
<td>33</td>
</tr>
<tr>
<td><strong>Allogeneic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good risk</td>
<td>88.2</td>
<td>17</td>
</tr>
<tr>
<td>Bad risk</td>
<td>82.3</td>
<td>79</td>
</tr>
<tr>
<td><strong>Non-myeloablative allogeneic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good risk</td>
<td>100.0</td>
<td>3</td>
</tr>
<tr>
<td>Bad risk</td>
<td>90.9</td>
<td>22</td>
</tr>
</tbody>
</table>
Research

Principal Investigator – Dr. Brian Bolwell
IRB 5386: Tandem autologous stem cell transplantation for patients with primary progressive or poor-risk Hodgkin disease.

Principal Investigator – Dr. Brian Bolwell
IRB 6067: Multiple unit unrelated donor umbilical cord blood transplantation for patients with hematologic diseases.

Principal Investigator – Dr. Ronald Sobecks
CASE 1A07: A study of outcomes and toxicity of Busulfex® as part of a high dose chemotherapy preparative regimen in autologous hematopoietic stem cell transplantation for patients with plasma cell myeloma.

Principal Investigator – Dr. Ronald Sobecks
DBI 1Z09: A phase 3, randomized, double-blind, placebo-controlled, multicenter study of the safety and efficacy of Orbec® (Oral Beclomethasone 17,21-Dipropionate) in conjunction with ten days of high-dose prednisone therapy in the treatment of patients with gastrointestinal graft vs. host disease (BDP-GVHD-03).

Principal Investigator – Dr. Robert Dean
CASE 2409: Phase I/II trial of maintenance therapy with lenalidomide and rituximab following high-dose chemotherapy and autologous stem cell transplantation for B-cell non-Hodgkin lymphoma.

Selected Publications


 KRISTY KRESS  | HEART TRANSPLANT RECIPIENT

“My whole life changed overnight. You have a baby. You have heart failure. Now, you have to have a heart transplant.” — Kristy Kress, 31, Toledo, Ohio. Seven months into her first pregnancy, Kristy learned she had peripartum cardiomyopathy and required a heart transplant in order to save her life. Now more than a year later, she is running two miles a day, working full-time and savoring every moment with her son.

To watch a videotaped interview with this patient, visit clevelandclinic.org/transplant.
2009 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 2009. A total of 210 patients were formally considered for transplantation; 109 candidates were listed and 60 transplants were performed. Additionally, staff performed several dual organ transplants including three heart/liver transplants and three heart/lung transplants in 2009.

The program also continued to achieve excellent outcomes. The Scientific Registry of Transplant Recipients (SRTR) demonstrates that for patients receiving their first transplant between January 1, 2007, and June 30, 2009, 92 percent of adult recipients were alive one year after transplant, compared with the expected 87 percent (based on the characteristics of recipients and donors, as well as on the experience of similar patients throughout the United States). For patients receiving their first transplant between July 1, 2004, and December 13, 2006, the three-year survival rate for our program was 84 percent compared with the 81 percent that was expected nationally. These excellent results are testimony to the outstanding multidisciplinary care of our transplant program.

In 2009, 23 patients were implanted with a mechanical circulatory support device at the Kaufman Center for Heart Failure. Access to and expertise with four different mechanical support devices (Thoratec, Heartmate II, Syncardia’s Total Artificial Heart and HVE Heartmate) allow us to utilize the optimal device in each individual patient. We have also used some temporary support devices, including Tandem Heart.

We welcomed Robert Stewart, MD, a pediatric and congenital heart surgeon, to our staff this year.
**Fast facts**

Initiated: 1984

First Adult Heart Transplant: August 15, 1984

UNOS Approval: March 21, 1988

Medicare Approval: June 13, 1988

As of December 31, 2009, 1,469 heart transplants have been performed at Cleveland Clinic.

Cleveland Clinic 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 U.S. Food and Drug Administration. The Total Artificial Heart can provide a bridge to transplantation for patients who are at risk of imminent death from non-reversible biventricular failure.

While the first official heart transplant at Cleveland Clinic was performed in 1968, Cleveland Clinic’s Cardiac Transplant Program team began regular heart transplantation services in 1984. 2009 marked the 25th anniversary of these services.

**Research and Innovations**

The cardiac transplant program continues to participate in many clinical research studies. The goals of these trials are to improve long-term survival, minimize post-transplant morbidity and develop short- and long-term mechanical circulatory support.

In November 2009, we completed the IMAGE Trial (Invasive Monitoring Attenuation through Gene Expression). This multicenter, nonblinded, randomized clinical trial evaluates the safety and efficacy of GEP in the monitoring of asymptomatic heart transplant patients for acute rejection. Results from the trial will be presented at the International Society for Heart & Lung Transplantation meeting in Chicago and published in April 2010.

Other trials include:

*Principal Investigator – Dr. Randall Starling*

RAD 2310 IRB 8623: 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 Transplant Recipients. The study completed enrollment in July 2009, and we will continue to follow patients through August 2011.

*Principal Investigator – Dr. Randall Starling*

07-438 CTOT-05: NIH Observational Study of Alloimmunity in Cardiac Transplantation.

**Awards and Achievements**

Randall Starling, MD, was named Chair of the International Society for Heart & Lung Transplantation Program in 2009.

**Expertise**

**Adult Cardiac Transplant.** Cleveland Clinic’s cardiac transplant program is a recognized leader in the field. We remain the highest volume center in Ohio and the third largest program in the United States.

In August 1997, George M. and Linda H. Kaufman created a center focused on the clinical care and research challenges associated with heart failure and cardiac transplantation. The center has developed a more systemic, integrative approach to research, diagnosis and the treatment of heart failure, creating an extraordinary opportunity to make a major impact on the growing epidemic of heart failure.
**Pediatric Cardiac Transplant.** When an infant is diagnosed with a complex congenital cardiac defect, the pediatric heart transplant team works closely with families to determine whether transplantation is the optimal treatment option. The multispecialty team provides sophisticated assessment and management of all associated cardiac and non-cardiac issues. Cleveland Clinic has a three-year survival rate of 92 percent for pediatric patients (ages 18 and under) who receive heart transplants.

### Survival analysis: patient survival for 307 primary heart-only transplants 2005-2009

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>94.0</td>
</tr>
<tr>
<td>1 year</td>
<td>92.1</td>
</tr>
<tr>
<td>2 years</td>
<td>88.3</td>
</tr>
</tbody>
</table>

### Number of transplants 2005-2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Heart Only</th>
<th>Heart/Lung</th>
<th>Heart/Kidney</th>
<th>Heart/Liver</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>71</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>73</td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2007</td>
<td>60</td>
<td>3</td>
<td>1</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>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Total 333 (includes re-transplants)

### Number of transplants 1984-2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Heart Only</th>
<th>Heart/Lung</th>
<th>Heart/Kidney</th>
<th>Heart/Liver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984-2009</td>
<td>1441</td>
<td>20</td>
<td>4</td>
<td>4</td>
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</tbody>
</table>

Total 1,469
### Days on waiting list and post-transplant length of stay (LOS) for patients transplanted in 2009

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>196.2</td>
<td>102.0</td>
<td>60</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>19.6</td>
<td>13.8</td>
<td>60</td>
</tr>
</tbody>
</table>

### UNOS status of patients transplanted in 2009

<table>
<thead>
<tr>
<th>Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>25</td>
<td>43.9</td>
</tr>
<tr>
<td>1B</td>
<td>22</td>
<td>38.6</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>17.5</td>
</tr>
</tbody>
</table>

### Primary diagnoses for patients transplanted in 2009

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary artery disease</td>
<td>17</td>
<td>28.3</td>
</tr>
<tr>
<td>Dilated cardiomyopathy</td>
<td>17</td>
<td>28.3</td>
</tr>
<tr>
<td>Hypertrophic cardiomyopathy</td>
<td>13</td>
<td>21.7</td>
</tr>
<tr>
<td>Valvular heart disease</td>
<td>3</td>
<td>5.0</td>
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<tr>
<td>Congenital heart disease without surgery</td>
<td>2</td>
<td>3.3</td>
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<tr>
<td>Restrictive cardiomyopathy</td>
<td>2</td>
<td>3.3</td>
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<tr>
<td>Retransplant/graft failure</td>
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<td>Congenital heart disease with surgery</td>
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<td>1.7</td>
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<tr>
<td>Other</td>
<td>3</td>
<td>5.0</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

### Heart transplant mortality 2009

- Hospital deaths (within 30 days post-transplant) 2 (includes 1 heart/lung)
Selected Publications


CHRIS ARTH | CORNEAL TRANSPLANT RECIPIENT

“I see colors better than I’ve ever seen them before.” — Chris Arth, 38, Solon, Ohio. Diagnosed with keratoconus in his left eye, Chris struggled with decreasing eyesight and ill-fitting contacts for a decade before undergoing a corneal transplant. A graphic designer, Chris required the ability to see details and color to perform his job. Since the transplant, Chris enjoys excellent vision.

To watch a videotaped interview with this patient, visit clevelandclinic.org/transplant.
CORNEAL TRANSPLANTATION

2009 Highlights

In 2009, Cole Eye Institute surgeons continued to be at the forefront of corneal surgery and research. Team members performed 152 surgical graft procedures, including penetrating keratoplasty, lamellar keratoplasty, deep anterior lamellar keratoplasty, keratoprosthesis and amniotic membrane grafts. Cole Eye Institute transplant surgeons have also implanted the Boston Keratoprosthesis as a mode of restoring vision in patients with end-stage corneal disease, including those with corneal blindness from severe chemical trauma.

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. The National Institutes of Health (NIH) is supporting the Fuchs’ Endothelial Corneal Dystrophy study, a multicenter trial to investigate the genetics of this disease. The study has completed enrollment and genetic analysis is underway.

Additional research efforts include:

Primary Investigator: Dr. Steven Wilson

Corneal wound healing basic research funded by NIH and Research to Prevent Blindness.

Fast facts

In 2009, 152 corneal transplants were performed at Cleveland Clinic.

See page 88 for complete staff listing
Primary Investigator: Dr. William Dupps
Clinical and computational modeling studies of the biomechanics of keratoconus, a major cause of corneal vision loss and leading indication for corneal transplantation in adults under 65, funded by NIH, Research to Prevent Blindness, and the National Keratoconus Foundation/Discovery Eye Foundation. Also principal site investigator for the NIH-sponsored Fuchs Endothelial Corneal Dystrophy study. Principal investigator of DSAEK Donor Tissue Preparation Study.

Primary Investigator: Dr. David Meisler
NIH-sponsored corneal donor study to determine whether the graft-failure rate over a five-year follow-up period following corneal transplantation is the same when using corneal tissue from donors older than 65 years of age compared with tissue from younger donors; to assess the relationship between donor/recipient ABO blood type compatibility and graft failure due to rejection; and to assess corneal endothelial cell density as an indicator of the health of the cornea and as an alternate outcome measure.

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
• Posterior lamellar keratoplasty (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).
Selected Publications


"It’s wonderful being able to eat again." — Margaret Zaprowski, 48, Buffalo, N.Y. Years of Crohn’s disease and more than 30 surgeries forced Margaret to rely on total parenteral nutrition (TPN) for sustenance — a step that ultimately destroyed her liver. After undergoing a liver transplant followed by a small bowel transplant, Margaret is enjoying the fruits of her favorite pastimes — cooking and gardening.

To watch a videotaped interview with this patient, visit clevelandclinic.org/transplant.
2009 Highlights

In 2009, the Intestinal Rehabilitation and Transplant Program (IRTP) completed three intestinal transplants for a total of seven transplants since the program’s inception in June 2008.

The program expanded its offerings by performing its first multivisceral transplant. In 2009, a sequential split liver followed by an isolated intestinal transplant was performed to decrease waiting time and mortality on the transplant list for combined intestinal/liver candidates. The surgeries were performed six weeks apart, and the patient, featured on the facing page, has recovered well.

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

Additionally, the IRTP has developed a pediatric transplant patient protocol manual of care and evaluated its first pediatric transplant candidate. The candidate is currently listed and awaiting multivisceral transplant surgery.

To better serve potential patients, the IRTP now 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 who have failed TPN 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 the adult include dysmotility disorders and benign intra abdominal tumors (such as desmoid tumors) that require an extensive intra abdominal evisceration.
In the last five 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 is consistently ranked by *U.S. News & World Report* as one of the top two hospitals in treating digestive diseases. It is currently the top ranked hospital for treating digestive diseases that offers intestinal transplant. Additionally, the American Society for Parenteral and Enteral Nutrition (ASPen) recognizes Cleveland Clinic as a program of excellence in nutrition support.

**Staff**

In 2009, the IRTP welcomed Koji Hashimoto, MD, PhD, an intestinal transplant surgeon who completed fellowships in liver transplant and multiple abdominal transplants at Cleveland Clinic. Additionally, the program added three full-time and one part-time dietitian, enabling an increased number of referrals (42% increase from 2008 to 2009) and increased total patient volume (77% increase from 2008 to 2009).

**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 249 patient referrals were seen in 2009 by the IRTP. Of those, 75 were referred with the possibility of intestinal transplant (52% internally referred and 48% externally referred). Of the 75 new intestinal transplant referrals, 18 underwent a complete intestinal transplant evaluation. Three of these patients completed a full intestinal transplant in 2009.
Research Activities

- TPN-induced liver disease: early detection to improve survival rates.
- Patients diagnosed with desmoids tumors: identify the natural history of the disease and identify patients appropriate for intestinal transplant referral.

Selected Publications

Abstracts presented at the XIth International Small Bowel Transplant Symposium in Bologna, Italy, September 9-12, 2009:

“Natural History and Prognostic Factors of Patients with Intra-Abdominal Desmoid Tumor”

“Treatment Options in Patients with End-Stage Liver Disease and Complete Porto-Spleno-Mesenteric Vein Thrombosis (PSMVT): A Meta-Analysis”
“It was the best day of my life when they told me I was compatible with my baby.” — Olga Torres, 40, mother of Flormarie, Cleveland. When Flormarie was just 3 months old, she was diagnosed with biliary atresia, a disease of the liver and bile ducts that required a transplant. Her mother donated a portion of her liver, enabling Flormarie to regain full health in time for her first birthday.

To watch a videotaped interview with this patient, visit clevelandclinic.org/transplant.
2009 Highlights

In 2009, we performed 141 liver transplants, with improved outcomes and survival rates. Accordingly, our program is one of the largest in the country and the largest in the region, finishing in the top four for volume in the United States.

Cleveland Clinic celebrated 25 years of liver transplantation in 2009. We completed our first adult liver transplant on Nov. 8, 1984. Since that date, we have completed more than 1,400 liver transplants, including the first lung-liver transplant in Ohio in 2007. Wait-list death continues to decrease despite an increase in the number of patients with a MELD score greater than 21. Additionally, the program maintains graft and patient survival above the national averages.

A national survey of OLT programs throughout the United States identified the 10 exemplary programs in which organs were most efficiently utilized, maintaining excellent outcomes. Cleveland Clinic's liver transplant program was named among those 10 programs.

2009 was a time 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 464 patients underwent liver transplant evaluation, and 235 patients were listed for transplantation. About 200 patients are on our liver transplant waiting list.

Additionally, we established the Multidisciplinary Liver Tumor Clinic under the direction of Federico Aucejo, MD. The mission of the Liver Tumor Clinic is to offer state-of-the-art medical care to patients with hepatic tumors through a multidisciplinary team of experienced healthcare professionals in the field of hepatic oncology. The Liver Tumor Clinic enables patients, within a single visit, to be seen by a board-certified hepatologist, oncologist, surgeon and interventional radiologist.

With the rapid increase in the number of patients on the waiting list for liver transplantation and lack of availability of enough organs for transplantation, liver transplant programs have focused on the use of organs from donors that...
were once considered not suitable/high-risk, as “Expanded Criteria Donors.” One group of these donors are 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 problems. This is thought to be secondary to formation of thrombi in the peribiliary vascular system at the time of lack of perfusion of the organs. To counteract this phenomenon, we adopted a protocol of infusion of the hepatic artery with anti-thrombotic agent, tissue plasminogen activator (TPA) before the implantation of these livers. The preliminary studies resulted in superior graft function and significant reduction in biliary complications.

This innovative technique was presented at the congress of the International Liver Transplantation Society in 2009. HRSA provided a $729,665 grant to study this innovative technique in liver and kidney transplantation using organs from DCD donors.

**Awards and Achievements**


John Fung, MD, PhD, has been appointed to the Advisory Committee on Organ Transplantation in the Health Resources and Services Administration. He also was the recipient of the 2009 Chinese American Medical Society Scientific Achievement Award. Additionally, Dr. Fung earned an International Liver Transplant Society (ILTS) Distinguished Service Award.

Charles Miller, MD, was selected as a Councilor to the American Society of Transplant Surgeons.

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>92.6</td>
</tr>
<tr>
<td>1 year</td>
<td>90.5</td>
</tr>
<tr>
<td>2 years</td>
<td>86.5</td>
</tr>
</tbody>
</table>

Number of liver transplants by donor type in 2009

<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>Liver</td>
<td>128*</td>
<td>123</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Liver/Kidney</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver/Lung</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver/Heart</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver/Intestine/</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pancreas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>141</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* includes 7 re-transplants

Type of liver transplant in 2009

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole</td>
<td>131</td>
<td>92.9</td>
</tr>
<tr>
<td>Split</td>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>Reduced/partial</td>
<td>5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Liver transplant mortality 2009

<table>
<thead>
<tr>
<th>Cause</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital deaths (within 30 days post-transplant)</td>
<td>6*</td>
</tr>
</tbody>
</table>

* includes 1 intestine/liver/pancreas, 1 liver/lung
### Days on waiting list and post-transplant length of stay (LOS) for liver patients transplanted in 2009

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>161.2</td>
<td>62.0</td>
<td>141</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>17.7</td>
<td>12.0</td>
<td>140*</td>
</tr>
</tbody>
</table>

* 1 patient not discharged as of February 4, 2010.

### Primary diagnoses for liver patients transplanted in 2009

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis C</td>
<td>37</td>
<td>26.2</td>
</tr>
<tr>
<td>NASH</td>
<td>22</td>
<td>15.6</td>
</tr>
<tr>
<td>Hepatoma and cirrhosis</td>
<td>20</td>
<td>14.2</td>
</tr>
<tr>
<td>Alcohol cirrhosis</td>
<td>9</td>
<td>6.4</td>
</tr>
<tr>
<td>Retransplant/graft failure</td>
<td>7</td>
<td>5.0</td>
</tr>
<tr>
<td>Malignancy</td>
<td>7</td>
<td>5.0</td>
</tr>
<tr>
<td>Primary sclerosing cholangitis</td>
<td>7</td>
<td>5.0</td>
</tr>
<tr>
<td>Biliary cirrhosis</td>
<td>6</td>
<td>4.3</td>
</tr>
<tr>
<td>Biliary atresia</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Cryptogenic cirrhosis</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Familial cholestasis</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Metabolic disease</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Total parenteral nutrition</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Amyloidosis</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Benign tumor</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Fulminant hepatic failure</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Other cirrhosis</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>141</strong></td>
<td></td>
</tr>
</tbody>
</table>
Research

Principal Investigator: Dr. John Fung
8230: Solid Organ Transplantation in HIV: Multi-Site Study

Principal Investigator: Dr. Bijan Eghtesad
05-138: A Multicenter, Randomized Open-label Study to Compare the Development of Liver Fibrosis at 12 Months After Transplantation for Hepatitis C Cirrhosis in Patients Receiving Either Cyclosporine or Tacrolimus

Principal Investigator: Dr. Dympna Kelly
05-181: The Impact of Immunosuppression on Post-Liver Transplant Rejection in Crossmatch Positive and Negative Patients

Principal Investigator: Dr. John Fung
06-167: REGISTRY: Electronic Data Interface for Transplant (EDIT)

Principal Investigator: Dr. Dympna Kelly
06-758: EXEMPT: Risk factors for developing biliary complications following liver transplantation

Principal Investigator: Dr. John Fung
08-050: Evaluation of HepaGam B in combination with antiviral treatment in hepatitis B liver transplant patients.

Principal Investigator: Dr. Federico Aucejo
08-463: Hepatocellular Carcinoma (HCC) Genetic Profiling: Searching for predictors of tumor recurrence after liver transplantation

Principal Investigator: Dr. John Fung
4927: The Unified Transplant Database (UTD)

Principal Investigator: Dr. Charles Miller
7497: REGISTRY: Parenchymal Perfusion of Native and Graft Livers During Transplantation

Principal Investigator: Dr. John Fung
07-375: Study of the Antiviral Activity of Entecavir in Patients Receiving Liver Transplant Due to Chronic Hepatitis B Virus Infection

Principal Investigator: Dr. John Fung
08-343: A 24-month, multicenter, open-label, randomized, controlled study to evaluate the efficacy and the safety of concentration-controlled everolimus to eliminate or to reduce tacrolimus compared to tacrolimus in de novo liver transplant recipients
Principal Investigator: Dr. Dympna Kelly
08-786: Hepatic Artery (HA) Infusion of Adenosine increases arterial blood flow in adult liver transplant recipients. A Pilot Study

Principal Investigator: Dr. Bijan Eghtesad
09-432: A Randomized Controlled Clinical Trial of Low Dose Thymoglobulin and Extended Delay of Calcineurin Inhibitor Therapy for Renal Protection after Liver Transplantation

Selected Publications


DONNA WILLIAMS  | DOUBLE LUNG TRANSPLANT RECIPIENT

“I feel like I’m 16 years old. I can’t be still.” — Donna Williams, 59, Cleveland. Chronic obstructive pulmonary disease left Donna exhausted from even the simplest of daily activities, such as combing her hair, talking and cooking. After undergoing a double-lung transplant, Donna now enjoys roller skating, babysitting her granddaughter, running errands for her neighbor and exercising at the local YMCA.

To watch a videotaped interview with this patient, visit clevelandclinic.org/transplant.
2009 Highlights

Surgeons at Cleveland Clinic performed 157 lung transplants in 2009, setting an international record for lungs transplanted in a single year. We completed our 840th transplant since the program’s inception in 1990. We attribute the high numbers and excellent outcomes to factors including more aggressive donor utilization, teamwork and strong institutional support.

The transplant program has established a reputation for accepting challenging, complex cases, which has led to a high referral rate. In 2009, the transplant team evaluated 562 end-stage lung disease patients from across the United States and other countries. The program’s average waiting time for a graft remains stable, despite the new lung allocation score (LAS). Almost one-third of patients listed get new lungs within 30 days, and 90 percent get a new organ within a year (compared to only 40 percent nationally).

Our hospital and 30-day mortality remain low despite heightened case severity resulting from LAS giving priority to the sickest patients. The lung transplant program has achieved very strong survival rates that are at or above national averages. Median and long-term outcomes continue to improve, with a 1-year survival rate of 85.4 percent, and 2-year survival rate of 77.2 percent. A continued emphasis on quality assurance and quality improvement remains central to the program, reflected by a post-transplant length of stay of a median of 19 days.

In 2009, we welcomed Kenneth McCurry, MD, Program and Surgical Director, Lung and Heart-Lung Transplant, to lead our team. He is a cardiothoracic surgeon specializing in heart failure; and heart, lung and combined heart-lung transplantation in adults and children. Dr. McCurry joined the Cleveland Clinic staff from the University of Pittsburgh where he was head of the Section of Cardiothoracic Transplantation, director of lung and heart-lung transplantation, director of cardiac transplantation, surgical director of clinical heart failure research and surgical director of pediatric lung and heart-lung transplantation.
Fast facts

- Set world record for number of lung transplants performed in a single year: 2009
- Initiation date: 1990
- First Adult Lung Transplant: February 14, 1990
- First liver-lung transplant: January 31, 2007
- First double lung transplant with bronchial artery revascularization performed December 15, 2007 at Cleveland Clinic.
- Performed first lung-liver transplant in Ohio in 2007.
- UNOS approval: March 3, 1993
- Medicare Approval: October 22, 1997
- As of December 31, 2009, 840 lung transplants have been performed at Cleveland Clinic.

Marie Budev, DO, was designated as the UNOS Primary Physician and Medical Director for the Lung Transplant Program in 2009. Dr. McCurry was designated as the UNOS Primary Surgeon and Surgical Director in 2010.

Research and Innovations

The Cleveland Clinic lung transplant team is involved in a series of multicenter trials focusing on primary graft dysfunction and acute rejection therapy, as well as on induction therapy and ex vivo perfusion. Currently, Cleveland Clinic is a leading center for evaluating the safety and efficacy of cyclosporine inhalation in preventing chronic rejection in lung transplant recipients.

In 2007, Cleveland Clinic lung transplant surgeons initiated a study offering bronchial artery revascularization (BAR) in an effort to reduce impaired airway healing after lung transplantation. During a lung transplant with BAR, surgery includes an additional connection between a recipient artery and the diminutive donor lung bronchial arteries. Thus, a normal bronchial blood supply is restored. Currently, 16 patients have been transplanted with BAR. All patients are alive, and 15 of 16 had excellent airway healing. In April 2009, these results were presented at the International Society for Heart & Lung Transplantation meeting in Paris. Currently, more than 50 patients are enrolled in the BAR pilot study.

Additionally, surgeons look forward to completing even more lung transplants in 2010, as a greater use of donation after cardiac death (DCD) could help increase the number of transplants. While most transplanted organs come from donation after brain death, a Cleveland Clinic study that evaluated all DCD lung transplants performed in the United States from 1987 to 2007 determined that survival after lung transplant using DCD donors was excellent and, in fact, better than survival after brain death donation.

Expertise

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

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: patient survival for 406 primary lung transplants 2005-2009 (includes 9 heart/lung and 4 lung/liver)

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>87.7</td>
</tr>
<tr>
<td>1 year</td>
<td>85.4</td>
</tr>
<tr>
<td>2 years</td>
<td>77.2</td>
</tr>
</tbody>
</table>

Lung transplants 2009

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double</td>
<td>111</td>
<td>70.7</td>
</tr>
<tr>
<td>Single</td>
<td>46</td>
<td>29.3 (27 left and 19 right)</td>
</tr>
<tr>
<td>Total</td>
<td>157*</td>
<td></td>
</tr>
</tbody>
</table>

* includes 5 re-transplants

Lung transplant mortality 2009

<table>
<thead>
<tr>
<th></th>
<th>8*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital deaths (within 30 days post-transplant)</td>
<td></td>
</tr>
</tbody>
</table>

* includes 1 lung/heart and 1 lung/liver

Number of lung transplants 2005-2009

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>Double</th>
<th>Total</th>
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<tbody>
<tr>
<td>2005</td>
<td>22</td>
<td>43*</td>
<td>65</td>
</tr>
<tr>
<td>2006</td>
<td>21</td>
<td>43**</td>
<td>64</td>
</tr>
<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>Total</td>
<td>132</td>
<td>283</td>
<td>415</td>
</tr>
</tbody>
</table>

* (includes 1heart/lung)
** (includes 2 heart/lung)
*** (includes 3 heart/lung and 1 lung/liver)
**** (includes 3 heart/lung and 3 lung/liver)
### Number of transplants 1990-2009

<table>
<thead>
<tr>
<th>Organ</th>
<th>Double</th>
<th>Single</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>431</td>
<td>385</td>
<td>816</td>
</tr>
<tr>
<td>Heart/Lung</td>
<td>20</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Lung/Liver</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>455</td>
<td>385</td>
<td>840</td>
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### Days on waiting list and post-transplant length of stay (LOS) for lung patients transplanted in 2009

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>120.7</td>
<td>29.0</td>
<td>157</td>
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<tr>
<td>Post-transplant LOS</td>
<td>29.7</td>
<td>19.0</td>
<td>151*</td>
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</table>

* 6 patients not discharged as of February 4, 2010.

### Primary diagnoses for patients transplanted in 2009

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiopathic pulmonary fibrosis</td>
<td>72</td>
<td>45.9</td>
</tr>
<tr>
<td>COPD/emphysema</td>
<td>40</td>
<td>25.5</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>18</td>
<td>11.5</td>
</tr>
<tr>
<td>Pph (Primary pulmonary HTN)</td>
<td>7</td>
<td>4.5</td>
</tr>
<tr>
<td>Re-transplant/graft fail</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>Sarcoidosis</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>Alpha-1 antitrypsin deficiency</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>5.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>157</td>
<td></td>
</tr>
</tbody>
</table>
Publications


RENEE BEAUCHAMP | PANCREAS TRANSPLANT RECIPIENT

“I feel excellent. This is the best thing I could have ever done for my life.” — Renee Beauchamp, 33, Wayne, Mich. Diabetic since the age of two, Renee underwent a pancreas transplant after years of struggling with the effects of diabetes, including seizures and the loss of eyesight in one eye. Renee had relied on an insulin pump to maintain normal blood sugar levels but sought a pancreas transplant as a long-term solution. Now cured of diabetes, Renee enjoys spending time with her extended family, cooking and working at a hospital without the inconvenience of requiring an insulin pump.

To watch a videotaped interview with this patient, visit clevelandclinic.org/transplant.
2009 Highlights

In 2009, a total of 28 pancreas transplants were performed, including 19 kidney/pancreas transplants, 1 pancreas/intestine/liver transplant and 1 pancreas/intestine transplant and 7 pancreas-alone transplants. This brings the total number of transplants performed since the beginning of the program to 277.

By maintaining this level of clinical activity, the Cleveland Clinic Kidney/Pancreas Transplant Program continues to rank among the 10 busiest pancreas transplant programs in the country. Equally important, clinical outcomes continue to remain excellent along with the increased clinical volumes. For patients receiving a pancreas/kidney or pancreas-alone transplant in 2009, survival was 100 percent.

The majority of pancreas transplants performed at Cleveland Clinic result from diabetes.

Achievements and Awards

Emilio Poggio, MD, was selected to join the editorial board of Transplantation – the official journal of the Transplantation Society.

Titte Srinivas, MD, organized “Contentious Issues in Organ Transplantation – A Colloquium” at Cleveland Clinic, October 8-9, 2009. The event aimed to improve collaboration between various stakeholders in transplantation, including regulatory authorities and transplant centers.

Research and Innovations

The introduction of specific solid phase assays and improved histological recognition has made the detection of antibody-mediated rejection of organ allografts more reliable. Antibody-mediated rejection is now emerging as a common cause of graft injury and loss, both early and late after transplant. Unfortunately, the treatment of antibody-mediated rejection has been limited to attempts at removal of the offending antibody from the serum or blocking its effects. Recently,
the drug bortezomib, an inhibitor of cytoplasmic proteosomes, has been shown to inhibit antibody production directly in plasma cells.

We have used bortezomib in a regimen combined with plasmapheresis and intravenous gammaglobulin to reverse established antibody-mediated rejection in renal allograft recipients. During this past year, eight kidney recipients and two multiple organ recipients (liver-kidney, pancreas-kidney) have been treated with this regimen for failing grafts due to antibody-mediated rejection.

At six months after treatment, 87 percent of the grafts still function, and we were able to identify a reduction in the most dominant donor-specific antibody of about 75 percent. This preliminary experience has demonstrated that bortezomib can be used in a treatment regimen for antibody-mediated rejection, and is well-tolerated by most patients. While such treatment may decrease donor-specific antibody titers and prolong graft function, the long-term safety, optimum dose, length of treatment, and need for additional agents will be the topic of future studies.

Additional studies include:

Principal Investigator: Dr. Emilio Poggio
Kinetics of T-cell Donor Reactivity Post-Kidney Transplantation: NIH-sponsored study aimed at characterizing the cellular alloimmune response (T-cell reactivity to donor antigens) in kidney and pancreas transplant candidates, and providing insight into immunological risk profiling by using noninvasive immune monitoring techniques. This study is also designed to correlate pre-transplant cellular alloreactivity with post-transplant clinical outcomes.

Publications
Refer to list of publications on page 74 (renal).

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>96.2</td>
</tr>
<tr>
<td>1 year</td>
<td>93.5</td>
</tr>
<tr>
<td>2 years</td>
<td>90.3</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>95.4</td>
</tr>
<tr>
<td>1 year</td>
<td>92.0</td>
</tr>
<tr>
<td>2 years</td>
<td>85.9</td>
</tr>
</tbody>
</table>

Number of pancreas transplants in 2009

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreas</td>
<td>7</td>
<td>25.0</td>
</tr>
<tr>
<td>Pancreas/kidney</td>
<td>19</td>
<td>67.9</td>
</tr>
<tr>
<td>Pancreas/intestine</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>Pancreas/intestine/liver</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td></td>
</tr>
</tbody>
</table>

Days on waiting list and post-transplant length of stay (LOS) for pancreas patients transplanted in 2009

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>310.0</td>
<td>272.0</td>
<td>28</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>12.3</td>
<td>8.0</td>
<td>28</td>
</tr>
</tbody>
</table>
Primary diagnoses for patients transplanted in 2009

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>26</td>
<td>92.9</td>
</tr>
<tr>
<td>COPD/emphysema</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
<td></td>
</tr>
</tbody>
</table>

Pancreas transplant mortality 2009

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

* intestine/liver/pancreas
Shari Mosley | Kidney Transplant Recipient

“Now that I have the transplant, I’ve been given back my freedom.” — Shari Mosley, 23, Woodmere, Ohio. Seven years and one day after starting dialysis three times every week due to kidney failure, Shari underwent a kidney transplant. Freed from a life scheduled around dialysis treatments as well as complications from fistulae, Shari just graduated with a bachelor’s degree in fashion merchandising and looks forward to completing a master’s degree in business administration.

To watch a videotaped interview with this patient, visit clevelandclinic.org/transplant.
2009 Highlights

Clinical activity in renal transplantation remained strong at Cleveland Clinic’s Glickman Urological & Kidney Institute in 2009. We performed 161 transplants in 2009.

Transplantation, more than other clinical endeavors, is carried out with significant regulatory oversight. All Cleveland Clinic programs were among the first to be re-certified by CMS.

In February, Cleveland Clinic collaborated with St. Vincent Hospital in Indianapolis to establish a Renal Transplant Program. The Renal Transplant Program was led by Bashir Sankari, MD, surgical director; Alvin Wee, MD, attending surgeon; and Mahendra Govani, MD, medical director. Drs. Sankari and Wee are both fellowship trained in kidney and pancreatic transplantation and are employed by Cleveland Clinic. This regional transplant program is modeled after Cleveland Clinic’s partnership with the Charleston Area Medical Center in West Virginia where Cleveland Clinic transplant surgeon Jeff Chueh, MD, PhD, leads the program along with four certified clinical transplant coordinators, a dietitian, social worker and attending nephrologists.

The renal transplant program continues to be active in the Paired Donation Network, an innovative service for incompatible donor-recipient pairs.

Awards and Achievements

Emilio Poggio, MD, has been selected to join the Editorial Board of Transplantation — the official journal of the Transplantation Society.

Titte Srinivas, MD, organized “Contentious Issues in Organ Transplantation – A Colloquium” at Cleveland Clinic, October 8-9, 2009. The event aimed to improve collaboration between various stakeholders in transplantation, including regulatory authorities and transplant centers.
Research and Innovations

The laboratory of Robert L. Fairchild, PhD, continues to focus on:
- mechanisms that produce high levels of inflammation early in transplanted tissues and organs,
- understanding how this inflammation directs alloantigen-primed T cells and other leukocytes into allografts, and
- effector mechanisms leading to solid organ graft rejection.

The introduction of specific solid phase assays and improved histological recognition has made the detection of antibody-mediated rejection of organ allografts more reliable. Antibody-mediated rejection is now emerging as a common cause of graft injury and loss, both early and late after transplant. Unfortunately, the treatment of antibody-mediated rejection has been limited to attempts at removal of the offending antibody from the serum or blocking its effects. Recently, bortezomib, an inhibitor of cytoplasmic proteosomes, has been shown to inhibit antibody production directly in plasma cells.

We have used bortezomib in a regimen combined with plasmapheresis and intravenous gammaglobulin to reverse established antibody-mediated rejection in renal allograft recipients. During this past year, eight kidney recipients and two multiple organ recipients (liver-kidney, pancreas-kidney) have been treated with this regimen for failing grafts due to antibody-mediated rejection.

At six months after treatment, 87 percent of the grafts still function, and we were able to identify a reduction in the most dominant donor-specific antibody of about 75 percent. This preliminary experience has demonstrated that bortezomib can be used in a treatment regimen for antibody-mediated rejection, and is well-tolerated by most patients. While such treatment may decrease donor-specific antibody titers and prolong graft function, the long-term safety, optimum dose, length of treatment, and need for additional agents will be the topic of future studies.

Other studies include:

Principal Investigator: Dr. Emilio Poggio

Kinetics of T-cell Donor Reactivity Post-Kidney Transplantation: NIH-sponsored study aimed at characterizing the cellular alloimmune response (T-cell reactivity to donor antigens) in kidney transplant candidates, and providing insight into immunological risk profiling by using noninvasive immune monitoring techniques. This study is also designed to correlate pre-transplant cellular alloreactivity with post-transplant clinical outcomes.
Principal Investigator: Dr. Howard Goldman
Impact of Renal Transplant on Female Sexual Function: an investigatory-initiated study designed to assess the prevalence of sexual dysfunction in female subjects and their male partners prior to renal transplant and to determine if there is improvement after transplantation. It will also assess the sexual function of female kidney donors before and after donation, an understudied area.

Principal Investigator: Dr. Stuart Flechner
Genomics for Kidney Transplantation: study to apply the latest technologies in genomics to advance our understanding of clinical kidney transplantation.

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: a study to learn whether ramipril is safe and effective in preventing increased protein in the urine when the immunosuppressive regimen is switched from a calcineurin inhibitor to sirolimus (a non-calcineurin inhibitor medication). In native kidneys, drugs like ramipril are helpful in controlling the amount of protein in the urine. This study attempts to determine if the same is true in the transplanted kidney.

Principal Investigator: Dr. Emilio Poggio
Clinical Trial in Organ Transplantation (CTOT-09): Noninvasive Monitoring to Predict Outcome in De Novo Kidney Transplant Recipients: NIH-sponsored multicenter observational trial with the major goal to determine whether any single test or a combination of tests obtained in the first six months after renal transplantation correlates with acute rejection or graft loss in renal allograft recipients receiving commonly used immunosuppressive regimes.

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>96.4</td>
</tr>
<tr>
<td>1 year</td>
<td>94.4</td>
</tr>
<tr>
<td>2 years</td>
<td>91.5</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>96.4</td>
</tr>
<tr>
<td>1 year</td>
<td>94.4</td>
</tr>
<tr>
<td>2 years</td>
<td>90.3</td>
</tr>
</tbody>
</table>

### Survival analysis: kidney graft survival for 74 primary kidney/pancreas transplants 2005-2009

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>95.7</td>
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<tr>
<td>1 year</td>
<td>90.3</td>
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<tr>
<td>2 years</td>
<td>86.1</td>
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</table>

### Number of transplants 2009

<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>136</td>
<td>76</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>Kidney/pancreas</td>
<td>19</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kidney/liver</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Waiting list and post-transplant length of stay (LOS) for kidney patients transplanted in 2009

<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>886.0</td>
<td>745.0</td>
<td>101</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>7.5</td>
<td>6.0</td>
<td>160*</td>
</tr>
</tbody>
</table>

* 1 patient not discharged as of February 4, 2010

Primary diagnoses for kidney patients transplanted in 2009

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>46</td>
<td>28.6</td>
</tr>
<tr>
<td>Cystic disease</td>
<td>20</td>
<td>12.4</td>
</tr>
<tr>
<td>Glomerular disease</td>
<td>20</td>
<td>12.4</td>
</tr>
<tr>
<td>Re-transplant/graft failure</td>
<td>19</td>
<td>11.8</td>
</tr>
<tr>
<td>Hypertension</td>
<td>13</td>
<td>8.1</td>
</tr>
<tr>
<td>Multi-system disease</td>
<td>9</td>
<td>5.6</td>
</tr>
<tr>
<td>Nephritis/interstitial disease</td>
<td>9</td>
<td>5.6</td>
</tr>
<tr>
<td>Malignant disease</td>
<td>3</td>
<td>1.9</td>
</tr>
<tr>
<td>Obstructive disease</td>
<td>3</td>
<td>1.9</td>
</tr>
<tr>
<td>Congenital/hereditary disease</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Vascular disease</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Others</td>
<td>12</td>
<td>7.5</td>
</tr>
<tr>
<td>Total</td>
<td>161</td>
<td></td>
</tr>
</tbody>
</table>

Kidney transplant mortality 2009

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital deaths</td>
<td>0</td>
</tr>
</tbody>
</table>
Publications


“Dr. Joyce said I could wear high heels in the future. I’m just happy about that.” — Hannah Hicks, 15, Solon, Ohio. Hannah was diagnosed with a solid mass tumor in her tibia last summer after experiencing pain and a lump in her lower leg. After undergoing 17 cycles of chemotherapy and an eight-hour surgery that replaced her diseased bone with 12 cm of donor bone, Hannah is on her way to recovery. Despite her ordeal, Hannah managed to maintain her 4.0 grade point average and looks forward to getting back to running and horseback riding this fall.
2009 Highlights

Some 20 disciplines across 11 of Cleveland Clinic’s institutes and ambulatory surgery centers utilize bone and soft tissue during surgical reconstruction. In 2009, Cleveland Clinic used approximately 5,342 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 the Orthopaedic Research Center. Cleveland Clinic physicians also have been active in the American Association of Tissue Banks, American Academy of Orthopaedic Surgeons Committee on Biological Implants, American Society of Testing and Materials, as well as with the FDA and Centers for Disease Control 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.

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 The Joint Committee standards are met by qualifying all vendors; tracing tissues from receipt through storage, preparation and use; and identifying and reporting recipient adverse events and handling tissue recalls successfully. At Cleveland Clinic, the storage facility requires a swipe badge to enter and has a carbon dioxide tank back-up system in case of an electrical failure.
Awards and Achievements

Michael Joyce, MD, was elected to the American Orthopaedic Association in recognition of orthopaedic education and academic contributions.

Cardiology/Cardiothoracic Surgery

Cleveland Clinic’s heart and heart surgery program has been ranked No. 1 in the nation for the past 16 years by *U.S. News & World Report* (2010). Cleveland Clinic has the largest heart valve surgery practice in the United States, performing 2,693 procedures in 2009, including 1,311 valve repairs and 1,759 valve replacements.

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 also is 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 with 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 Life-Banc for cartilage defects in the knee. 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. The 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

Our gastrointestinal disorders program was ranked second in the nation in 2010 by *U.S. News & World Report*. The Department of Colorectal Surgery utilizes tissue in specialized procedures, including anal fistula repair using a tissue plug and ventral hernia repair.

Vascular Surgery

The Department of Vascular Surgery performed more than 2,823 procedures in 2009 (excluding conscious sedation cases and limited to main campus). The department frequently 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 utilizes 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. They include in vitro fertilization (IVF), intracytoplasmic sperm injection, sperm aspiration, assisted hatching, blastocyte transfer and embryo cryopreservation. The center also obtains egg and sperm donations and offers an IVF surrogate program.

Focus on Quality

To ensure safety and the best possible results, allograft donors are thoroughly screened with 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 Transplantation Program also adheres to the new Joint Commission standards that were established in 2007. 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 2009, the Transplant Center utilized 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 and is currently implemented in more than 125 operating and procedure rooms. In 2009 the system was responsible for handling the tracking of the 5,342 tissues segments and has electronic interfaces with the Cleveland Clinic Operating Room Information System and receives product and donor information from vendor systems.

Publications


84  Allogen Laboratories
84  Bone Marrow
85  Cardiac
88  Corneal
89  Infectious Disease
90  Intestinal
91  Liver
95  Lung and Heart/Lung
97  Pancreas and Kidney/Pancreas
98  Renal
101  Tissue
102  Support
**ALLOGEN LABORATORIES**

**Diane J. Pidwell, PhD**  
Director, Allogen Laboratories  
Office Phone: 216.444.2805  
Appointments: 216.444.2804  
Email: pidweld@ccf.org  
Staff Appointment: 2007  
Specialty Interests: Histocompatibility of solid organ and bone marrow transplantation, effects of anti-HLA antibody on graft function and survival

**Medhat Z. Askar, MD, PhD**  
Associate Director, Allogen Laboratories  
Office Phone: 216.444.5918  
Appointments: 216.444.2804  
Email: askarm@ccf.org  
Staff Appointment: 2006  
Specialty Interests: Immunogenetics and transplant immunology

**BONE MARROW**

**Brian Bolwell, MD**  
Chairman, Hematologic Oncology and Blood Disorders; Vice Chairman, Office of the Chief of Staff; Professor of Medicine, Cleveland Clinic Lerner School of Medicine  
Office Phone: 216.444.6922  
Appointments: 216.444.6833  
Email: bolwelb@ccf.org  
Staff Appointment: 1987  
Specialty Interests: Bone marrow transplantation, leukemia, lymphoma

**Steven Andresen, DO**  
Hematologic Oncology and Blood Disorders  
Office Phone: 216.444.3737  
Appointments: 216.444.6833  
Email: andress@ccf.org  
Staff Appointment: 1987  
Specialty Interests: Hematology, hematologic malignancies, bone marrow transplantation, breast cancer

**Edward Copelan, MD**  
Program Director, Acute Leukemia; Hematologic Oncology and Blood Disorders  
Office Phone: 216.445.5647  
Appointments: 216.444.6833  
Email: copelae@ccf.org  
Staff Appointment: 2007  
Specialty Interests: Preparative regimens for transplantation, CML, acute leukemias

**Robert Dean, MD**  
Hematologic Oncology and Blood Disorders  
Office Phone: 216.445.5365  
Appointments: 216.444.6833  
Email: deanr@ccf.org  
Staff Appointment: 2005  
Specialty Interests: Bone marrow and stem cell transplantation, lymphoma, leukemia, multiple myeloma
Matt Kalaycio, MD  
Program Director, Chronic Leukemia and Multiple Myeloma; Hematologic Oncology and Blood Disorders  
Office Phone: 216.444.3705  
Appointments: 216.444.6833  
Email: kalaycm@ccf.org  
Staff Appointment: 1994  
Specialty Interests: Leukemia, lymphoma, bone marrow transplantation

Brad Pohlman, MD  
Program Director, Lymphoma; Hematologic Oncology and Blood Disorders  
Office Phone: 216.445.6070  
Appointments: 216.444.6833  
Email: pohlmab@ccf.org  
Staff Appointment: 1993  
Specialty Interests: Hodgkin and non-Hodgkin lymphoma, bone marrow transplantation

Stephen Smith, MD  
Hematologic Oncology and Blood Disorders  
Office Phone: 216.444.8258  
Appointments: 216.444.6833  
Staff Appointment: 2008  
Specialty Interests: Non-Hodgkin lymphoma, targeted therapy, hematologic diseases, benign and malignant

Ronald Sobecks, MD  
Hematologic Oncology and Blood Disorders  
Office Phone: 216.445.4626  
Appointments: 216.444.6833  
Email: sobeckr@ccf.org  
Staff Appointment: 1999  
Specialty Interests: Leukemia, hematopoietic stem cell transplantation, other hematologic malignancies, drug development/clinical trials for these diseases

John Sweetenham, MD  
Clinical Research Director, Taussig Cancer Institute; Hematologic Oncology and Blood Disorders  
Office Phone: 216.445.6707  
Appointments: 216.444.6833  
Email: sweetej@ccf.org  
Staff Appointment: 2005  
Specialty Interests: Hodgkin and non-Hodgkin lymphoma, autologous stem cell transplantation, hematologic malignancies

C A R D I A C

Randall C. Starling, MD, MPH, FACC  
Program and Medical Director, Heart Transplant Program and Kaufman Center for Heart Failure; Head, Section of Heart Failure and Cardiac Transplant Medicine; Vice Chairman, Department of Cardiovascular Diseases; Cardiovascular Medicine  
Office Phone: 216.444.2268  
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Email: starlir@ccf.org  
Staff Appointment: 1995  
Specialty Interests: Heart failure, cardiomyopathy, cardiac transplantation; mechanical circulatory support devices

Nicholas Smedira, MD  
Program and Surgical Director, Heart Transplant Program and Kaufman Center for Heart Failure; Thoracic and Cardiovascular Surgery; Polly and W. Neil Rossborough Chair in Cardiac Transplantation  
Office Phone: 216.445.7052  
Appointments: 216.444.4466  
Email: smedirn@ccf.org  
Staff Appointment: 1995  
Specialty Interests: Heart and heart/lung transplantation, ventricular assist devices, ECMO, heart failure surgery, aortic and mitral valve repair and replacement, off-pump coronary bypass grafting, myectomy, reoperations, ascending and descending thoracic aortic replacement

Eugene Blackstone, MD  
Thoracic and Cardiovascular Surgery; Quantitative Health Sciences  
Office Phone: 216.444.6712  
Staff Appointment: 1997  
Email: blackse@ccf.org  
Specialty Interests: Clinical research in adult and congenital cardiac surgery, adult thoracic surgery clinical research, cardiac and pulmonary transplantation, novel mathematical methods for analysis of time-related events and longitudinal clinical outcomes, predictive modeling, semantic database research and development
Corinne Bott-Silverman, MD
Cardiovascular Medicine
Office Phone: 216.444.8414
Appointments: 216.444.6697
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Staff Appointment: 1986
Specialty Interests: Heart failure, heart transplantation, clinical cardiology, cardiac catheterization, myocardial biopsy

Gerard J. Boyle, MD
Chairman, Pediatric Cardiology; Head, Section of Pediatric Heart Transplantation and Congestive Heart Failure; Associate Professor, Cleveland Clinic Lerner College of Medicine of Case Western Reserve University
Office Phone: 216.444.3083
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Staff Appointment: 2004
Specialty Interests: Pediatric heart transplantation, congestive heart failure

Gonzalo V. Gonzalez-Stawinski, MD
Cardiovascular Surgery
Office Phone: 216.444.6708
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Staff Appointment: 2006
Specialty Interests: Adult cardiac surgery, heart transplantation, reoperations, pump coronary and valve procedures, pulmonary embolectomy and thromboendarterectomy, mechanical circulatory device

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Cardiovascular Medicine
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Staff Appointment: 2006
Specialty Interests: Congestive heart failure, hypertrophic cardiomyopathy, cardiac transplantation and mechanical circulatory support devices

Robert Hobbs, MD
Cardiovascular Medicine
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Staff Appointment: 1979
Specialty Interests: Congestive heart failure, cardiac transplantation

Eileen Hsich, MD
Cardiovascular Medicine
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Staff Appointment: 2004
Specialty Interests: Heart failure in women, cardiac transplantation, nuclear cardiology

Karen James, MD
Cardiovascular Medicine
Office Phone: 216.444.9288
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Staff Appointment: 1991
Specialty Interests: Cardiac transplantation, congestive heart failure

Constantine Mavroudis, MD
Chairman, Pediatric and Congenital Heart Surgery
Office Phone: 216.636.5288
Appointments: 216.444.3627
Email: mavrouc@ccf.org
Staff Appointment: 2008
Specialty Interests: Pediatric heart surgery, congenital coronary artery surgery, arrhythmia surgery, repair of transposition of great arteries, valve sparing repair of tetralogy of Fallot, adult congenital heart surgery

Tomislav Mihaljevic, MD
Thoracic and Cardiovascular Surgery
Office Phone: 216.444.0648
Appointments: 216.444.4466
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Staff Appointment: 2004
Specialty Interests: Minimally invasive valve surgery, mitral and aortic valve repair and replacement, coronary artery disease, beating heart revascularization, maze procedure, robotic cardiac surgery, cardiac transplantation, lung transplantation, ventricular assist devices, adult congenital heart disease
Christine Moravec, PhD  
Molecular Cardiology  
Office Phone: 216.445.9949  
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Staff Appointment: 1993  
Specialty Interests: Cardiovascular disease, heart failure, psychophysiological disorders, autonomic nervous system activation in heart failure, implantable ventricular assist device (VAD), intracellular signaling

Maria Mountis, DO  
Cardiovascular Medicine  
Office Phone: 216.636.6101  
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Staff Appointment: 2008  
Specialty Interests: Heart failure, cardiac transplantation, mechanical circulatory support devices, women’s cardiac care, pulmonary hypertension

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Cardiovascular Medicine  
Office Phone: 216.444.6721  
Appointments: 216.444.6697  
Email: rincong@ccf.org  
Staff Appointment: 1972  
Specialty Interests: Cardiac catheterization and angiography, clinical cardiology, clinical pharmacology in cardiac failure, cardiac transplantation

Rene Rodriguez, MD  
Head, Section of Autopsy Pathology, Anatomic Pathology, Thoracic and Cardiovascular Surgery, Molecular Cardiology  
Office Phone: 216.444.2091  
Email: rodrigr2@ccf.org  
Staff Appointment: 2004  
Specialty Interests: Cardiovascular pathology, cardiomyopathies, cardiac transplant pathology, aortic diseases, valvular diseases, congenital heart disease, molecular diagnostics of cardiovascular diseases

Edward Soltesz, MD  
Thoracic and Cardiovascular Surgery  
Office Phone: 216.444.5680  
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Email: soltese@ccf.org  
Staff Appointment: 2008  
Specialty Interests: Adult cardiac surgery, complex aortic and endovascular surgery, complex coronary disease, heart failure/heart transplantation/ventricular assist devices, minimally invasive valve surgery, reoperative cardiac surgery, minimally invasive maze procedure

Robert Stewart, MD  
Surgical Head, Pediatric Heart Transplant  
Office Phone: 216.444.9125  
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Staff Appointment: 2009  
Specialty Interests: Pediatric and congenital heart surgery

Carmela Tan, MD  
Anatomic Pathology  
Office Phone: 216.444.9489  
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Staff Appointment: 2005  
Specialty Interests: Anatomic pathology, cardiovascular pathology, antibody-mediated rejection in cardiac allografts, regulation of complement activation in antibody-mediated rejection, gene expression in cardiac allograft vasculopathy

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Cardiovascular Medicine  
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Staff Appointment: 2004  
Specialty Interests: Cardiomyopathy, heart failure, cardiac transplantation and mechanical circulatory support, diabetic heart disease, chemotherapy-induced cardiomyopathy, cardio-renal syndrome
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Cardiovascular Medicine; Professor of Medicine, Cleveland Clinic Lerner College of Medicine of Case Western Reserve University
Office Phone: 216.444.2492
Appointments: 216.444.4462
Email: taylord2@ccf.org
Staff Appointment: 2001
Specialty Interests: Congestive heart failure, cardiac transplantation, mechanical circulatory support

James Young, MD
Executive Dean, Education Institute; Chairman, Endocrinology and Metabolism Institute; Staff, Cardiovascular Medicine
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Appointments: 216.444.6697
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Staff Appointment: 1995
Specialty Interests: Heart failure, heart transplantation, mechanical circulatory assist devices

William J. Dupps, MD, PhD
Cole Eye Institute
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Staff Appointment: 2004
Specialty Interests: Refractive surgery, cataract surgery, corneal transplantation, corneal healing

Roger H.F. Langston, MD
Cole Eye Institute
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Appointments: 216.444.2020
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Staff Appointment: 1974
Specialty Interests: Corneal and external disease, corneal transplantation, cataract and implant surgery

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Cole Eye Institute
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Staff Appointment: 1982
Specialty Interests: Corneal and external disease, corneal transplantation, adult cataract surgery

Allen Roth, MD
Beachwood Ophthalmology
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Staff Appointment: 1999
Specialty Interests: Corneal transplantation, refractive surgery, cataract surgery

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Office Phone: 216.444.4363
Appointments: 216.444.2020
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Staff Appointment: 1997
Specialty Interests: Ocular diseases of children, genetic eye diseases, strabismus, retinoblastoma, congenital cataracts, childhood glaucoma, residency education
**Infectious Disease**

**Steven Gordon, MD**
Chairman, Infectious Disease  
Office Phone: 216.444.8975  
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Staff Appointment: 1994  
Specialty Interests: Epidemiology, infections, endocarditis, cardiac device infections

**Sherif Mossad, MD**
Section Head, Transplant Infectious Disease  
Office Phone: 216.445.2572  
Appointments: 216.444.8845  
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Staff Appointment: 1996  
Specialty Interests: Infectious complications and vaccinations in bone marrow and solid organ transplant recipients; upper respiratory tract infections, including influenza and rhinovirus

**Robin Avery, MD**
Infectious Disease; Professor of Medicine, Cleveland Clinic Lerner College of Medicine of Case Western Reserve University  
Office Phone: 216.444.8977  
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Email: averyr@ccf.org  
Staff Appointment: 1996  
Specialty Interests: Transplantation infectious disease, infection in the immunocompromised host

**Lara Danziger-Isakov, MD, MPH**
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Staff Appointment: 2003  
Specialty Interests: Infections in transplantation and the immunocompromised host, epidemiology, clinical trials, pediatric infectious diseases

**Lucileia Teixeira Johnson, MD**
Infectious Disease  
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Staff Appointment: 2006  
Specialty Interests: Bone and joint infection, general ID, Mycobacteria, solid organ and bone marrow transplant

**Steven Mawhorter, MD**
Infectious Disease  
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Staff Appointment: 1995  
Specialty Interests: Immunology, parasitic medicine, infections, travel/tropical medicine, diagnostic testing in infectious diseases

**Cyndee Miranda, MD**
Infectious Disease  
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Staff Appointment: 2008  
Specialty Interests: Infections in ICU and critical care patients; tuberculosis testing; nontuberculous mycobacterial infections

**Nabin Shrestha, MD**
Infectious Disease  
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Staff Appointment: 2004  
Specialty Interests: Molecular microbiology, mycobacterial infections, tropical infectious diseases

**Rabin Shrestha, MD**
Infectious Disease  
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Staff Appointment: 2007  
Specialty Interests: HIV & AIDS, transplantation infectious disease
INFECTIONOUS DISEASE continued

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Staff Appointment: 1998
Specialty Interests: HIV, surgical infections, transplant infections

David van Duin, MD, PhD
Infectious Disease
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Staff Appointment: 2007
Specialty Interests: general infectious disease

INTESTINAL

Cristiano Quintini, MD
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Staff Appointment: 2006
Specialty Interests: Living donor liver transplantation, liver transplant, liver surgery, intestinal transplant and surgery

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Office Phone: 216.445.6609
Appointments: 216.444.6536
Email: kirbyd@ccf.org
Staff Appointment: 2008
Specialty Interests: Gastroenterology and internal medicine, complex nutritional issues

Bijan Eghtesad, MD
Hepato-pancreateo-biliary and Transplant Surgery; General Surgery
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Staff Appointment: 2005
Specialty Interests: Liver transplantation, hepatitis B and C, liver transplantation in HIV-positive patients, living donor liver transplantation, immunosuppression, organ donation, recovery and preservation

John J. Fung, MD, PhD
Director, Transplant Center; Chairman, Hepato-pancreateo-biliary and Transplant Surgery; Chairman, General Surgery
Office Phone: 216.444.3776
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Staff Appointment: 2004
Specialty Interests: Liver transplantation; hepatobiliary and liver, kidney, pancreas and intestinal transplant surgery; immunology; liver cancer
Koji Hashimoto, MD, PhD  
Hepato-pancreato-biliary and Transplant Surgery  
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Staff Appointment: 2009  
Specialty Interests: Abdominal multi-organ transplant

Ezra Steiger, MD  
Head, Intestinal Rehabilitation Program;  
Co-Director, Nutrition Support Team;  
Hepato-pancreatic-biliary and Transplant Surgery  
Office Phone: 216.444.6667  
Appointments: 216.444.2090  
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Staff Appointment: 1975  
Specialty Interests: Parenteral nutrition, home parenteral nutrition, intestinal rehabilitation

Le-Chu Su, MD, PhD, CPNS  
Gastroenterology and Hepatology  
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Appointments: 216.444.6536  
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Staff Appointment: 2003  
Specialty Interests: Malabsorption, short bowel syndrome, celiac disease, inflammatory bowel disease, small bowel transplant

LIVER

Charles Miller, MD  
Program and Surgical Director, Liver Transplantation; Hepato-pancreato-biliary and Transplant Surgery; General Surgery  
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Email: millerc8@ccf.org  
Staff Appointment: 2004  
Specialty Interests: Liver transplantation, hepato-biliary surgery, living donor liver transplantation

Nizar N. Zein, MD  
Medical Director, Liver Transplantation;  
Chief, Section of Hepatobiliary Diseases;  
Gastroenterology and Hepatology; Associate Professor of Medicine, Cleveland Clinic  
Lerner College of Medicine of Case Western Reserve University  
Office Phone: 216.444.6126  
Appointments: 216.444.6536  
Email: zeinn@ccf.org  
Staff Appointment: 2002  
Specialty Interests: Liver diseases, liver transplantation, viral hepatitis

Vera Hupertz, MD  
Director, Pediatric Transplant Hepatology;  
Pediatric Gastroenterology  
Office Phone: 216.444.0964  
Appointments: 216.444.9000  
Email: hupertv@ccf.org  
Staff Appointment: 2000  
Specialty Interests: Pediatric liver disease and transplantation, inflammatory bowel disease, chronic pancreatitis

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Gastroenterology and Hepatology  
Office Phone: 216.839.3000  
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Staff Appointment: 2006  
Specialty Interests: Hepatitis C, hepatitis, liver conditions, liver transplantation
William Carey, MD  
**Gastroenterology and Hepatology; Director, Center for Continuing Education; Vice Chairman, Division of Education**  
Office Phone: 216.444.6885  
Appointments: 216.444.6536  
Email: careyw@ccf.org  
Staff Appointment: 1976  
Specialty Interests: liver transplantation, liver-biliary tract disease, endoscopy  

Jacek Cywinski, MD  
**Anesthesiology**  
Office Phone: 216.444.2305  
Email: cywinsj@ccf.org  
Staff Appointment: 2003  
Specialty Interests: Hepatic transplantation anesthesia, intraoperative TEE, vascular anesthesia, organ preservation, clinical research  

Srinivasan Dasarathy, MD  
**Gastroenterology and Hepatology**  
Office Phone: 216.444.2980  
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Email: dasaras@ccf.org  
Staff Appointment: 2006  
Specialty Interests: Liver transplantation, non-alcoholic fatty liver disease, skeletal muscular loss in liver disease  

Milan Dodig, MD  
**Gastroenterology and Hepatology**  
Office Phone: 216.444.3992  
Appointments: 216.444.2276  
Email: dodigm@ccf.org  
Staff Appointment: 2006  
Specialty Interests: Noninvasive GI imaging (wireless capsule endoscopy), liver fibrosis, cirrhosis  

Bijan Eghtesad, MD  
**Hepato-pancreato-biliary and Transplant Surgery; General Surgery**  
Office Phone: 216.444.9898  
Appointments: 216.444.6664  
Email: eghtesb@ccf.org  
Staff Appointment: 2005  
Specialty Interests: Liver transplantation, hepatitis B and C, liver transplantation in HIV-positive patients, living donor liver transplantation, immunosuppression, organ donation, recovery and preservation  

Federico Aucejo, MD  
**Hepato-pancreato-biliary and Transplant Surgery; General Surgery**  
Office Phone: 216.445.7159  
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Email: aucejof@ccf.org  
Staff Appointment: 2006  
Specialty Interests: Liver transplantation, living donor liver transplantation, HCC, general surgery, pediatric liver transplant, laparoscopic liver surgery  

David Barnes, MD  
**Vice Chairman, Gastroenterology and Hepatology**  
Office Phone: 216.444.1764  
Appointments: 216.444.6536  
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Staff Appointment: 1986  
Specialty Interests: Liver and biliary tract disease, liver transplantation, diagnostic/therapeutic endoscopy  

Ana Bennett, MD  
**Anatomic Pathology**  
Office Phone: 216.444.3796  
Appointments: 216.444.3796  
Email: benneta@ccf.org  
Staff Appointment: 2003  
Specialty Interests: Gastrointestinal pathology with emphasis on polyposis syndromes and idiopathic inflammatory bowel disease; liver and pancreas pathology including neoplastic, inflammatory conditions and transplantation pathology  

Mary Bronner, MD  
**Anatomic Pathology; Cancer Biology**  
Office Phone: 216.444.4833  
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Staff Appointment: 2003  
Specialty Interests: Gastrointestinal hepatic and pancreaticobiliary pathology, molecular diagnostics
Kyrsten Fairbanks, MD
Gastroenterology and Hepatology
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Staff Appointment: 2004
Specialty Interests: Liver disease, liver transplantation

Robert Helfand, MD
Head, Anesthesia for Orthopaedic and Rheumatologic Institute
Office Phone: 216.444.0185
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Staff Appointment: 1999
Specialty Interests: Regional anesthesia, blood conservation, anesthesia for liver transplantation

John J. Fung, MD, PhD
Director, Transplant Center; Chairman, Hepato-pancreato-biliary and Transplant Surgery; Chairman, General Surgery
Office Phone: 216.444.3776
Appointments: 216.444.6664
Email: fungj@ccf.org
Staff Appointment: 2004
Specialty Interests: Liver transplantation; hepatobiliary and liver; kidney; pancreas and intestinal transplant surgery; immunology; liver cancer

Samuel Irefin, MD
Anesthesiology
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Staff Appointment: 1997
Specialty Interests: Anesthesia for liver transplantation, critical care medicine, clinical research, orthopaedic anesthesia, resident education

Dymphna Kelly, MD
Hepato-pancreato-biliary and Transplant Surgery; General Surgery
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Staff Appointment: 2005
Specialty Interests: Liver transplantation, liver transplant research, resident education

Jia Lin, MD, PhD
Anesthesiology
Office Phone: 216.444.4613
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Staff Appointment: 2001
Specialty Interests: Anesthesia for complicated cardiovascular, neurologic and spine surgical procedures; anesthesia for transplant procedures; anesthesia for patients with difficult airways

Theodore Marks, MD, PhD
Head, Anesthesia for Heart and Vascular Institute
Office Phone: 216.444.6154
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Staff Appointment: 2000
Specialty Interests: Vascular anesthesia, anesthesia for liver transplantation
Kadakkal Radhakrishnan, MD

Pediatric Gastroenterology
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Staff Appointment: 2006

Specialty Interests: Chronic pancreatitis, cyclic vomiting, diagnostic and therapeutic endoscopy, Intestinal failure and small bowel rehabilitation in children, liver disorders in children and care of liver transplant patients, metabolic disorders - care of GI problems in metabolic disorders - care of liver related metabolic problems, pediatric liver disease, pediatric liver transplantation, pediatric liver diseases, small intestine short bowel rehab

Mangalakaraipudur Ramachandran, MD

Anesthesiology
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Staff Appointment: 2002

Specialty Interests: Cardiothoracic anesthesia, vascular anesthesia, obstetric anesthesia, regional anesthesia

Mark Sands, MD

Radiology
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Staff Appointment: 1998

Specialty Interests: Hepato-biliary disease and transplantation, vascular interventional radiology

Ralph Tuthill, MD

Anatomic Pathology
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Staff Appointment: 1981

Specialty Interests: Dermatopathology, hepatic pathology and cytopathology

Claudene Vlah, MD

Anesthesiology
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Staff Appointment: 2007

Specialty Interest: Liver transplantation
David Vogt, MD
General Surgery
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Email: vogtd@ccf.org
Staff Appointment: 1981
Specialty Interests: Liver, biliary and pancreatic surgery; liver transplantation

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Gastroenterology and Hepatology
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Email: fleminj1@ccf.org
Staff Appointment: 2002
Specialty Interests: Liver diseases, gastrointestinal and liver disorders in women

Charles Winans, MD
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Staff Appointment: 2002
Specialty Interests: Liver and pancreas transplantation, hepatobiliary surgery, general surgery

Lisa Yerian, MD
Anatomic Pathology
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Staff Appointment: 2004
Specialty Interests: Liver pathology, gastrointestinal pathology

Marie Budev, DO, MPH, FCCP
Program and Medical Director, Lung Transplant; Pulmonary, Allergy and Critical Care Medicine
Office Phone: 216.444.3194
Appointments: 216.444.6503
Email: budevm@ccf.org
Staff Appointment: 2004
Specialty Interests: Lung and heart lung transplantation, secondary pulmonary hypertension, cystic fibrosis, gender specific pulmonary issues

Kenneth McCurry, MD
Thoracic and Cardiovascular Surgery Program and Surgical Director, Lung and Heart-Lung Transplant Program
Office Phone: 216.445.9303
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Email: mccurrk@ccf.org
Staff Appointment: 2009
Specialty Interests: Thoracic and cardiovascular surgery, pathobiology

Jeffrey Chapman, MD
Pulmonary, Allergy and Critical Care Medicine
Office Phone: 216.444.4222
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Email: chapmaj@ccf.org
Staff Appointment: 2000
Specialty Interests: Interstitial lung disease, idiopathic pulmonary fibrosis, advanced lung disease

Lara Danziger-Isakov, MD, MPH
Pediatric Infectious Disease; Director for Pediatric Clinical Research, Cleveland Clinic Children’s Hospital; Assistant Professor of Pediatrics, Cleveland Clinic Lerner College of Medicine
Office Phone: 216.636.1077
Appointments: 216.444.5437
Email: danzigl@ccf.org
Staff Appointment: 2003
Specialty Interests: Infections in transplantation and the immunocompromised host, epidemiology, clinical trials, pediatric infectious diseases
Carol Farver, MD  
Anatomic Pathology; Pathobiology; Pulmonary, Allergy and Critical Care Medicine  
Office Phone: 216.445.7695  
Appointments: 216.445.7695  
Email: farverc@ccf.org  
Staff Appointment: 1995  
Specialty Interest: Pulmonary pathology

Thomas R. Gildea, MD  
Medical Director, Center for Major Airway Diseases; Pulmonary, Allergy and Critical Care Medicine; Transplant Center  
Office Phone: 216.444.6490  
Appointments: 216.444.6503  
Email: gildeat@ccf.org  
Staff Appointment: 2003  
Specialty Interests: Advanced diagnostic/therapeutic bronchoscopy, interventional pulmonary medicine, lung volume reduction, lung transplantation, alpha-1 antitrypsin deficiency

Steven Gordon, MD  
Chairman, Infectious Disease  
Office Phone: 216.444.8975  
Appointments: 216.444.8845  
Email: gordons@ccf.org  
Staff Appointment: 1994  
Specialty Interests: Epidemiology, infections, HIV/AIDS, interventional pulmonary medicine, lung volume reduction, lung transplantation, alpha-1 antitrypsin deficiency

Michael Machuzak, MD  
Pulmonary, Allergy and Critical Care Medicine  
Office Phone: 216.444.2718  
Appointments: 216.444.6503  
Email: machuzm@ccf.org  
Staff Appointment: 2006  
Specialty Interests: Bronchoscopy with advanced diagnostics, including endobronchial ultrasound, TBNA and electromagnetic navigation; therapeutics, including rigid bronchoscopy, laser and endobronchial surgery, and bronchial thermoplasty; COPD and lung cancer, including clinical trials; pleural disease; stent placement

David P. Mason, MD  
Cardiothoracic Surgery  
Office Phone: 216.444.4053  
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Email: masond2@ccf.org  
Staff Appointment: 2004  
Specialty Interests: General thoracic surgery, minimally invasive thoracoscopic and laparoscopic surgery, lung cancer, esophageal cancer, malignant mesothelioma, lung transplantation, immunosuppression

Omar A. Minai, MD  
Pulmonary, Allergy and Critical Care Medicine  
Office Phone: 216.445.2610  
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Email: minaio@ccf.org  
Staff Appointment: 1999  
Specialty Interests: Pulmonary hypertension, COPD, sleep apnea, lung volume reduction, lung transplantation

Sudish Murthy, MD, PhD  
Thoracic and Cardiovascular Surgery  
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Appointments: 216.445.6860  
Email: murthys1@ccf.org  
Staff Appointment: 1999  
Specialty Interests: Lung transplantation, esophageal, pulmonary, mediastinal, chest wall and diaphragm surgery; minimally invasive surgery; lung volume reduction surgery; general thoracic surgery

Thomas Olbrych, MD  
Pulmonary, Allergy and Critical Care Medicine  
Office Phone: 440.312.7140  
Appointments: 216.444.6503  
Email: olbryct@ccf.org  
Staff Appointment: 2006  
Specialty Interests: Adult cystic fibrosis, lung transplantation, COPD, asthma, general pulmonary medicine
Gösta Pettersson, MD, PhD
Vice Chairman, Thoracic and Cardiovascular Surgery
Office Phone: 216.444.2035
Appointments: 216.444.4466
Email: petterg@ccf.org
Staff Appointment: 1999

**Specialty Interests:** Adult and congenital acquired heart and aortic diseases including reoperations; surgical treatment of endocarditis; aortic valve repair, preservation (including remodeling and reimplantation) and replacement (including homograft and Ross procedure); adult congenital heart surgery; surgery of the thoracic aorta; lung and heart/lung transplantation

Nicholas Smedira, MD
Program and Surgical Director, Heart Transplant Program and Kaufman Center for Heart Failure; Thoracic and Cardiovascular Surgery; Polly and W. Neil Rossborough Chair in Cardiac Transplantation
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Appointments: 216.444.4466
Email: smedirn@ccf.org
Staff Appointment: 1995

**Specialty Interests:** Heart and heart/lung transplantation, ventricular assist devices, ECMO, heart failure surgery, aortic and mitral valve repair and replacement, off-pump coronary bypass grafting, myectomy, reoperations, ascending and descending thoracic aortic replacement

**PANCREAS AND KIDNEY/PANCREAS**

Venkatesh Krishnamurthi, MD
Program and Surgical Director, Pancreas Transplant; Urology
Office Phone: 216.444.0393
Appointments: 216.444.5600
Email: krishnv@ccf.org
Staff Appointment: 2000

**Specialty Interests:** Kidney and pancreas transplantation, urologic oncology

Emilio Poggio, MD
Medical Director, Pancreas Transplant; Director, Renal Function Laboratory; Nephrology and Hypertension
Office Phone: 216.444.5383
Appointments: 216.444.6771
Email: poggioe@ccf.org
Staff Appointment: 2003

**Specialty Interests:** Kidney and pancreas transplantation, chronic kidney disease in solid organ transplantation, chronic kidney disease, evaluation of renal function

Charles Winans, MD
Surgical Co-Director, Pancreas Transplant; Hepato-pancreato-biliary and Transplant Surgery; General Surgery
Office Phone: 216.445.0612
Appointments: 216.444.6664
Email: winansc@ccf.org
Staff Appointment: 2002

**Specialty Interests:** Liver and pancreas transplantation, hepatobiliary surgery, general surgery

Richard Fatica, MD
Vice Chairman, Nephrology and Hypertension Medical Director, Kidney Transplant; Nephrology and Hypertension
Office Phone: 216.445.9953
Appointments: 216.444.6771
Email: faticar@ccf.org
Staff Appointment: 2000

**Specialty Interests:** Chronic kidney disease, dialysis, kidney transplant, fellowship education
David A. Goldfarb, MD
Program and Surgical Director, Renal Transplant; Urology
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Appointments: 216.444.5600
Email: goldfad@ccf.org
Staff Appointment: 1992
Specialty Interests: Renal transplantation

Richard Fatica, MD
Medical Director, Renal Transplant; Nephrology and Hypertension
Office Phone: 216.445.9953
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Email: faticar@ccf.org
Staff Appointment: 2000
Specialty Interests: Chronic kidney disease, dialysis, kidney transplant, glomerulonephritis

William Baldwin, MD, PhD
Immunology
Office Phone: 216.445.2384
Email: baldwiw@ccf.org
Staff Appointment: 2008
Specialty Interests: Cardiac and renal allograft rejection, vascular inflammation

William Braun, MD
Nephrology and Hypertension
Office Phone: 216.444.6995
Appointments: 216.444.6771
Email: braunw@ccf.org
Staff Appointment: 1968
Specialty Interests: Renal transplantation, polycystic kidney disease, glomerulonephritis

Shih-Chieh Chueh, MD, PhD
Regional Urology (Charleston Area Medical Center)
Office Phone: 304.388.6370
Email: chuehs@ccf.org
Staff Appointment: 2009
Specialty Interests: Laparoscopic surgery (especially laparoscopic donor nephrectomy), immunosuppressive monitoring
Robert Fairchild, PhD
Urology; Immunology
Office Phone: 216.444.3146
Email: fairchr@ccf.org
Staff Appointment: 1990
Specialty Interests: Transplantation immunology, T-lymphocyte tolerance

Stuart M. Flechner, MD
Urology
Office Phone: 216.445.5772
Appointments: 216.444.5600
Email: flechns@ccf.org
Staff Appointment: 1993
Specialty Interests: Renal transplantation, vascular disease, oncology

Surafel Gebreselassie, MD
Nephrology and Hypertension
Office Phone: 216.636.9229
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Email: gebress@ccf.org
Staff Appointment: 2008
Specialty Interests: CKD, renal transplantation, glomerulonephritis

Priya Kalahasti, MD
Nephrology and Hypertension
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Email: kalahap@ccf.org
Staff Appointment: 2006
Specialty Interests: nephrology and hypertension

Jihad Kaouk, MD
Director, Center for Advanced Laparoscopic and Robotic Surgery; Urology
Office Phone: 216.444.2976
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Email: kaoukj@ccf.org
Staff Appointment: 2002
Specialty Interests: Laparoscopic surgery of the adrenal, kidney, bladder and prostate; cryosurgery and needle ablation of kidney tumor; robotic surgery

Venkatesh Krishnamurthi, MD
Program and Surgical Director, Pancreas Transplant; Urology
Office Phone: 216.444.0393
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Staff Appointment: 2000
Specialty Interests: Kidney and pancreas transplantation, urologic oncology

Charles Kwon, MD
Center for Pediatric Nephrology
Director, Cleveland Clinic Minority Organ Donation Initiative; Urology
Office Phone: 216.444.6123
Appointments: 216.444.3627
Email: kwonc@ccf.org
Staff Appointment: 2008
Specialty Interests: Congenital renal malformations, nephrotic syndrome, pediatric hypertension, dialysis and kidney transplantation

Charles Modlin, MD, FACS
Director, Minority Men’s Health Center;
Director, Cleveland Clinic Minority Organ Donation Initiative; Urology
Office Phone: 216.445.7550
Appointments: 216.444.5600
Email: modlinc@ccf.org
Staff Appointment: 1996
Specialty Interests: Renal transplantation, general urology, prostate, renal cancer, minority healthcare initiatives

Joseph Nally, MD
Nephrology and Hypertension
Office Phone: 216.444.8897
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Staff Appointment: 1987
Specialty Interests: Renal disease and transplantation, hypertension, renovascular disease

Saul Nurko, MD
Nephrology and Hypertension
Office Phone: 216.445.8628
Appointments: 216.444.6771
Email: nurkos@ccf.org
Staff Appointment: 1997
Specialty Interests: Chronic renal disease, anemia of chronic kidney disease, iron metabolism, hemodialysis, acute renal failure, glomerulonephritis, acute renal failure, renal transplantation
Emilio Poggio, MD
Medical Director, Pancreas Transplant; Director, Renal Function Laboratory; Nephrology and Hypertension
Office Phone: 216.444.5383
Appointments: 216.444.6771
Email: poggioe@ccf.org
Staff Appointment: 2003
Specialty Interests: Kidney and pancreas transplantation, transplant immunobiology, immune biomarkers, living donation

John Rabets, MD
Urology
Office Phone: 216.444.1120
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Email: rabetsj@ccf.org
Staff Appointment: 2007
Specialty Interests: Kidney transplantation, pancreas transplantation, general urology

Bashir Sankari, MD
Regional Urology (Charleston Area Medical Center)
Office Phone: 304.388.6370
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Staff Appointment: 1991
Specialty Interests: Renal transplantation, renal vascular surgery

Martin Schreiber Jr., MD
Chairman, Nephrology and Hypertension
Office Phone: 216.444.6365
Appointments: 216.444.6771
Email: schreim@ccf.org
Staff Appointment: 1982
Specialty Interests: Diabetic renal disease, home dialysis, cardiorenal syndrome, complications of dialysis, ICU nephrology, peritoneal dialysis, renovascular hypertension

Daniel Shoskes, MD
Urology
Office Phone: 216.445.4757
Appointments: 216.444.5600
Email: shosked@ccf.org
Staff Appointment: 2000
Specialty Interests: Kidney transplantation, chronic prostatitis, interstitial cystitis, chronic pelvic pain syndrome

Titte Srinivas, MD
Nephrology and Hypertension
Office Phone: 216.445.0034
Appointments: 216.444.6771
Email: srinivt@ccf.org
Staff Appointment: 2008
Specialty Interests: Kidney and pancreas transplantation, medical evaluation and long-term follow-up of living kidney donor, renal issues after non-renal organ transplants

Brian Stephany, MD
Nephrology and Hypertension
Office Phone: 216.444.5382
Appointments: 216.444.6771
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Staff Appointment: 2004
Specialty Interests: Renal transplantation, chronic kidney disease after non-renal solid organ transplantation

Alvin Wee, MD
Regional Urology (Indianapolis)
Office Phone: 317.338.6556
Email: weea@ccf.org
Staff Appointment: 2008
Specialty Interests: Renal transplantation, renal vascular surgery

clevelandclinic.org/staff
Tissue

Michael Joyce, MD
Medical Director, Musculoskeletal Tissue Bank, Orthopaedic Surgery
Office Phone: 216.444.4282
Appointments: 216.444.2606
Email: joycem@ccf.org
Staff Appointment: 1993
Specialty Interests: Trauma, oncology, total joint replacement, musculoskeletal tissue banking

Steven Lietman, MD
Orthopaedic Surgery; Director, Musculoskeletal Tumor Center
Office Phone: 216.445.2742
Appointments: 216.444.2606
Email: lietmas@ccf.org
Staff Appointment: 2004
Specialty Interests: Bone and soft tissue tumors, total joint replacement (hip and knee)

George Muschler, MD
Vice Chairman, Orthopaedic and Rheumatologic Institute; Director, Clinical Tissue Engineering Center; Director, Orthopaedic and Rheumatologic Research Center; Vice Chairman, Department of Biomedical Engineering
Office Phone: 216.444.5338
Appointments: 216.444.2606
Email: muschlg@ccf.org
Staff Appointment: 1988
Specialty Interests: Joint replacement of the hip and knee, treatment of fracture non-union, arthritis surgery

Kenneth Marks, MD
Orthopaedic Surgery
Office Phone: 216.692.8230
Appointments: 216.444.2606
Specialty Interests: Hip and knee replacement

Maria Siemionow, MD, PhD
Plastic Surgery; Orthopaedic Surgery; Immunology
Office Phone: 216.445.2405
Appointments: 216.444.6900
Email: siemiom@ccf.org
Staff Appointment: 1995
Specialty Interests: Microsurgery, hand surgery, peripheral nerve surgery, microcirculation research, face and hand transplantation
Support

Bioethics

Eric Kodish, MD
Chairman, Bioethics Department
Office Phone: 216.444.3850
Email: kodishe@ccf.org
Staff Appointment: 2004
Specialty Interests: Pediatric ethics, research ethics, childhood cancer

Paul Ford, PhD
Bioethics Department
Office Phone: 216.444.8723
Email: fordp@ccf.org
Staff Appointment: 2001
Specialty Interests: Bioethics, clinical ethics consultation, neurosurgical ethics

Carmen Paradis, MD
Bioethics Department
Office Phone: 216.445.2767
Email: paradic@ccf.org
Staff Appointment: 2006
Specialty Interests: Research ethics, informed consent, ethics education

Martin Smith, STD
Director, Clinical Ethics, Bioethics Department
Office Phone: 216.445.2769
Email: smithm2p@ccf.org
Staff Appointment: 1987
Specialty Interests: Ethics consultation, end-of-life issues, institutional ethics committees, medical mistakes, informed consent

Anthony Thomas, MD
Bioethics Department
Office Phone: 216.445.7850
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Staff Appointment: 1982
Specialty Interests: Reproductive and pediatric ethics

Kathryn Weise, MD, MA
Bioethics Department
Office Phone: 216.445.1404
Email: weisek@ccf.org
Staff Appointment: 1997
Specialty Interests: Pediatric critical care; pediatric palliative medicine; biomedical ethics

Biomedical Engineering

Paul Murray, PhD
Biomedical Engineering; Center for Anesthesiology Research
Office Phone: 216.444.0543
Email: murrayp@ccf.org
Staff Appointment: 1994
Specialty Interests: Pulmonary vasoregulation, anesthesia, lung transplantation, signal transduction

Endocrinology

Angelo A. Licata, MD, PhD
Endocrinology
Office Phone: 216.444.6248
Appointments: 216.444.6568
Email: licataa@ccf.org
Staff Appointment: 1982–2002;
Consultant: 2002 – present
Specialty Interests: Calcium disorders, metabolic bone and skeletal problems, osteoporosis

Immunology

Thomas Hamilton, PhD
Chairman, Immunology
Office Phone: 216.444.6246
Email: hamiltt@ccf.org
Staff Appointment: 1987
Specialty Interests: Macrophage activation, inflammation, inflammatory gene expression
Psychiatry and Psychology

Kathy Coffman, MD, FAPM

Psychiatry and Psychology
Office Phone: 216.444.8832
Appointments: 216.636.5860
Email: coffmak@ccf.org
Staff Appointment: 2007
Specialty Interests: Alcohol and drug abuse in liver transplant patients, delirium, immunomodulatory effects of psychotropic drugs, CNS effects of scleroderma and celiac disease

Quantitative Health Services

Jesse Schold, PhD

Quantitative Health Services
Office Phone: 216.444.6254
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Email: scholdj@ccf.org
Staff Appointment: 2009
Specialty Interests: Outcomes research and medical informatics
THANKS TO OUR DONATION AND PROCUREMENT AGENCIES

The 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 more than 700 corneas were provided for sight-restoring corneal transplants.

For more information, please call 216.844.EYES.

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 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 216.229.2690.

The 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.
CLEVELAND CLINIC

Cleveland Clinic encompasses 2,000 physicians and scientists in 120 specialties and subspecialties. All of these specialties — along with pediatrics at the Cleveland Clinic Pediatric Institute & Children’s Hospital — are present in one facility, making multidisciplinary consultation, diagnosis and treatment readily available.

In 2010, Cleveland Clinic was ranked one of America’s top four hospitals, according to *U.S. News & World Report*’s annual “Best Hospitals Survey.” Cleveland Clinic has been listed among the nation’s top five hospitals every year since 1999. Cleveland Clinic also celebrated 16 years of being ranked as the nation’s No. 1 cardiac care center. In addition, the survey ranks 14 Cleveland Clinic specialty care areas among the nation's top 10, with three of those areas ranked among the top 2 in the United States.
**Referrals**

**General Patient Referral**
24/7 hospital transfers or physician consults  
800.553.5056  
On the Web at clevelandclinic.org

**Transplant Center**
216.444.2394 or 800.223.2273, ext. 42394  
On the Web at clevelandclinic.org/transplant

**Services for Physicians**

**Physician Directory**
View all Cleveland Clinic staff online at clevelandclinic.org/staff.

**Referring Physician Center**
For help with service-related issues, information about our clinical specialists and services, details about CME opportunities and more, contact us at refdr@ccf.org, or 216.448.0900 or toll-free 888.637.0568.

**Critical Care Transport Worldwide**
Cleveland Clinic's critical care transport team and fleet of mobile ICU vehicles, helicopters and fixed-wing aircraft serve critically ill and highly complex patients across the globe. To arrange a transfer for STEMI (ST elevated myocardial infarction), acute stroke, ICH (intracerebral hemorrhage), SAH (subarachnoid hemorrhage) or aortic syndromes, call 877.379.CODE (2633). For all other critical care transfers, call 216.444.8302 or 800.553.5056.

**Request for Medical Records**
216.444.2640 or 800.223.2273 ext. 42640

**MyConsult:**
Online Medical Second Opinion  
MyConsult securely connects patients to top physician specialists for more than 1,000 life-threatening or life-changing diagnoses at the click of a mouse. clevelandclinic.org/myconsult or 800.223.2273, ext. 43223

**Outcomes Data**
View the latest clinical Outcomes book from many Cleveland Clinic institutes at clevelandclinic.org/quality/outcomes.

**CME Opportunities: Live and Online**
Cleveland Clinic’s Center for Continuing Education’s website, ccfcm.com, offers convenient, complimentary learning opportunities, from a virtual textbook of medicine (Disease Management Project) and a medical newsfeed refreshed daily, to myCME, a system for physicians to manage their CME portfolios. Many live CME courses are hosted in Cleveland, an economical option for business travel.

**Services for Patients**

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

**Global Patient Services**
Complimentary assistance for national and international patients and families  
001.216.444.8184 or visit clevelandclinic.org/gps

**DrConnect:**
Improved Communication, Improved Care  
DrConnect offers secure, online access to your patient’s treatment progress while at Cleveland Clinic. To establish a DrConnect account, visit clevelandclinic.org/drconnect or email drconnect@ccf.org.