ON THE COVER: Maria Siemionow, MD, PhD, leads a team of surgeons through the first near-total face transplant in the United States. The historical transplant was performed at Cleveland Clinic in December 2008.

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.
Foundation of Excellence Leads to Advancements in Transplantation

From 1963, when physicians here performed the first kidney transplant in Ohio, to 2008, when our staff completed the nation’s first near-total face transplant, Cleveland Clinic has been recognized as a pioneer in the field of transplantation. In 2008, we completed more than 800* 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.

A Year of Firsts

• Near-Total Face Transplantation

Toward the close of 2008, we performed the first near-total face transplant in U.S. history. During a 22-hour procedure, surgeons transplanted 80 percent of the face of a woman who had suffered severe facial trauma. Surgeons essentially replaced her entire face, except for her upper eyelids, forehead, lower lip and chin. This was the largest and most complex face transplant in the world, integrating different functional components such as nose and lower eyelids, as well as different tissue types including skin, muscles, bony structures, arteries, veins and nerves.

The transplant team was led by Maria Siemionow, MD, PhD, Head of Plastic Surgery Research, who received worldwide attention in November 2004 when Cleveland Clinic’s Institutional Review Board announced that face transplantation is both ethical and possible by approving the first protocol for the surgery. Dr. Siemionow, a highly regarded scientist, has dedicated her professional life to researching and developing the methods doctors could use to substantially help patients with severe facial disfigurement.

The Cleveland Clinic Dermatology & Plastic Surgery Institute led the face transplant surgery, partnering with the Cleveland Clinic Head & Neck Institute with support from the Transplant Center. Staff members from psychology/psychiatry, bioethics, social work, anesthesia, transplant, nursing, infectious disease, dentistry, ophthalmology, pharmacy, environmental services and security also were significantly involved.

• Intestinal Transplantation

In 2008, we also completed our first intestinal transplant (first adult in Ohio). Drawing on the expertise of our liver transplant specialists, colorectal and general surgeons, infectious disease and intestinal rehabilitation and nutrition specialists and gastroenterologists, we are actively growing the program and, along with our patients, celebrating the renewed health an intestinal transplant can bring. Cleveland Clinic is one of the only centers in the region performing adult small bowel transplantation.

In 2007 we initiated an auto-islet transplantation program for a sub-group of chronic pancreatitis patients.

• Kidney Transplantation

Cleveland Clinic surgeons pioneered a single-port procedure to remove donor kidneys through a single incision in the umbilicus.

We also expanded our kidney transplant program in 2008. Staff members in the Glickman Urological & Kidney Institute collaborated with physicians and leadership at St. Vincent Medical Center in Indianapolis to open a new kidney transplant program there.

Improving Data Quality

Throughout 2008, the Transplant Center focused on enhancing the quality of data via our Electronic Data Interface for Transplantation (EDIT). We formed an abstraction team to streamline the data collection process and make regulatory form submission a more deliberate and thoughtful process. EDIT, which was implemented in 2006, is utilized by all solid organ programs and centrally coordinates and tracks patients throughout the transplantation process from referral to post-transplant follow-up and contains more than 21,700 patient records and nearly 7,500 donor records. EDIT provides ample research data and communicates with the United Network for Organ Sharing (UNOS) to meet form submission requirements at each phase in the transplant process.

Key enhancements in 2008 included a daily data feed to import patient vital signs from our electronic medical record, as well as downloads of detailed donor information and HLA tissue-typing data to further increase the data available for research and post-transplant follow-up.

* Does not include all tissue transplants.
Advancing Research

We provide the highest quality care for patients facing transplantation and their families. We use a surgical-medical team approach, which enhances our efforts to develop more effective treatments.

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 treats them accordingly. The GMI, launched three years ago, is composed of 90 physicians and researchers who work in the Lerner Research building on Cleveland Clinic’s main campus.

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 (ASHI) 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 and Medicaid Services for heart, heart/lung, kidney, kidney/pancreas, liver, lung and pancreas transplantation.

Transplantation Outcomes

We are pleased to present Transplantation 2008, a summary of outcomes and key data about Cleveland Clinic Transplant Center programs. The following data summarize our activities for the year.

Number of solid organ transplants in 2008

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Transplants</th>
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<tbody>
<tr>
<td>Heart</td>
<td>60</td>
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<tr>
<td>Intestine</td>
<td>4</td>
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<tr>
<td>Kidney</td>
<td>168 *</td>
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<tr>
<td>Liver</td>
<td>147 **</td>
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<tr>
<td>Lung</td>
<td>57</td>
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<tr>
<td>Pancreas</td>
<td>31 ***</td>
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* (includes 16 kidney/pancreas and 8 kidney/liver)
** (includes 8 liver/kidney and 1 liver/pancreas)
*** (includes 16 pancreas/kidney and 1 pancreas/liver)

Number of patients on waiting lists†

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<th>Number of Patients Waiting</th>
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<td>Liver</td>
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<td>Lung</td>
<td>61 ****</td>
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<tr>
<td>Pancreas</td>
<td>66 *****</td>
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</tbody>
</table>

† As of December 31, 2008

* (includes 5 heart/kidney and 4 heart/liver)
** (includes 33 kidney/pancreas, 1 kidney/liver and 5 kidney/heart)
*** (includes 3 liver/intestine/pancreas, 1 liver/kidney, 4 live/heart and 2 liver/lung)
**** (includes 2 lung/liver)
***** (includes 3 pancreas/intestine/liver and 33 pancreas/kidney)
State of Residence of Transplant Patients 2008

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<th>Liver</th>
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Number of evaluations in 2008

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Patients</th>
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</thead>
<tbody>
<tr>
<td>Bone marrow</td>
<td>333</td>
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<tr>
<td>Heart</td>
<td>204</td>
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<tr>
<td>Intestine</td>
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<tr>
<td>Kidney</td>
<td>426</td>
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<td>Liver</td>
<td>461</td>
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<tr>
<td>Lung</td>
<td>301</td>
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<td>Pancreas</td>
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</tbody>
</table>

Number of post-transplant patients followed during 2008

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td>772*</td>
</tr>
<tr>
<td>Intestine</td>
<td>4</td>
</tr>
<tr>
<td>Kidney</td>
<td>1493**</td>
</tr>
<tr>
<td>Liver</td>
<td>902***</td>
</tr>
<tr>
<td>Lung</td>
<td>366****</td>
</tr>
<tr>
<td>Pancreas</td>
<td>184*****</td>
</tr>
</tbody>
</table>

* (includes 9 heart/lung, 3 heart/kidney and 1 heart/liver)
** (includes 3 kidney/heart and 30 kidney/liver)
*** (includes 30 liver/kidney, 1 liver/heart, 1 liver/lung and 4 liver/pancreas)
**** (includes 9 lung/heart and 1 lung/liver)
***** (includes 101 pancreas/kidney and 4 pancreas/liver)
Transplantation Facilities

Pre-Transplant Heart Failure Intensive Care Unit, 10 beds
Surgical Intensive Care Unit, 30 beds
Heart/Lung Post-Transplant Intensive Care, 14 beds
Cardiothoracic Intensive Care Unit, 76 beds
Transplant Special Care, 34 beds
Heart/Lung Transplant Unit, 24 beds
Pediatric Intensive Care Unit, 15 beds
Pediatric Stepdown Unit, 18 beds
Bone Marrow Transplant Unit, 17 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 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
- 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 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 and click on “Program and OPO Data,” then “Transplant Program and OPO Specific Reports.”
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.

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.

* Note: This process applies to solid organ transplantation only and may vary as necessary according to the patient’s condition and transplant type.
2008 Highlights

In 2008, technologists at Cleveland Clinic’s Allogen Laboratories performed more than 91,000 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 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.)

A testing protocol was developed and implemented for the new Cleveland Clinic Intestine Transplant Program.

Allogen Laboratories successfully passed the following inspections:
- ASHI focus inspection for new lab director
- LifeBanc annual audit
- Ohio CMS safety inspection
- ASHI interim self-inspection of the Cleveland lab
- ASHI interim self-inspection of the Charleston, W.Va., lab

Research and Innovations

Our current IRB-approved studies include:

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

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

MICA typing and antibody screening in lung transplants.

Principal Investigator – Dr. Medhat Z. Askar

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

MICA typing for reduced intensity conditioning allogeneic bone marrow transplants.

In addition, Allogen Laboratories' samples/data are a component of the following studies:

Principal Investigator – Dr. Robin Avery

Co-investigator – Dr. Medhat Z. Askar

The impact of killer immunoglobulin-like receptors (KIR) genotype profile and KIR/hLA combinations on primary CMV infections in the CMV D transplant recipient.

Principal Investigator – Dr. Peter Cohen

A collection protocol of healthy donor volunteers to provide blood components via monocyteapheresis for in vitro research use.

Principal Investigator – Dr. Jaroslaw Maciejewski

Collection of blood and bone marrow from patients with hematologic disorders and from normal volunteers and patients for research purposes.

Principal Investigator – Dr. Jaroslaw Maciejewski

Bone Marrow Failure Research Center.

Principal Investigator – Dr. John Fung

UTD-histocompatibility testing results.

Principal Investigator – Dr. Emilio Poggio

Relevance of B cell crossmatch and transplant markers in renal transplantation.

Principal Investigator – Dr. Titte Srinivas

IRB under evaluation: Evaluation of pre-sensitization by pregnancy and kidney transplants.

Principal Investigator – Dr. Stuart Flechner

Analysis of 10 years of UNOS mandatory share kidney transplants.

Principal Investigator – Dr. David Goldfarb (Michael Knight)

Effect of transplant nephrectomy on PRA.

Ongoing internal research and development in 2008 included:

• Predicting negative crossmatch in solid organ transplants; October 2008 ASHI Workshop participant.
• Correlation of the strength of bead antibody with clinical outcome in solid organ transplants.
• Further analysis and product testing for pre- and posttransplant donor-specific HLA antibody testing.
• Short tandem repeat (STR) testing to determine the percentage of donor chimerism to support the diagnosis of graft-vs.-host disease (GvHD) after liver or other solid organ transplants.
• HLA Epitope antibody analysis in nephrectomized renal transplant patients. September 2008, Project under the 15th International Workshop for Histocompatibility and Immunogenetics.
• MIC-A typing and antibody kits; beta testing and evaluating for clinical utility, as well as optimizing the assay and increasing its robustness for testing clinical samples.
• Outcome of hematopoietic stem cell transplant (HSCT) donor searches from the U.S. National Marrow Donor Program (NMDP) Registry: Cleveland Clinic 10-year experience and comparison to searches from other U.S. and European centers.
• Validation of buccal swab sampling and DNA typing.
• HLA antibody pre- and post-nephrectomy in renal transplant patients.
• Backup repository for B cell line developed in the lab of Emilio Poggio, MD.
• Kidney/liver transplant survival study with David Goldfarb, MD, and Ho Yee Tiong, MD.
• Pancreas post-transplant monitoring using HLA antigen-coated beads and/or flow cytometry crossmatch testing.
• Comparison and evaluation of donor specific antibody identified by flow bead and Luminex bead assays in relation to pre-transplant flow crossmatch results in solid organ transplants.
• Evaluation of flow crossmatch cut-offs and interpretation.

ClevelandClinic.org/TRANSPLANT

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ClevelandClinic.org/TRANSPLANT
• Evaluation of RosetteSep cell isolation technology.
• Several product/instrument evaluations were conducted, including the SystemLink’s HistoTrac, AbSorber AB XM-ONE assay, E-Gene CE system, RoboSep, Maxwell DNA extractor, Texas BioGene Morgan MLB SSP kit, Abbott Molecular AlleleSEQR/HARPS, GTI-EZE type SSP system, Tepnel Lifematch RSSOP and LabType high-resolution DR-RSSOP kit.
• A possible new HLA allele was submitted to GenBank (HLA-B*0702 variant Gene Bank ACCESSION #FJ790820 and FJ790821) and was officially named HLA-B*0770.
• Two new MICA alleles were submitted to GenBank (Gene Bank ACCESSION #FJ790820 and FJ790821) and were officially named MICA*058 and MICA*00203.

Education
In 2008, staff and technologists routinely organized lectures, discussions and presentations to Allogen Laboratories’ visitors, including residents, transplant coordinators, students, patients and new LifeBanc employees.

Two medical students have assisted with clinical projects (Lauren Moore and Michael Knight). Several employees attended and/or presented at national and international workshops, conferences, specialty courses and neighboring transplant centers.

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 technologies to support transplant centers nationwide. Four of our employees were requested to perform 7 ASHI lab inspections of other histocompatibility labs. Commercial vendors also rely on Allogen Laboratories’ expertise.

Publications

Askar M, Gupta S, Zhang A, Danziger-Iaikov L, Qian X, Thomas D, Klingman L, Murthy S, Mason D, Yun J, Mehta A, Pidwell D, Budev M. Pretransplant MICA antibodies in lung transplantation: the presence of MICA antibodies is not associated with increased acute rejections or bronchiolitis obliterans syndrome. (Accepted for poster presentation in ATC 2009)
Srinivas T, Peggio E, Flechner S, Fatica R, Goldfarb D, Shockey D, Askar M. Donor and recipient gender interactions significantly impact kidney transplant outcome. (Accepted for oral presentation in ATC 2009)
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.

Expertise

Under the chairmanship of Steven Gordon, MD, Cleveland Clinic’s Department of Infectious Disease (Adult) consists of 19 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 is comprised of nine 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 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.

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.

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**

Dr. Robin K. Avery received the 2008 American Society of Transplantation Astellas Established Investigator Award.

Dr. Lara Danziger-Isakov received an AST/Roche Clinical Science Faculty Development Grant.

**Research**

**Principal Investigator - Dr. Robin Avery**


**Principal Investigator – Dr. Robin Avery**

Organ transplant infection prevention and detection project 1.0. Cohort study of transplant recipients at “ultra-high” risk for invasive fungal infections. Centers for Disease Control and Prevention/GCRC.

**Principal Investigator – Dr. Robin Avery**

The impact of killer immunoglobulin-like receptors (KIR) genotype profile and KIR/HLA combinations on primary CMV infection in the CMV D+/R-transplant recipient.

**Principal Investigator - Dr. Robin Avery**

A randomized, double-blind study to assess the efficacy and safety of prophylactic use of maribavir versus oral ganciclovir for the prevention of cytomegalovirus disease in recipients of orthotopic liver transplants (ViroPharma, Incorporated).

**Principal Investigator – Dr. Robin Avery (preliminary study)**

Viral triggers of bronchiolitis obliterans syndrome in lung transplantation: Molecular detection of human herpes virus 6 and 7 in archived lung biopsy specimens from lung transplant recipients.

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

Viral triggers of alloimmunity and autoimmunity in pediatric lung transplantation: The major goals of this project are to evaluate the natural history of respiratory viral infections and to evaluate the impact of respiratory viral infections on the development of alloimmunity and autoimmunity after pediatric lung transplantation.

**Principal Investigator – Dr. Sherif Mossad**

Case 6Z05. Incidence of rhinovirus infection in autologous and allogeneic myeloablative bone marrow transplantation in adults.

**Principal Investigator – Dr. Sherif Mossad**


**Principal Investigator – Dr. David van Duin**

Infectious disease risk assessment in liver transplant candidates.
Publications
Danziger-Isakov L, Mark Baillie G. Hematologic complications of anti-CMV therapy. Clin Transplant 2008;Dec 16(Epub ahead of print)
Mossad SB. Larger dose of intradermal influenza vaccination may be more immunogenic in transplant recipients (letter). Am J Transplant 2008 May; 8(5):1073.
DOUGLAS SPURRIER | BONE MARROW TRANSPLANT RECIPIENT

“I enjoy the days a little more. It’s special to be alive.” — Douglas Spurrier, 55, Hinckley, Ohio.
Douglas underwent a bone marrow transplant in May 2008. The marrow was donated by his sister as a treatment for the acute myelogenous leukemia that had Douglas fighting for his life. Douglas, retired from a supervisory position at a large corporation and the father of two grown sons, has been cancer-free since the transplant. He said the doctors kept him alive and his wife, Susan, kept him going. “The mental aspect of the illness was tougher than the treatment,” he says.

BONE MARROW TRANSPLANTATION

2008 Highlights

The Bone Marrow Transplant Program team performed 152 bone marrow/stem cell/umbilical cord blood transplants in 2008. We performed 32 autologous transplants for multiple myeloma, which is the most in our program’s history.

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

Our 100-day survival rate for autologous transplantation was 92%. Our 100-day survival rate for related allogeneic transplantation and all non-myeloablative allogeneic transplantation was 86%.

Research and Innovations

We continue to have a program that is driven by clinical and translational investigation. We recently completed a multi-institutional study of a novel way to stimulate peripheral stem cells for transplantation. We were the second-leading accruing institution in the study. In December 2008, this molecule was FDA approved. This should be a significant clinical advance and give many patients the opportunity to mobilize stem cells for transplantation who might otherwise have been unable to do so.

We are poised to embark on a novel protocol using lenalidomide and rituxan following autologous stem cell transplant in an attempt to improve patient outcomes. This protocol will be part of the Leukemia and Lymphoma Society’s partnership with Cleveland Clinic. 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 bone marrow transplant cell processing laboratory has moved to the Glickman Tower along with the rest of the blood bank. We now have a state-of-the-art BMT cell processing laboratory that is unmatched.
Expertise

In 2008, Stephen Smith, MD, joined our BMT physician staff. Dr. Smith joins Drs. Bolwell, Andresen, Copelan, Dean, Kalaycio, Pohlman, Sobecks and Sweetenham in a program with significant depth, expertise and experience.

While we are very pleased with our wonderful year in 2008, we realize that much more work needs to be done before we achieve our goal of successfully combating the diseases that we treat, including leukemia, lymphoma, multiple myeloma and others. We look forward to 2009 as an opportunity to continue our excellence in patient care and to further enhance our research endeavors.

Number of transplants 2008

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autologous</td>
<td>89</td>
<td>58.6</td>
</tr>
<tr>
<td>Allogeneic</td>
<td>47</td>
<td>30.9</td>
</tr>
<tr>
<td>Non-myeloablative Allogeneic</td>
<td>16</td>
<td>10.5</td>
</tr>
<tr>
<td>Total</td>
<td>152*</td>
<td></td>
</tr>
</tbody>
</table>

* Excluding 9 Tandems

Length of stay from admission to discharge for patients transplanted in 2008*

<table>
<thead>
<tr>
<th>Type</th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>25.0</td>
<td>21.0</td>
<td>135</td>
</tr>
<tr>
<td>Autologous</td>
<td>19.0</td>
<td>20.0</td>
<td>88</td>
</tr>
<tr>
<td>Allogeneic (related donor)</td>
<td>30.0</td>
<td>27.0</td>
<td>21</td>
</tr>
<tr>
<td>Allogeneic (unrelated donor)</td>
<td>37.0</td>
<td>35.0</td>
<td>26</td>
</tr>
</tbody>
</table>

* Excluding non-myeloablative allogeneic transplants. One patient not discharged yet.

Survival analysis: 100-day patient survival for primary transplants 2006-2007

<table>
<thead>
<tr>
<th>Type</th>
<th>100-Day Survival (%)</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autologous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>99.1</td>
<td>108</td>
</tr>
<tr>
<td>Myeloma</td>
<td>98.0</td>
<td>50</td>
</tr>
<tr>
<td>Hodgkin’s disease</td>
<td>97.5</td>
<td>40</td>
</tr>
<tr>
<td>Allogeneic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good risk</td>
<td>87.5</td>
<td>8</td>
</tr>
<tr>
<td>Bad risk</td>
<td>78.7</td>
<td>75</td>
</tr>
<tr>
<td>Non-myeloablative allogeneic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good risk</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>Bad risk</td>
<td>77.8</td>
<td>27</td>
</tr>
</tbody>
</table>

Primary diagnoses for bone marrow patients transplanted in 2008

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>40</td>
<td>26.3</td>
</tr>
<tr>
<td>Myeloma</td>
<td>32</td>
<td>21.1</td>
</tr>
<tr>
<td>AML</td>
<td>23</td>
<td>15.1</td>
</tr>
<tr>
<td>Hodgkin’s disease</td>
<td>17</td>
<td>11.2</td>
</tr>
<tr>
<td>Myelodysplastic syndrome</td>
<td>12</td>
<td>7.9</td>
</tr>
<tr>
<td>ALL</td>
<td>8</td>
<td>5.3</td>
</tr>
<tr>
<td>Aplastic Anemia</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>CLL</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>CML</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Neuroblastoma</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Others</td>
<td>10</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>152</td>
<td></td>
</tr>
</tbody>
</table>
Research

Principal Investigator – Dr. Brian Bolwell
IRB 8316: A randomized, double-blind, placebo-controlled trial to evaluate palifermin (rHuKGF) in the reduction of acute graft versus host disease in subjects with hematologic malignancies undergoing allogeneic marrow/PBPC transplantation.

Principal Investigator – Dr. Brian Bolwell
AMD 1406: Long-term observational follow-up study of a multicenter, randomized, double-blind, placebo-controlled comparative trial of AMD3100 (240 µg/kg) plus G-CSF (10 µg/kg) versus G-CSF (10 µg/kg) plus placebo to mobilize and collect > 5 x 10^6 CD34+ cells/kg in non-Hodgkin's lymphoma patients for autologous transplantation.

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

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

Publications


GRADY SCHLABACH | HEART TRANSPLANT RECIPIENT

“Grady is such a little blessing. We can’t imagine our lives without him!” — Emma and Kenneth Schlabach, parents of Grady Schlabach, Sugarcreek, Ohio. Before he was born in September 2007, doctors discovered that Grady, now almost 2, had a life-threatening heart defect. Early interventions proved to only temporarily help Grady and he was placed on a ventilator and IVs. He was moved to Cleveland Clinic in October 2007 and evaluated for transplant. The following month, Grady received a heart transplant and a new start on his young life.

CARDIAC TRANSPLANTATION

2008 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 2008. A total of 233 patients were formally considered for transplantation; 65 candidates were listed and 60 transplants were performed.

The program also continued to achieve excellent outcomes. The July 2009 report of the Scientific Registry of Transplant Recipients (SRTR) demonstrates that for patients receiving their first transplant between January 1, 2005, and January 30, 2007, 91% of adult recipients were alive one year after transplant, compared with the expected 87% (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 January 1, 2003, and January 30, 2005, the three-year survival rate for our program was 84% compared with the 81% that was expected nationally. These excellent results are testimony to the outstanding multidisciplinary care of our transplant program.

In 2008, 48 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 allows us to utilize the optimal device in each individual patient.

Research and Innovations

The Organ Care System is an eagerly awaited innovation in the field of cardiac transplantation. This new technology maintains organs in a warm, functioning state outside of the body to optimize their health and allow continuous clinical evaluation. Through the use of proprietary technology, the Organ Care System:

• increases the amount of time that an organ can be maintained outside the body in a condition suitable for transplantation by reducing time-dependent ischemic injury.
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, 2008, 1,409 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.

Education

We continue to offer an advanced fellowship in heart failure and cardiac transplant medicine.

Expertise

Adult Cardiac Transplant: Cleveland Clinic’s cardiac transplant program is a recognized leader in the field. We remain the highest-volume center in both Ohio and the Midwest and are 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: Cleveland Clinic offers more types of pediatric transplantation than any other center in the region. 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 five-year survival rate greater than 90 percent for infants who receive heart transplants.

Number of transplants 2004-2008

<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>2004</td>
<td>58</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<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>1</td>
<td></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>Total</td>
<td>332 (includes retransplants)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of transplants 1984-2008

<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>1984-2008</td>
<td>1,388</td>
<td>17</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1,409</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Days on waiting list and post-transplant length of stay (LOS) for patients transplanted in 2008*

<table>
<thead>
<tr>
<th>Duration</th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>80.7</td>
<td>40.0</td>
<td>60</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>19.9</td>
<td>15.5</td>
<td>58*</td>
</tr>
</tbody>
</table>

* Two patients not discharged as of February 17, 2009

UNOS status of patients transplanted in 2008

<table>
<thead>
<tr>
<th>Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>31</td>
<td>51.7</td>
</tr>
<tr>
<td>1B</td>
<td>21</td>
<td>35.0</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Children’s Hospital

First Pediatric Heart Transplant: March 30, 1985

8 pediatric heart transplants were performed in 2008.
Survival analysis: patient survival for 310 primary heart-only transplants 2004-2008

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>94.1</td>
</tr>
<tr>
<td>1 year</td>
<td>92.6</td>
</tr>
<tr>
<td>2 years</td>
<td>86.5</td>
</tr>
</tbody>
</table>

Heart transplant mortality 2008

| Hospital deaths (within 30 days post-transplant) | 0 |

Primary diagnoses for patients transplanted in 2008

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dilated cardiomyopathy</td>
<td>25</td>
<td>41.7</td>
</tr>
<tr>
<td>Hypertrophic cardiomyopathy</td>
<td>11</td>
<td>18.3</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>9</td>
<td>15.0</td>
</tr>
<tr>
<td>Congenital heart disease with surgery</td>
<td>5</td>
<td>8.3</td>
</tr>
<tr>
<td>Restrictive cardiomyopathy</td>
<td>4</td>
<td>6.7</td>
</tr>
<tr>
<td>Valvular heart disease</td>
<td>3</td>
<td>5.0</td>
</tr>
<tr>
<td>Amyloidosis</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Congenital heart disease without surgery</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Retransplant/graft failure</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

Publications


“You can’t imagine what it’s like to come so close to losing your eyesight and then have it saved.” — Mike Kelly, 67, North Olmsted, Ohio. When Mike Kelly couldn’t read a highway sign, he was shocked into seeking treatment for his failing eyesight. The retired pipefitter and welder was diagnosed with Fuchs’ dystrophy, an eye disease for which the only cure is corneal transplant. Having transplants in both eyes has given Mike back his vision and allowed him to build the hunting cabin he now enjoys in retirement.

2008 Highlights

In 2008, Cole Eye Institute surgeons continued to be at the forefront of corneal surgery and research. Team members performed 210 surgical graft procedures, including penetrating keratoplasty, lamellar keratoplasty, deep anterior lamellar keratoplasty, keratoprosthesis and amniotic membrane grafts. They also developed new techniques to improve on existing practices.

Research and Innovations

Cole Eye Institute 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 shortens recovery time and entails a smaller, stronger wound. Primary investigator David M. Meisler, MD, and our team initially enrolled patients in the IRB-approved research study. Because the procedure proved successful, DSAEK is now offered to patients without requiring study participation.

Fuchs’ endothelial disease is among the leading indications in the United States for corneal transplantation. The National Institutes of Health (NIH) has funded the Fuchs’ Endothelial Corneal Dystrophy study, a multicenter trial to investigate the genetics of this disease. As one of the study centers, Cole Eye Institute is enrolling qualifying families under the direction of William J. Dupps, Jr., MD, PhD.

Persistent corneal epithelial defects can plague corneal transplants and cause them to scar and fail. Research is being pursued to evaluate the role of autologous serum in the healing of persistent corneal epithelial defects.

Other ongoing studies in the department include the NIH-sponsored Corneal Donor Study.
Expertise

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

**Corneal transplantation**
- Full-thickness
- Partial-thickness
  - Anterior lamellar
  - Posterior lamellar

**Limbal stem cell transplantation**

**Amniotic membrane grafting**

**Artificial corneas**

Approximately 35,000 corneal transplants are performed in the United States every year. They are considered to be safe, as 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).

Publications


MICHAEL BATTAGLIA | INTESTINAL TRANSPLANT RECIPIENT

“It will be nice to be able to go away and not have to bring TPN (intravenous feeding) supplies.” — Michael Battaglia, 47, Painesville, Ohio. Michael has been battling ileitis (Chrons disease) since the early 1980s and has had surgeries to remove much of his small intestine, create a stoma, repair fistulas and have his rectum and anus removed. The former tool and dye maker was the first patient to undergo an intestinal transplant at Cleveland Clinic. Since then, Michael has had his stoma reversed and has been freed from TPN. He enjoys time with his dog and is looking forward to starting part-time work.

New in 2008

The Cleveland Clinic Digestive Disease Institute and Transplant Center have collaborated to form the Intestinal Rehabilitation and Transplantation Program (IRTP).

In June, Cleveland Clinic performed the first adult intestinal transplant in Ohio. By the end of the year, a total of four intestinal transplants were performed.

The IRTP is able to offer the broadest spectrum of medical and surgical treatment options to patients diagnosed with intestinal failure.

In conjunction with the Cleveland Clinic Nutrition Support Team, the IRTP represents one of the largest intestinal failure programs in the country.

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.

The first intervention is diet modification. The next step utilizes medications to increase or decrease bowel motility and function. In patients who are not responding to medical treatment, our team of transplant and colorectal surgeons is able to offer a variety of surgical procedures designed to increase the ability of absorption. Among the most commonly performed procedures are operations to restore intestinal continuity, relieve obstruction, lengthen the intestine, taper a dilated bowel and reconstruct or reverse a previous surgical procedure.

Failure of medical and conservative surgical treatments translates into the need for either enteral or parenteral nutrition. In a selected group of patients, total parenteral nutrition (TPN) can cause recurrent episodes of line sepsis, loss of vascular access, and/or TPN-induced liver failure. Our nutrition support team interacts with the IRTP to identify and treat patients who have failed the “artificial gut.”

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
Initiated: 2008
Performed First Adult Intestinal Transplant in Ohio: June 2008
As of December 31, 2008, four intestinal transplants have been performed at Cleveland Clinic.

original disease and TPN. Other common indications for intestinal transplant in the adult includes dismotility disorders and benign intrabdominal tumors (such as desmoid tumors) that require an extensive intrabdominal 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.

There are commonly three types of intestinal transplantation performed:

**Isolated small bowel transplantation**
Isolated small bowel transplantation typically includes the jejunum and the ileum. Occasionally, part of the colon may also be transplanted. Isolated SBTx is recommended when the cause of intestinal failure is primarily the small bowel. Successful SBTx may reverse TPN–induced liver dysfunction.

**Combined liver and small intestine**
This type of transplant includes the liver, jejunum, and ileum (may also include the colon), and part or all of the pancreas. In this case, transplant is reserved for candidates with intestinal failure and irreversible liver failure induced by prolonged TPN therapy. Medical presentation in these situations is more likely to include portal hypertension, severe fibrosis, or cirrhosis.

**Multivisceral transplantation**
Multivisceral transplantation usually includes stomach, duodenum, jejunum, ileum (colon may also be included), and pancreas. This procedure can be performed with or without liver transplant. When the liver is spared, the native liver (the patient’s own liver) is preserved. Multivisceral transplant is used to treat candidates with locally aggressive, non-metastasizing abdominal tumors; pseudo-obstruction and very poor gastric emptying; and surgically unreconstructable gastrointestinal tracts (such as encountered in patients with multiple fistulas, congenital GI tract anomalies or trauma).

**Clinical Activities**
A total of 228 new patient referrals were seen in 2008 by the Intestinal Rehabilitation and Transplant Program. Of those, 66 were referred for intestinal transplant evaluation (79 percent internally referred and 21 percent externally referred). Of the 66 new intestinal transplant referrals, 27 patients were seen in the hospital setting for initial evaluation, 28 were seen initially in clinic, and 11 received initial phone evaluation. Fifteen of these patients completed a full intestinal transplant evaluation and eight were listed for an intestinal (isolated or combined with a liver) transplant. Four of these patients went on to be transplanted in 2008.

Developed the educational material for our intestinal transplant patients including a video featuring our first intestinal transplant recipient.

Developed the protocol manual for procedures and management of intestinal transplant patients.

**Research Activities**
Current clinical trials:
- TPN-induced liver disease: incidence, prognosis, monitoring and prevention.
- Outcomes of intra-abdominal desmoid tumors.
- Use of GLP-2 growth factor to enhance absorption in TPN- or IVF-dependent patients with short bowel syndrome.

Future clinical trial:
- Animal research to study the intestinal transplant rejection mechanism and the use of new immunosuppressant agents and protocols.

**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.

**Publications**


Cleveland Clinic's liver transplant program had many successes in 2008. We performed 147 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 4 for volume in the United States.

Wait-list death in the period from July 1, 2007 through June 30, 2008 decreased to 5.7%, compared with nearly 15% wait-list death from July 1, 2002 through June 30, 2003, when liver transplant volume at Cleveland Clinic was much lower. This decrease occurred despite a significant increase in the number of patients with a MELD score greater than 21. Additionally, our program maintained graft and patient survival above the national averages: observed graft 83.98 (expected 82.59) and national 83.38 (all SRTR July 1, 2005 – December 31, 2007) and observed patient survival 90.97 (expected 88.42) and national 87.85.

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 among these 10 programs.

The year 2008 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 461 patients underwent liver transplant evaluation, and 213 patients were listed for transplantation. About 200 patients are on our liver transplant waiting list.

Pediatric Liver Transplant: Cleveland Clinic offers more types of pediatric transplantation than any other center in the region. Our multidisciplinary team has performed 20 liver transplants in 20 pediatric patients over the last four years, with 95 percent patient survival.

FIONA O’NEILL | LIVER TRANSPLANT RECIPIENT
“She’s the most amazing kid. Her spirit, her spunk and her happiness never wavered through this whole thing.” — Julie O’Neill on her 1-year-old daughter Fiona, Concord, Ohio. When she was just four days old, Fiona had surgery to repair a malrotated bowel. That was the beginning of a series of procedures Fiona went through in her first year of life. Biliary atresia — a disease of the liver and bile ducts — was preventing Fiona from gaining weight and growing. In July 2008, Fiona’s mother Julie donated part of her liver to Fiona. Her daughter now is doing most of the same things other kids her age do.
Number of liver transplants by donor type in 2008

<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>138*</td>
<td>133</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Liver/kidney</td>
<td>8</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liver/pancreas</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total 147</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Includes 3 retransplants

Type of liver transplant

<table>
<thead>
<tr>
<th>Type of liver transplant</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole</td>
<td>139</td>
<td>94.6</td>
</tr>
<tr>
<td>Split</td>
<td>4</td>
<td>2.7</td>
</tr>
<tr>
<td>Reduced/partial</td>
<td>4</td>
<td>2.7</td>
</tr>
</tbody>
</table>

Days on waiting list and post-transplant length of stay (LOS) for liver patients transplanted in 2008

<table>
<thead>
<tr>
<th>Days waiting</th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>224.6</td>
<td>63.0</td>
<td>139</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>14.3</td>
<td>10.0</td>
<td>144</td>
</tr>
</tbody>
</table>

Survival analysis: patient survival for 587 primary liver, liver/heart, liver/kidney, liver/lung and liver/pancreas transplants 2004-2008

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>92.3</td>
</tr>
<tr>
<td>1 year</td>
<td>90.3</td>
</tr>
<tr>
<td>2 years</td>
<td>86.5</td>
</tr>
</tbody>
</table>

Liver transplant mortality 2008

| Hospital deaths | 6 |

Primary diagnoses for liver patients transplanted in 2008

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatoma and Cirrhosis</td>
<td>43</td>
<td>29.9</td>
</tr>
<tr>
<td>Hepatitis C</td>
<td>25</td>
<td>17.4</td>
</tr>
<tr>
<td>NASH</td>
<td>18</td>
<td>12.5</td>
</tr>
<tr>
<td>Primary sclerosing cholangitis</td>
<td>11</td>
<td>7.6</td>
</tr>
<tr>
<td>Cryptogenic cirrhosis</td>
<td>9</td>
<td>6.3</td>
</tr>
<tr>
<td>Alcohol cirrhosis</td>
<td>8</td>
<td>5.6</td>
</tr>
<tr>
<td>Other cirrhosis</td>
<td>7</td>
<td>4.9</td>
</tr>
<tr>
<td>Benign tumor</td>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>Biliary cirrhosis</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Metabolic disease</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Retransplant/graft failure</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>2.1</td>
</tr>
<tr>
<td>Biliary atresia</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Cholestatic liver disease</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Congenital hepatic fibrosis</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Cystic fibrosis</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><strong>Total 144</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Research and Innovations
The liver transplant program achieved several milestones and made numerous improvements during 2008.

FasTrac program to improve referral to listing time was initiated. Many changes to our patient evaluation approach were made. Significant improvement had already been seen by the time the program was officially implemented.

Federico Aucejo, MD, began work on a multidisciplinary Hepatocellular Carcinoma Clinic, specializing in treating patients with HCC.

Work began to update the liver surgery website on clevelandclinic.org to provide more information to referring providers and easily accessible education to patients.

Personnel Update
The following individuals joined the liver transplant program in 2008:
Koji Hashimoto, MD, was appointed Clinical Scholar for Liver Transplant.
Ganesh Gunasekaran, MD, and Naveed Ahmed, MD, began their transplant fellowships.

Other Personnel Highlights
The Liver Transplant Coordinators began to use E-Script to make refilling prescriptions for transplant patients more efficient.
Dympna Kelly, MD, was a judge for the Bumpus Clinical Research Awards in September.
Charles Miller, MD, traveled to St. Louis, Mo., to represent Cleveland Clinic and the Ohio Solid Organ Transplant Consortium to maintain the Statewide Liver Sharing Agreement.
Dr. Miller gave the Keynote Ethics Address at the DDW meeting in San Diego on Living Donor Liver Transplantation.

Education
The Liver Transplant Program coordinated several educational programs with the Division of Surgery Grand Rounds and Transplant Center Grand Rounds for 2008.

Cristiano Quintini, MD, was appointed as the liaison for the general surgery and visiting residents as they rotate through the liver transplant service.

Dr. Kelly is responsible for the surgical educational curriculum for surgical interns, including didactic lectures and a skills program.

The large animal transplant lab is now fully functional. This is an excellent source for teaching the fellows and residents. There are two surgical fellows, a surgical resident and a Project Scientist under Dr. Kelly's supervision. This lab also allows Dr. Kelly to be involved in the training of veterinary and OR technicians.

We continue to attract and recruit excellent fellows who are passionate about liver transplantation and liver surgery.
A cross-training program with the HBP fellows was created.

Awards and Achievements
Dr. Miller was appointed Chairman of the Governance Board of DDI CRU.

Developed and implemented new techniques for en-bloc liver-pancreas transplantation in three cases.
Peggy George was elected President, Cleveland Chapter of the American Liver Foundation.

Renee Bennett was elected to the International Transplant Nurses Society Board of Directors.

John Fung, MD, was awarded the 2008 Francis Moore Excellence in Mentorship in the Field of Transplantation Award by the American Society of Transplant Surgeons (ASTS) Vanguard Committee.

Dr. Kelly was awarded the ASTS-Wyeth Mid-Level Faculty Research Award.
Research

Principal Investigator – Dr. Federico Aucejo
Hepatocellular carcinoma (HCC) genetic profiling: Searching for predictors of tumor recurrence after liver transplantation - validation of the University of Pittsburgh study and assessment of HCC p53 loss, telomere lengthening and VEGF2 activation. (IRB 08-463)

Principal Investigator – Dr. Charles Miller (Completed and closed)
A prospective, open-label, multicenter, randomized trial of the efficacy and safety of a long-term calcineurin inhibitor free maintenance regimen with mycophenolate mofetil and sirolimus in recipients of an orthotopic liver transplant. (ML18423)

Principal Investigator – Dr. Bijan Eghtesad (Closed to enrollment)
A multi-center, randomized, open-label study to compare the development of liver fibrosis at 12 months after transplantation for hepatitis C cirrhosis in patients receiving either Neoral or Prograf. (COLO400A2426)

Principal Investigator – Dr. John Fung (Closed to enrollment)
Immunosuppression with Campath-1H and tacrolimus in liver transplantation (ILEX Oncology, Inc. & NIAID, Immune Tolerance Network). (IRB 7782)

Principal Investigator – Dr. John Fung
Evaluation of hepaGam BTM in combination with antiviral treatment in hepatitis B liver transplant patients. (IRB 08-050)

A randomized, double-blind study to assess the efficacy and safety of prophylactic use of Maribavir vs. oral ganciclovir for the prevention of cytomegalovirus disease in recipients of orthotopic liver transplant. (1263-301)

Principal Investigator – Dr. John Fung
Study of the antiviral activity of entecavir in patients receiving liver transplant due to chronic hepatitis B virus infection. (IRB 07-375)

A 24-month multicenter, randomized, open-label study to evaluate the efficacy and safety of concentration controlled everolimus with corticosteroids in combination with minimization or elimination of tacrolimus in de novo liver transplant recipients compared to tacrolimus and corticosteroid. (CARD001H2304)

Principal Investigator – Dr. Dympna Kelly (August 2006-Present)
A randomized, double-blind, double-dummy, Active-Comparator Controlled Multi-Center Study of the Efficacy and Safety of Valganciclovir (Ro107-9070) Vs. Oral Ganciclovir for Prevention of Cytomegalovirus Disease in High-Risk Heart, Liver and Kidney Allograft Patients. (Abbott (GCO# 00-454 SU))

Principal Investigator – Dr. Brian Eghtesad (Closed to enrollment)
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. (IRB 05-138)

Principal Investigator – Dr. John Fung
Solid organ transplant in HIV. NIH multi-site study. (IRB 8230)

Principal Investigator – Dr. John Fung
Phase II multicenter trial to assess the safety and efficacy of Campath-1H and tacrolimus followed by immunosuppression withdrawal in liver transplant. NIH/ITN (ITN024ST)

Principal Investigator – Dr. John Fung
Phase II trial to assess the safety of immunosuppression withdrawal in liver transplant recipients with hepatitis C. NIH/ITN (ITN303ST)

Co-Principal Investigator – Dr. John Fung
Infliximab (Remicade®) as an adjunct to pegylated-interferon α2b and ribavirin in the treatment of hepatitis C virus infection. Centocor (CO168X98)

A randomized, open-label, multicenter, efficacy and safety study of peginterferon α-2b and ribavirin in the treatment of chronic hepatitis C. NIH/ITN (ITN030ST)

Principal Investigator – Dr. John Fung
Study of the antiviral activity of entecavir in patients receiving liver transplant due to chronic hepatitis B virus infection. (IRB 07-375)

A 24-month multicenter, randomized, open-label study to evaluate the efficacy and safety of concentration controlled everolimus with corticosteroids in combination with minimization or elimination of tacrolimus in de novo liver transplant recipients compared to tacrolimus and corticosteroid. (CARD001H2304)

Principal Investigator – Dr. Dympna Kelly (August 2006-Present)
Very small for size living donor liver transplantation (LDLT) in a pig model. CCF Animal Lab.
Principal Investigator – Dr. Dympna Kelly
The impact of immunosuppression on post-liver transplant rejection in crossmatch positive and negative patients. (IRB 05-181)

Principal Investigator – Dr. John Fung
REGISTRY: Electronic data interface for transplant (EDIT). (IRB 06-167)

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

Principal Investigator – Charles Miller
REGISTRY: Parenchymal perfusion of native and graft livers during transplantation. (IRB 7497)

Publications


Aucejo F, Kim R, Zein N, Quintini C, Uso TD, Lopez R, Eghtesad B, Fung J, Miller C, Yerian L. Vascular endothelial growth factor receptor 2 expression in non-tumorous cirrhotic liver is higher when hepatoma is beyond Milan criteria. Liver Transpl. (In press)


“To look back, I don’t even feel like I went through what I did. I feel that good.” — Rolando Quiroga, 44, Lansing, Mich. After inhaling toxic gases in a car fire in 1995, Rolando spent 31 days in a coma and several months in a hospital. His lungs aged 30 years from the accident, and Rolando later developed a condition that made breathing difficult. After a double-lung transplant in April 2008, Rolando is back to exercising and is chaplain to the local minor league Spanish-speaking baseball players.

2008 Highlights

The year 2008 was a successful year for Cleveland Clinic’s Lung and Heart/Lung Transplant Program. We completed our 683rd transplant since the program’s inception in 1990. This year we performed 57 lung transplants.

The transplant program has established a reputation for accepting challenging, complex cases, which has led to a high referral rate. In 2008, the transplant team evaluated more than 415 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). Our median waiting time is 82 days.

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 86.5% and 2-year survival rate of 76.9%. A continued emphasis on quality assurance and quality improvement remains central to the program, reflected by the decrease in post-transplant length of stay to a median of 15 days.

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.

Our surgeons also have pioneered transplant surgical techniques that may further improve outcomes by reducing ischemic injury. This includes a bronchial artery revascularization technique and transplantation off ECMO and other bridging therapies to transplantation.
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).

Our physicians frequently speak at national and international conferences and serve as peer reviewers for medical journals. As part of a statewide quality assurance program, we continue to actively participate in the Ohio Solid Organ Consortium, providing educational programs and hosting site visits for other programs in the state.

Number of lung transplants 2004-2008 (includes 7 heart/lung and 1 lung/liver)

<table>
<thead>
<tr>
<th>Year</th>
<th>Single</th>
<th>Double</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>28</td>
<td>36*</td>
<td>64</td>
</tr>
<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>Total</td>
<td>114</td>
<td>208****</td>
<td>322</td>
</tr>
</tbody>
</table>

* (includes 1 heart/lung)
** (includes 2 heart/lung)
*** (includes 3 heart/lung)
**** (includes 3 heart/lung and 1 lung/liver)
***** (includes 7 heart/lung and 1 lung/liver)

Number of transplants 1990-2008

<table>
<thead>
<tr>
<th>Organ</th>
<th>Double</th>
<th>Single</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung</td>
<td>326</td>
<td>339</td>
<td>665</td>
</tr>
<tr>
<td>Heart/lung</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Lung/liver</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>344</td>
<td>339</td>
<td>683</td>
</tr>
</tbody>
</table>

Days on waiting list and post-transplant length of stay (LOS) for lung patients transplanted in 2008

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>140.8</td>
<td>82.0</td>
<td>57</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>24.1</td>
<td>15.0</td>
<td>57</td>
</tr>
</tbody>
</table>

Survival analysis: patient survival for 316 primary lung transplants 2004-2008 (includes 6 heart/lung and 1 lung/liver)

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>88.7</td>
</tr>
<tr>
<td>1 year</td>
<td>86.5</td>
</tr>
<tr>
<td>2 years</td>
<td>76.9</td>
</tr>
</tbody>
</table>

Lung transplant mortality 2008

Hospital deaths (within 30 days post-transplant) 4
Primary diagnoses for patients transplanted in 2008

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idiopathic pulmonary fibrosis</td>
<td>28</td>
<td>49.1</td>
</tr>
<tr>
<td>COPD/emphysema</td>
<td>12</td>
<td>21.1</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>3</td>
<td>5.3</td>
</tr>
<tr>
<td>Sarcoidosis</td>
<td>3</td>
<td>5.3</td>
</tr>
<tr>
<td>Alpha-1 antitrypsin deficiency</td>
<td>2</td>
<td>3.5</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>2</td>
<td>3.5</td>
</tr>
<tr>
<td>Other diagnosis</td>
<td>5</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Total 57

Publications


Kim Holmes | Kidney-Pancreas Transplant Recipient

“\textit{I am ready to live on my own again and start my life over.}” — Kim Holmes, 30, Cleveland, Ohio.

Kim underwent a kidney-pancreas transplant in January after the diabetes she had been dealing with since she was 9 years old led to kidney failure and blindness. Kim had been on dialysis and in and out of the hospital for the past three years. She had to live in a nursing home prior to her transplant. She now looks forward to living on her own again with her two children, Xavier, 11, and Shiara, 10.

PANCREAS AND KIDNEY/PANCREAS TRANSPLANTATION

2008 Highlights

In 2008, a total of 31 pancreas transplants were performed, accounting for the second consecutive year we’ve done more than 30 transplants. The 2008 total included 16 simultaneous pancreas-kidney transplants, 3 pancreas after kidney transplants, 11 pancreas transplants alone and one multivisceral transplant. This brings the total number of transplants performed since the beginning of the program to 249.

By maintaining this level of clinical activity, the Cleveland Clinic Pancreas/Kidney 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. Patient survival for transplants performed in 2008 was 97 percent and overall pancreas graft survival was 90 percent.

Also in 2008, the size of the program’s staff grew with the addition of Alvin Wee, MD. In addition to kidney and pancreas transplantation, Dr. Wee brings a wealth of experience in laparoscopic surgery, including laparoscopic donor nephrectomy.

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

Number of pancreas transplants in 2008

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreas</td>
<td>14</td>
<td>45.2</td>
</tr>
<tr>
<td>Pancreas/kidney</td>
<td>16</td>
<td>51.6</td>
</tr>
<tr>
<td>Pancreas/liver</td>
<td>1</td>
<td>3.2</td>
</tr>
</tbody>
</table>

See page 95 for complete staff listing

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>97.5</td>
</tr>
<tr>
<td>1 year</td>
<td>94.2</td>
</tr>
<tr>
<td>2 years</td>
<td>91.0</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>88.1</td>
</tr>
<tr>
<td>1 year</td>
<td>83.7</td>
</tr>
<tr>
<td>2 years</td>
<td>70.9</td>
</tr>
</tbody>
</table>

Days on waiting list and post-transplant length of stay (LOS) for pancreas patients transplanted in 2008

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days waiting</td>
<td>264.9</td>
<td>274.7</td>
<td>30</td>
</tr>
<tr>
<td>Post-transplant LOS</td>
<td>14.1</td>
<td>9.0</td>
<td>30</td>
</tr>
</tbody>
</table>

Fast facts

Initiated: 1985

First Pancreas Transplant: March 22, 1988

First Kidney/Pancreas Transplant: October 23, 1985

As of December 31, 2008, 160 kidney/pancreas, 114 pancreas, and 5 liver/pancreas transplants have been performed at Cleveland Clinic.
“My energy level is back to normal. I work out and participate in a lot more activities now rather than just coming home from work and calling it a day.” — Krista Diddle, 31, Columbus, Ohio. Krista was diagnosed with membranoproliferative glomerulonephritis (MPGN), a kidney disease, when she was 18 years old. About 3 years ago, the kindergarten teacher experienced renal failure and was put on medication. In June 2008, Krista underwent a kidney transplant with a kidney donated by her brother, Marcus, 29. She says she had a good recovery experience and was able to go back to teaching school in August.

2008 Highlights
Clinical activity in renal transplantation remained strong at Cleveland Clinic’s Glickman Urological & Kidney Institute in 2008. We performed 168 transplants in 2008.

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.

The renal transplant program continues to be active in the Paired Donation Network, an innovative service for incompatible donor-recipient pairs. To date, Cleveland Clinic is the highest-enrolling center in the program.

Research and Innovations
The laboratory of Robert L. Fairchild, PhD, continues to focus on: 1) mechanisms that produce high levels of inflammation early in transplanted tissues and organs, 2) understanding how this inflammation directs alloantigen-primed T cells and other leukocytes into allografts, and 3) effector mechanisms leading to solid organ graft rejection.

Current studies are focused on the factors directing the memory CD8 T cells into the allografts within hours after the transplant. Preliminary results indicate that initial neutrophil activity is a prerequisite, but the recruiting factors produced directly or induced by neutrophils remain unidentified. Additional studies are under way to identify the functions expressed by these memory CD8 T cells that amplify inflammation in the allograft at early times post-transplant, if these CD8 T cells are capable of rejecting cardiac allografts on their own, and if the activity of these memory CD8 T cells is resistant to immunosuppressive drugs that are used in human transplant patients.

We recently have identified a serine protease, cathepsin G, produced by the neutrophils, that is important for the development of renal dysfunction following
Initiated: 1963
First Adult Kidney Transplant: January 9, 1963
Medicare Approval: July 1, 1966
UNOS Approval: March 21, 1988
As of December 31, 2008, 3,578 kidney, 143 kidney/pancreas, 35 kidney/liver and 3 kidney/heart transplants have been performed at Cleveland Clinic.
Cleveland Clinic developed and refined dialysis techniques in the 1950s to enable survival of patients with kidney failure.
We developed one of the first deceased-donor kidney transplant programs in the world, established in 1963.
We established active living donor programs for kidney (laparoscopic live donor nephrectomy) and liver transplant.
William (Wink) Baldwin, MD, is now an active member of the research team.

Fast facts

The Glickman Urological & Kidney Institute's Section of Renal Transplantation continues to contribute significantly to graduate and postgraduate education. This program is considered the premier urological transplant fellowship training program in the United States, and it continues to attract outstanding candidates.

Number of transplants 2008

<table>
<thead>
<tr>
<th>Organ</th>
<th>Number Deceased</th>
<th>Living/Related</th>
<th>Living/Unrelated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney</td>
<td>144</td>
<td>80</td>
<td>38</td>
</tr>
<tr>
<td>Kidney/pancreas</td>
<td>16</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Kidney/liver</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Waiting list and post-transplant length of stay (LOS) for kidney patients transplanted in 2008

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years waiting (deceased donor)</td>
<td>2.7</td>
<td>2.7</td>
<td>104</td>
</tr>
<tr>
<td>Days post-transplant LOS</td>
<td>8.1</td>
<td>6.0</td>
<td>168</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>96.8</td>
</tr>
<tr>
<td>1 year</td>
<td>94.7</td>
</tr>
<tr>
<td>2 years</td>
<td>92.8</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>93.1</td>
</tr>
<tr>
<td>1 year</td>
<td>90.8</td>
</tr>
<tr>
<td>2 years</td>
<td>86.8</td>
</tr>
</tbody>
</table>

Survival analysis: kidney graft survival for 65 primary kidney/pancreas transplants 2004-2008

<table>
<thead>
<tr>
<th>Time</th>
<th>Survival %</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>84.5</td>
</tr>
<tr>
<td>1 year</td>
<td>81.3</td>
</tr>
<tr>
<td>2 years</td>
<td>72.8</td>
</tr>
</tbody>
</table>

Primary diagnoses for kidney patients transplanted in 2008

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>44</td>
<td>26.2</td>
</tr>
<tr>
<td>Cystic disease</td>
<td>25</td>
<td>14.9</td>
</tr>
<tr>
<td>Glomerular disease</td>
<td>20</td>
<td>11.9</td>
</tr>
<tr>
<td>Nephritis/interstitial disease</td>
<td>19</td>
<td>11.3</td>
</tr>
<tr>
<td>Hypertension</td>
<td>17</td>
<td>10.2</td>
</tr>
<tr>
<td>Re-transplant/graft failure</td>
<td>10</td>
<td>6.0</td>
</tr>
<tr>
<td>Multi-system disease</td>
<td>9</td>
<td>5.4</td>
</tr>
<tr>
<td>Obstructive disease</td>
<td>3</td>
<td>1.8</td>
</tr>
<tr>
<td>Congenital hereditary disease</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Vascular disease</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Others</td>
<td>10</td>
<td>6.0</td>
</tr>
<tr>
<td>Unknown</td>
<td>6</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Total 168
Publications


KAREN L. KACHMAR | BONE AND SOFT TISSUE TRANSPLANT RECIPIENT

“I will be eternally grateful to Dr. Michael Joyce and his assistants at Cleveland Clinic for all they have done for me.” — Karen Kachmar, 59, Crescent, Pa. About 8 years ago, Karen fell down six steps, breaking the same femur bone she had broken when she was 2 years old. After two rods were placed in her leg, Karen was able to walk but in terrible pain. In 2004, Karen underwent a bone transplant at Cleveland Clinic. She is now pain-free with a straight healthy leg. The mother and grandmother swims regularly and enjoys time with her husband Paul.

TISSUE TRANSPLANTATION

2008 Highlights

Some 20 disciplines across 11 of Cleveland Clinic’s institutes and ambulatory surgery centers utilize bone and soft tissue during surgical reconstruction. In 2008, Cleveland Clinic used approximately 4,317 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 (which includes 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.

Cardiology/Cardiothoracic Surgery

Cleveland Clinic’s heart and heart surgery program has been ranked No. 1 in the nation for the past 14 years. Cleveland Clinic has the largest heart valve surgery practice in the United States, performing 2,355 procedures in 2008.

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. Those 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 2008 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 hemia repair.

Vascular Surgery

The Department of Vascular Surgery performs more than 6,000 procedures each year and 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 U.S. Food and Drug Administration (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 2008, 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 tissues from the donor or source facility to all recipients or other final disposition. The system provides 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. The system also obtains egg and sperm donations and offers an IVF surrogate program.
Publications


Medhat Z. Askar, MD, PhD

Organ and bone marrow transplantation, effects of anti-HLA antibody on graft function and survival

Diane J. Pidwell, PhD

AllGen Laboratories Bone Marrow Transplant Immunology

Antibody on graft function and survival

Immunogenetics and Specialty Interests:

Edward Copelan, MD

Hematologic Oncology and Blood Disorders

Program Director, Acute Leukemia; Hematologic Oncology and Blood Disorders

Staff Appointment: 2006

Specialty Interests: Preparative regimens for transplantation, CML, acute leukemias

Robert Dean, MD

Hematologic Oncology and Blood Disorders

Staff Appointment: 2005

Specialty Interests: Bone marrow and stem cell transplantation, lymphoma, leukemia, multiple myeloma

Brian Bolwell, MD

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Staff Appointment: 2005

Specialty Interests: Hodgkin and non-Hodgkin lymphoma, autologous stem cell transplantation, hematologic malignancies

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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

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Thoracic and Cardiovascular Surgery; Quantitative Health Sciences

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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
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Specialty Interests: Heart failure, heart transplantation, clinical cardiology, cardiac catheterization, myocardial biopsy

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Specialty Interests: Pediatric heart transplantation, congestive heart failure

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Email: duncanb@ccf.org  
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Specialty Interests: Adult cardiac surgery, heart transplantation, reparations, pump coronary and valve procedures, pulmonary embolectomy and thromboendarterectomy, mechanical circulatory device

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Specialty Interests: Neonatal cardiac surgery, pediatric cardiac transplantation, adult congenital heart disease, anomalies of pulmonary veins, minimally invasive surgical repair for congenital heart disease, valve repair for congenital valvular lesions, anomalies of coronary arteries, pediatric heart surgery

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Specialty Interests: Heart failure, cardiac transplantation, mechanical circulatory support devices, women’s cardiac care, pulmonary hypertension

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Specialty Interests: Cardiac catheterization and angiography, clinical cardiology, clinical pharmacology in cardiac failure, cardiac transplantation

Rene Rodriguez, MD  
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Office Phone: 216.444.2091  
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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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CITATIONS

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86 | 87

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

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Specialty Interests: Living donor liver transplantation, liver transplantation, immunosuppression, organ donation, liver transplantation in HIV-positive patients, living donor liver transplantation, liver, kidney, pancreas and intestinal transplant surgery; Liver transplantation; hepatobiliary and transplant surgery

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Staff Appointment: 1975
Specialty Interests: Parenteral nutrition, home parenteral nutrition, intestinal rehabilitation

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Gastroenterology and Hepatology
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Staff Appointment: 2003
Specialty Interests: Malabsorption, short bowel syndrome, celiac disease, inflammatory bowel disease, small bowel transplant

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Staff Appointment: 2004
Specialty Interests: Liver transplantation, hepato-biliary surgery, living donor liver transplantation

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Specialty Interests: Liver diseases, liver transplantation, viral hepatitis

David Barnes, MD
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Specialty Interests: Liver and biliary tract disease, liver transplantation, diagnostic/therapeutic endoscopy

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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

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William Carey, MD
Gastroenterology and Hepatology; Director, Center for Continuing Education; Vice Chairman, Division of Education
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Liver continued

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Specialty Interests: Interventional radiology, angiography, angioplasty, unrectable radiohepatic intervention

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Staff Appointment: 1995
Specialty Interests: Gastrointestinal, hepatic and soft tissue pathology

Koji Hashimoto, MD
Hepato-pancreato-biliary and Transplant Surgery
Office Phone: 888.410.1775, option 4
Email: hashimk@ccf.org
Staff Appointment: 2009
Specialty Interests: Abdominal multi-organ transplant

Robert Helland, MD
Head, Anesthesia for Orthopaedic and Rheumatologic Institute
Office Phone: 216.444.0185
Email: hellanr@ccf.org
Staff Appointment: 1999
Specialty Interests: Regional anesthesia, blood conservation, anesthesia for liver transplantation

Vera Hupertz, MD
Director, Pediatric Transplant Hepatology; Pediatric Gastro-enterology
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

Samuel Irelin, MD
Anesthesiology
Office Phone: 216.445.1152
Email: irelins@ccf.org
Staff Appointment: 1997
Specialty Interests: Anesthesia for liver transplantation, critical care medicine, clinical research, orthopaedic anesthesia, resident education

Dymna Kelly, MD
Hepato-pancreato-biliary and Transplant Surgery, General Surgery
Office Phone: 216.444.1888
Appointments: 216.444.8770
Email: kellyjd@ccf.org
Staff Appointment: 2005
Specialty Interests: Liver transplantation, resident education

Jia Lin, MD, PhD
Anesthesiology
Office Phone: 216.444.4613
Email: linj@ccf.org
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
Email: marstk@ccf.org
Staff Appointment: 2000
Specialty Interests: Vascular anesthesia, anesthesia for liver transplantation

Arthur McCullough, MD
Chairman, Gastroenterology and Hepatology; Pathobiology
Office Phone: 216.444.2766
Appointments: 216.444.6636
Email: mccullia@ccf.org
Staff Appointment: 2006
Specialty Interests: Fatty liver, nutrition in liver disease, chronic liver disease and cirrhosis of the liver, viral hepatitis, hepatocellular carcinoma

Robert O’Shea, MD, MSCE
Gastroenterology and Hepatology
Office Phone: 216.444.6518
Appointments: 216.444.6536
Email: oshea@ccf.org
Staff Appointment: 2004
Specialty Interests: End-stage liver disease, liver transplantation, viral hepatitis, drug-induced liver disease

Brian M. Parker, MD
Head, Section of Anesthesia for General Surgery and Liver Transplantation
Office Phone: 216.444.4136
Email: parkerb1@ccf.org
Staff Appointment: 1997
Specialty Interests: Hepatic transplantation anesthesia

Claudene Pritchard, MD
Anesthesiology
Office Phone: 216.445.7008
Email: pritchcl@ccf.org
Staff Appointment: 2007
Specialty Interest: Liver transplantation

Cristiano Quintini, MD
Program Director, Intestinal Transplant; Surgical Director, Intestinal Rehabilitation and Transplantation Program; Hepato-pancreato-biliary and Transplant Surgery; General Surgery
Office Phone: 216.445.3388
Appointments: 216.444.6664
Email: quintic@ccf.org
Staff Appointment: 2006
Specialty Interests: Living donor liver transplantation, liver transplant, liver surgery, intestinal transplant and surgery
<table>
<thead>
<tr>
<th>Name</th>
<th>Specialty Interests</th>
<th>Office Phone</th>
<th>Appointments</th>
<th>Email</th>
</tr>
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<tbody>
<tr>
<td>Kadakal Radakrishnan, MD</td>
<td>Pediatric Gastroenterology, care of liver transplant patients, metabolic disorders</td>
<td>216.444.9222</td>
<td></td>
<td><a href="mailto:radakal@ccf.org">radakal@ccf.org</a></td>
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<td>Staff Appointment: 2006</td>
</tr>
<tr>
<td></td>
<td>Speciality Interests: Chronic pancreatic, cyclic vomiting, diagnostic and therapeutic endoscopy, Intestinal failure and small bowel rehabilitation in children, liver disorders in children and care of liver trans-plant patients, metabolic disorders - care of G1 problems in metabolic disorders - care of liver related metabolic problems, pediatric liver disease, pediatric liver transplantation, pediat-ric liver diseases, small intestine short bowel rehab</td>
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<tr>
<td>Mangalakarapudur Ramachandran, MD</td>
<td>Anesthesiology, care of regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.444.5581</td>
<td></td>
<td><a href="mailto:ramachm@ccf.org">ramachm@ccf.org</a></td>
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<td>Staff Appointment: 2002</td>
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<tr>
<td></td>
<td>Speciality Interests: Cardiothoracic anestheisa, vascular anestheisa, obstetric anestheisa, care of patient during regional anesthesia, care of child during regional anesthesia</td>
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<tr>
<td>Mark Sands, MD</td>
<td>Radiology</td>
<td>216.444.5616</td>
<td></td>
<td><a href="mailto:sandsbm@ccf.org">sandsbm@ccf.org</a></td>
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<td>Staff Appointment: 1998</td>
</tr>
<tr>
<td></td>
<td>Speciality Interests: Vascular and intervensional radiology</td>
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<tr>
<td>Ralph Tuthill, MD</td>
<td>Anatomic Pathology, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.444.2245</td>
<td></td>
<td><a href="mailto:tuthilr@ccf.org">tuthilr@ccf.org</a></td>
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<td>Staff Appointment: 1981</td>
</tr>
<tr>
<td></td>
<td>Speciality Interests: Dermatopathology, hepatic pathology and cytopathology</td>
<td></td>
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<tr>
<td>David Vogt, MD</td>
<td>General Surgery, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.444.6968</td>
<td></td>
<td><a href="mailto:vogtd@ccf.org">vogtd@ccf.org</a></td>
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<td>Staff Appointment: 1981</td>
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<tr>
<td></td>
<td>Speciality Interests: Liver, biliary and pancreatic surgery, liver transplant</td>
<td>216.444.6664</td>
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**Liver continued**

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<tr>
<th>Name</th>
<th>Specialty Details</th>
<th>Office Phone</th>
<th>Appointments</th>
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<tbody>
<tr>
<td>Jamile Waksim-Fleming, MD</td>
<td>Gastroenterology and Hepatology, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.444.1764</td>
<td>216.444.6536</td>
<td><a href="mailto:flemjr@ccf.org">flemjr@ccf.org</a></td>
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<td>Staff Appointment: 2002</td>
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<tr>
<td></td>
<td>Speciality Interests: Liver diseases, women's health</td>
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<tr>
<td>Charles Winans, MD</td>
<td>Hepato-pancreato-biliary and Transplant Surgery, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.445.0612</td>
<td>216.444.6664</td>
<td><a href="mailto:winanc@ccf.org">winanc@ccf.org</a></td>
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<td>Staff Appointment: 2002</td>
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<tr>
<td></td>
<td>Speciality Interests: Liver and pancreas transplantation, hepatobiliary surgery, general surgery</td>
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<tr>
<td>Lisa Yerian, MD</td>
<td>Anatomic Pathology, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.445.7234</td>
<td></td>
<td><a href="mailto:yerianl@ccf.org">yerianl@ccf.org</a></td>
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<td>Staff Appointment: 2004</td>
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<tr>
<td></td>
<td>Speciality Interests: Liver pathology, gastrointestinal pathology</td>
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**Liver and Heart/Lung**

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<th>Name</th>
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<tbody>
<tr>
<td>Atul C. Mehta, MD</td>
<td>Vice Chairman, Pulmonary, Allergy and Critical Care Medicine, head of section of Bronchology, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.444.2911</td>
<td>216.444.6568</td>
<td><a href="mailto:mehta1@ccf.org">mehta1@ccf.org</a></td>
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<td>Staff Appointment: 1983</td>
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<tr>
<td></td>
<td>Speciality Interests: Lung transplantation, advanced lung diseases, diagnostic and therapeutic bronchscopy, endo-bronchial laser therapy, endobronchial radiation therapy, fiberoptic bronchoscopy, rigid bronchoscopy, bronchogenic carcinoma, transtracheal oxygen therapy, congenital lung disease, alpha 1 antitrypsin deficiency</td>
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<tr>
<td>Gösta Pettersson, MD, PhD</td>
<td>Vice Chairman, Thoracic and Cardiovascular Surgery, program and surgical director, lung and heart-lung transplant, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.444.2035</td>
<td>216.444.4466</td>
<td><a href="mailto:petten@ccf.org">petten@ccf.org</a></td>
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<td>Staff Appointment: 1999</td>
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<tr>
<td></td>
<td>Speciality Interests: Adult and congenital acquired heart and aortic diseases including operations, 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</td>
<td></td>
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<tr>
<td>Nicholas Smedira, MD</td>
<td>Program and Surgical Director, Heart Transplant Program and Kaufman Center for Heart Failure, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.445.7052</td>
<td>216.444.4466</td>
<td><a href="mailto:smedira@ccf.org">smedira@ccf.org</a></td>
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<td>Staff Appointment: 1995</td>
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<tr>
<td></td>
<td>Speciality Interests: Heart and heart/lung transplantation, ventilator assist devices, ECMO, heart failure surgery, aortic and mitral valve repair and replacement, off-pump coronary bypass grafting, myectomy, reparations, ascending and descending thoracic aortic repair</td>
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<tr>
<td>Jeffrey Chapman, MD</td>
<td>Pulmonary, Allergy and Critical Care Medicine, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.444.4222</td>
<td>216.444.6503</td>
<td><a href="mailto:chapmaj@ccf.org">chapmaj@ccf.org</a></td>
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<td>Staff Appointment: 2000</td>
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<tr>
<td></td>
<td>Speciality Interests: Intestinal lung disease, idiopathic pulmonary fibrosis, advanced lung disease</td>
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<tr>
<td>Lara Danziger-Iakov, MD, MPH</td>
<td>Pediatric Infectious Diseases, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.636.1077</td>
<td>216.444.5437</td>
<td><a href="mailto:danzigl@ccf.org">danzigl@ccf.org</a></td>
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<td>Staff Appointment: 2003</td>
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<tr>
<td></td>
<td>Speciality Interests: Infections in transplantation and the immunocompromised host, epidemiology, clinical trials, pediatric infectious diseases</td>
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<tr>
<td>Carol Farver, MD</td>
<td>Anatomic Pathology, Pathobiology, Pulmonary, Allergy and Critical Care Medicine, care of patient during regional anesthesia, care of child during regional anesthesia, care of patient during regional anesthesia, care of child during regional anesthesia</td>
<td>216.445.7695</td>
<td>216.445.7695</td>
<td><a href="mailto:farverc@ccf.org">farverc@ccf.org</a></td>
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<td>Staff Appointment: 1995</td>
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<td></td>
<td>Speciality Interest: Pulmonary pathology</td>
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LUNG AND HEART/LUNG continued

Thomas R. Gilea, 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: gileat@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: gordon@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
Appointments: 216.445.6860
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

Kenneth McCurry, MD
Thoracic and Cardiovascular Surgery
Office Phone: 216.445.9303
Appointments: 216.445.6860
Email: mccurk@ccf.org
Staff Appointment: 2009
Specialty Interests: Thoracic and cardiovascular surgery, pathology

Omar A. Minai, MD
Pulmonary, Allergy and Critical Care Medicine
Office Phone: 216.445.2610
Appointments: 216.445.2610
Email: minao@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
Office Phone: 216.444.5640
Appointments: 216.445.6660
Email: murthysh@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: 216.445.8733
Appointments: 216.444.6503
Email: olbrych@ccf.org
Staff Appointment: 2006
Specialty Interests: Adult cystic fibrosis, lung transplantation, COPD, asthma, general pulmonary medicine

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

Richard Fatica, MD
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Medical Director, Kidney Transplant; Nephrology and Hypertension
Office Phone: 216.445.9953
Appointments: 216.444.6771
Email: fartich@ccf.org
Staff Appointment: 2000
Specialty Interests: Chronic kidney disease, dialysis, kidney transplant, fellowship education

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 kidney disease, anemia of chronic renal disease, iron metabolism, hemodialysis, acute renal failure, glomerulonephritis, acute renal failure, renal transplantation

John Rabets, MD
Urology
Office Phone: 216.444.1120
Appointments: 216.444.5600
Email: rabetsj@ccf.org
Staff Appointment: 2007
Specialty Interests: Kidney transplantation, pancreas transplantation, general urology

Titte Srinivas, MD
Nephrology and Hypertension
Office Phone: 216.445.0034
Appointments: 216.444.6771
Email: srinivts@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

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

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Shih-Chieh Chueh, MD, PhD  
Urology; Immunology  
Office Phone: 216.444.3146  
Email: baichn@ccf.org  
Staff Appointment: 1992  
Specialty Interests: Transplantation immunology, T-lymphocyte tolerance  

Richard Fatica, MD  
Medical Director, Renal 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, glomerulonephritis  

William Baldwin, MD, PhD  
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  
Nephropathy and Hypertension  
Office Phone: 216.444.6768  
Appointments: 216.444.6771  
Email: gbress@ccf.org  
Staff Appointment: 2008  
Specialty Interests: CKD, renal transplantation, glomerulonephritis  

Priya Kalahasti, MD  
Nephropathy and Hypertension  
Office Phone: 216.444.6771  
Appointments: 216.444.6771  
Email: kalahap@ccf.org  
Staff Appointment: 2006  
Specialty Interests: nephropathy and hypertension  

Jihad Kaous, MD  
Director, Center for Advanced Laparoscopic and Robotic Surgery; Urology  
Office Phone: 216.444.2976  
Appointments: 216.444.5600  
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  
Appointments: 216.444.5600  
Email: krisriw@ccf.org  
Staff Appointment: 2000  
Specialty Interests: Kidney and pancreas transplantation, urologic oncology  

Charles Kwon, MD  
Center for Pediatric Nephrology  
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  
Nephropathy and Hypertension  
Office Phone: 216.444.8897  
Appointments: 216.444.6771  
Email: nallyj@ccf.org  
Staff Appointment: 1997  
Specialty Interests: Renal disease and transplantation, hypertension, renovascular disease  

Saul Nurko, MD  
Nephropathy 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; Nephropathy 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  
Appointments: 216.444.5600  
Email: rabetsj@ccf.org  
Staff Appointment: 2007  
Specialty Interests: Kidney transplantation, pancreas transplantation, general urology  

Basbir Sankari, MD  
Regional Urology (Charleston Area Medical Center)  
Office Phone: 304.388.6370  
Email: bashbir.sankari@camc.org  
Staff Appointment: 1991  
Specialty Interests: Renal transplantation, renal vascular surgery  

Martin Schreiber Jr., MD  
Chairman, Nephropathy and Hypertension  
Office Phone: 216.444.5365  
Appointments: 216.444.6771  
Email: schreim@ccf.org  
Staff Appointment: 1982  
Specialty Interests: Diabetic renal disease, home dialysis, cardionephropathy, 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
TITTLE SRINIVAS, MD
Nephrology and Hypertension
Office Phone: 216.445.0034
Appointments: 216.444.6771
Email: sринивt@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
Email: stephab@ccf.org
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

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
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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: 216.692.7780
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Specialty Interests: Hip and knee replacement

MARTA SIEMIONOW, MD, PhD
Plastic Surgery; Orthopaedic Surgery; Immunology
Office Phone: 216.445.2405
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Staff Appointment: 1995
Specialty Interests: Microsurgery, hand surgery, peripheral nerve surgery, microcirculation research

SUPPORT

Bioethics

ERIC KODISH, MD
Chairman, Bioethics Department
Office Phone: 216.444.3850
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Staff Appointment: 2004
Specialty Interests: Pediatric ethics, research ethics, childhood cancer

PAUL FORD, PhD
Bioethics Department
Office Phone: 216.444.8723
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Staff Appointment: 2001
Specialty Interests: Bioethics, clinical ethics consultation, neurosurgical ethics

CARMEN PARADIS, MD
Bioethics Department
Office Phone: 216.445.2767
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Staff Appointment: 2006
Specialty Interests: Research ethics, informed consent, ethics education

MARTIN SMITH, STD
Director, Clinical Ethics, Bioethics Department
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Staff Appointment: 1987
Specialty Interests: Ethics consultation, end-of-life issues, institutional ethics committees, medical mistakes, informed consent

ANTHONY THOMAS, MD
Bioethics Department
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Staff Appointment: 1982
Specialty Interests: Reproductive and pediatric ethics
Bioethics continued

Kathryn Weise, MD, MA
Bioethics Department
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Staff Appointment: 1997
Specialty Interests: Pediatric critical care; pediatric palliative medicine; biomedical ethics

Kathryn Weise, MD, MA
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Staff Appointment: 1997
Specialty Interests: Pediatric critical care; pediatric palliative medicine; biomedical ethics

Biomedical Engineering

Paul Murray, PhD
Biomedical Engineering; Center for Anesthesiology Research
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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: hammerl@ccf.org
Staff Appointment: 1987
Speciality 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
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 65 area hospitals. Last year more than 600 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 216.295.7007.

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 encompasses 1,800 physicians and scientists in 120 specialties and subspecialties. All of these specialties — along with pediatrics at the Cleveland Clinic Pediatric Institute and Children's Hospital — are present in one facility, making multidisciplinary consultation, diagnosis and treatment readily available.

In 2008, 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 14 years of being ranked as the nation’s No. 1 cardiac care center. In addition, the survey ranks 16 Cleveland Clinic specialty care areas among the nation’s best, with 10 of those areas ranked among the Top 10 in the United States.