

**MEDIA
PLANET**

NOVEMBER 2009

Transplants: The Gift of Life

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20 Years Later*



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Anniversary of the First Successful Living Donor Liver Transplant

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MEDIA PLANET

THE GIFT OF LIFE

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A Second Chance

BY: JAMES J. WYNN AND ROBERT SD HIGGINS, UNOS

We live in an exciting era where huge advances are being made in many areas of medical practice and science.

Over the past fifty years, the concept of Transplantation—replacing a diseased or non-functioning part of the body with a healthy one from a human donor—has evolved from an experimental therapy to the preferred treatment for many patients, with whole organ, bone and other tissue transplants having become relatively commonplace today.

The unique nature of Transplantation continues to capture the interest and imagination of society. Transplantation is dramatic; no one needs to exaggerate the fact that it is, for many people, the difference between life and death. For others in need, it is an opportunity for a vastly enhanced quality of life. And unlike anywhere else in medicine, the ulti-

mate implement of healing is a human gift. Transplant professionals rely on the generosity of ordinary people to help their fellow human being through organ, tissue and marrow donation. As such, the public needs and wants to know how these gifts are being used.

This special report is intended to give you, the reader, a greater understanding of how transplantation is done today and what the future may hold. It is easy for any of us to see today's news headline and assume it explains everything about the field. The reality is much more complex. Transplantation represents a unique crossroad between emerging science, medical practice, ethics, law and public policy. New developments in any one discipline can

affect each of the others in turn.

UNOS (United Network for Organ Sharing) operates the nation's Organ Procurement and Transplantation Network (OPTN) under federal contract. In this capacity, we develop and monitor policies that determine how deceased donor organs are allocated to candidates in need. We create standards for transplant institutions nationwide and investigate issues that may affect patient safety. We collect and report data on all vascular organ transplants nationwide; data which are reflected in some of the articles in this report.

We are proud of the achievements made thus far in the field of Transplantation. More than half a million people in the United States are living with

some form of transplant. Long-term survival continues to improve, as does the quality of life of transplant recipients. Yet the remaining challenges are daunting. Today, more than 103,000 men, women and children anxiously await an organ transplant nationwide. Many more need tissue, composite or bone marrow transplants.

We hope this report will not only inform you but remind you of your opportunities to help. If you have not done so, take just a moment to reflect on the inestimable good that comes from one person's commitment to help others through organ, tissue and marrow donation, and please join the tens of millions of people who have made this positive commitment already. Help us in our quest to save the lives of all those in need.



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UNITED NETWORK FOR ORGAN SHARING

Tackle the Shortage:

Donate Life Challenge with the Chicago Bears

This season, Donate Life Illinois and Astellas Pharma US, Inc., partnered with the Chicago Bears to launch the Tackle the Shortage: Donate Life Challenge, a campaign to register 5,000 new donors in the state of Illinois in honor of Bears legend Walter Payton, who passed away 10 years ago while on the waiting

list for a liver transplant. Currently, more than 100,000 people in the United States are on the waiting list for an organ transplant, including 4,700 Illinois residents. To find out more about the Tackle the Shortage initiative and organ donation, visit www.Facebook.com/DonateLife.



A Very Special Thanks To...



BMT: Frontline Therapy

BY: SEAN DOUGHERTY

Bone marrow transplants are a miracle of modern medicine that help people with blood and metabolic diseases cure or control previously fatal conditions.

The procedure does not require major surgery like a kidney or a liver transplant. It's a fairly simple process of acquiring blood producing cells from the circulation of one person and putting them into another," says David Peace, MD, Co-Director, Stem Cell Transplant Program at the University of Illinois Medical Center and Associate Professor University of Illinois at Chicago (UIC) Department of Hematology and Oncology.

Traditionally, the procedure involved heavy doses of radiation and chemotherapy to kill all of the patient's bone

marrow – along with the cancer cells – and replace it with donor marrow. At first only young, otherwise healthy patients could withstand the treatment and the immune system suppression that followed. However, the field has seen many important advances over time. "We now have many new anti-viral, anti-bacterial and anti-fungal agents that are able to control infections that previously were often fatal in these patients," Dr. Peace noted. "Moreover, the conditioning regimens we now use are much easier on the patient." Reducing the dose of chemo/radiotherapy

has made the treatment applicable to patients up into their 70s. Following this approach, the Stem Cell Transplant Program at UIC has pioneered the use of stem cell transplantation in elderly patients with myelofibrosis, a chronic type of marrow cancer which cannot be cured with chemotherapy alone.

Damiano Rondelli, MD, Co-Director, Stem Cell Transplant Program at the University of Illinois Medical Center and Associate Professor UIC Department of Hematology and Oncology plans to combine chemotherapy with radiation therapy to improve the results of stem

cell transplantation in patients with blood cancer at high risk of relapse. Radiation will be delivered with an innovative method more tolerable for patients. "We will use a computer to shape the dose of radiation to target only bone marrow, without irradiating the rest of the patient," he said. "It is the equivalent of irradiating the ribs without irradiating the lung. It could be very effective against leukemia without the toxicity."

Finding a genetic match between donor and patient also has been a major challenge to expanding the use of bone marrow transplants. Each sibling has only a 25 percent chance of matching. The odds are greatly improved with the use of an

unrelated matched donor. "Cord blood transplants also have helped as that blood is rich in stem cells that don't have developed immune systems and are much less likely to develop strong reactions against patient's tissues," Dr. Peace said. "It gives us further options when we can't find a compatible stem cell donor within a patient's family or the adult donor registry."

Bone marrow transplantation has gone from a last-ditch procedure for a narrow group of patients to a routine part of therapy for a range of conditions, including blood malignancies, metabolic disorders and sickle cell disease, extending the length and quality of life of many patients.

Islet Cell Transplants

BY: SEAN DOUGHERTY

For diabetics, controlling blood glucose levels is essential to controlling the disease. In extreme cases it can be a nearly full-time job.

In Type 1 diabetes, most patients have a natural alert mechanism in that they become dizzy or forgetful when their blood sugar is out of balance. It's then that they realize they need insulin or sugar," said Julia L. Greenstein, Ph.D., of the Juvenile Diabetes Research Foundation. "A subset of that population loses those signals, which can put them at risk."

The 17 percent of Type 1 diabetics suffering from this hypoglycemic unawareness can achieve insulin independence with Islet cell transplantation. Islet (of Langerhans) cells are regions of the pancreas that help stabilize blood glucose levels. Transplanting these cells safely into diabetics is a long held goal of medicine. The biggest problem with the procedure, apart from the scarcity of cadaveric Islet cells,

is suppression of the immune system, which leaves patients vulnerable to infections.

"We have found that in this at-risk population of diabetics, Islet cell transplant can substantially reduce their mortality rate as well as risk of secondary complications," Dr. Greenstein continued.

Jose Oberholzer, MD, Chief of the Division of Transplantation at the

University of Illinois Medical Center and Professor of Surgery, Bioengineering and Endocrinology at UIC has performed Islet transplants since 1996. Part of the Chicago Diabetes Project, a multi-national academic effort coordinated by UIC, he hopes to solve the two biggest Islet cell transplantation problems: immunosuppression and a lack of cadaver cells.

"When I started, we needed Islet cells from two to four cadavers to make one patient insulin independent," said Dr. Oberholzer. "Now it is one-to-one. We can also achieve the result in larger

people." Initially, Islet cell transplantation only worked in underweight patients, but now is effective in anyone not morbidly obese.

To expand the number of Islet cells available, Chicago Diabetes Project researchers are studying adult precursor cells, a non-embryonic stem cell that can be coaxed into becoming an Islet, as well as micro-encapsulation, in which a shell protects the Islet from attack by the patient's immune system.



ADVANCED MEDICINE JUST GOT A LITTLE MORE ADVANCED.

It's no easy task to advance medicine, but through efforts like our groundbreaking islet cell research, we may one day give diabetics a chance to live without insulin injections. And our stem cell/bone marrow transplantation program, which gives hope to many patients who were once thought incurable with more conventional therapies. At UIMC, we're changing medicine. And we're changing it for good.

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 **University of Illinois Medical Center**
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Helping the Body Accept a Transplanted Organ

Advancing Drug Research

BY: MARLENE PITURRO, PHD

A normal body's immune system, led by its white blood cells, is always ready to combat foreign invaders. Detecting and then attacking bacteria, viruses and other intruders before they damage healthy organs and tissues, the immune system protects people from dangerous infections and diseases.

In contrast, a compromised immune system leaves the body vulnerable. Organ transplant recipients, who have an artificially suppressed immune response, live with this reality every day. The donated organ has given the recipient the gift of life, but the host has to be kept hospitable to the foreign organ through a delicately balanced drug therapy regimen.

The challenge to organ transplant teams is to turn off, or suppress, the recipient's immune system just enough to permit it to accept the donated organ while allowing it to continue fighting off ordinary intruders such as the common cold and pneumonia. "We give immunosuppressive drugs, in combination with other drugs such as corticosteroids, to transplant patients in hopes of preventing the white blood cells from hyperactively attacking and destroying the donated organ. The end result of this attack could result in organ rejection," said William Fitzsimmons, Pharm.D. and Senior Vice President of U.S. Development for Astellas Pharma Global Development.

All organ transplant recipients start on immunosuppressive drug therapy either immediately before or right after transplant. The medications are usually given orally, and their timing, dosage and combination are important to minimizing the risk of organ rejection. Dr. Fitzsimmons explained that physicians monitor their patients constantly for acute organ rejection, which happens in about ten to twenty percent of transplant cases.

Physicians monitor patients each hour directly after transplant surgery for any signs of organ rejection. Over time, as the transplant "takes," monitoring eases off and occurs daily rather than hourly. As the body accepts the donated organ, such scrutiny further tapers as patients live months and

then years without organ rejection. However, physicians always continue to keep an eye on their patients' drug therapies.

The track record of immunosuppressive drugs in keeping organ recipients alive is quite impressive. According to data released in 2007 by the Scientific Registry of Transplant Recipients (www.ustransplant.org), 90 percent of kidney recipients from living donors, 80 percent of kidney recipients and lung recipients from deceased donors, 76 percent of liver recipients from living donors and 75 percent of heart recipients were alive five years after transplant. Such survival rates represent a quantum leap from the first heart transplant performed nearly 42 years ago by Dr. Christiaan Barnard of South Africa's Grootte Schuur Hospital. The pioneering transplant surgeon's brave patient, Louis Washkansky, lived only 18 days before succumbing to pneumonia induced by a primitive anti-rejection drug regimen.

Just as remarkable as the percentage of patients surviving organ transplant is the sheer number of people living with one or more transplanted organs. That number has grown dramatically, as has the sophistication of the immunosuppressive regimens necessary to keep them alive. In 1999 there were 115,000 survivors of kidney, liver,

heart and lung transplants. In 2007 that number had jumped to 180,000. In large part, they owe their survival to advances in immunosuppressive drugs.

Anti-rejection drug therapy usually combines several drugs to minimize the risk of organ rejection. Astellas' Prograf® (tacrolimus) is the most commonly used immunosuppressive drug in the calcineurin inhibitor family. Ninety percent of liver, 80 percent of kidney and 60 percent of heart transplant recipients receive Prograf as part of their immunosuppressive regimen. "Usually, physicians combine Prograf with prednisone, a corticosteroid, and CellCept® (mycophenolate mofetil), another immunosuppressive agent. There is no 'cook book' approach to anti-rejection medications, so every transplant team develops its own combination to best serve its patients," explained Dr. Fitzsimmons. For example, physicians try to reduce corticosteroid use because of long-term complications including bone loss, fracture and high blood glucose leading to diabetes.

Recent research by teams of scientists at the National Taiwan University Hospital and the David Geffen School of Medicine at UCLA has found new ways to decrease the toxicity of anti-rejection drug therapy. By adding

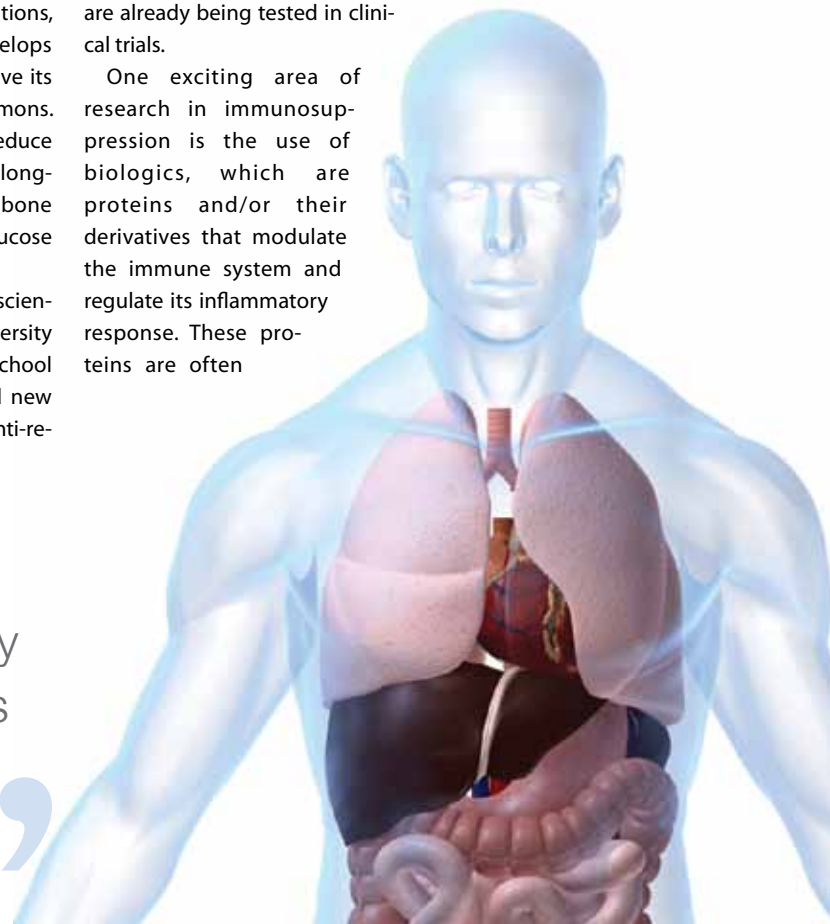
another drug, sirolimus (rapamycin), originally an antifungal agent found to have powerful immunosuppressive effects, they were able to reduce the levels of other drugs, hence lowering the chance of potential side effects.

The future of the immunosuppressive drug therapy industry is based on researchers continually improving outcomes for patients. "Today, most transplants work well early on, but can deteriorate over time if chronic rejection becomes a problem," noted Dr. Fitzsimmons. "As patients live longer we want to avoid that rejection and also find drugs that are better tolerated, because they are taken for such long periods of time." Dr. Fitzsimmons added that there are complex new drugs in the pipeline, some of which are already being tested in clinical trials.

One exciting area of research in immunosuppression is the use of biologics, which are proteins and/or their derivatives that modulate the immune system and regulate its inflammatory response. These proteins are often

produced from genetically engineered mice that produce proteins similar to human antibodies. In this case, human like antibodies are being created to fight chronic inflammatory diseases characterized by the body's overactive autoimmune reaction. These diseases include rheumatoid arthritis, multiple sclerosis, Crohn's disease and psoriasis. Since organ rejection subsequent to transplant closely resembles the overactive immune system response in autoimmune diseases, development of these extremely complex biologics may help prevent organ rejection. "We are developing a better understanding of biologics and the mechanisms of how they work. This is the key to altering the body's destructive autoimmune reactions, which will help organ transplant recipients as well as those who suffer from autoimmune diseases," concluded Dr. Fitzsimmons.

“ The future of the immunosuppressive drug therapy industry is based on researchers continually improving outcomes for patients... ”





Advancing the Future of Transplantation

Transplant Surgeon

Transplant Nurse

Nephrologist

Social Worker

Pharmacist



WE ARE PROUD TO SUPPORT TEAM JUDY

The life Judy now enjoys is a testament to your commitment and the dedication of every individual who is vital to the transplant team. Astellas is passionate about supporting your efforts—and your patients' success—by continuing to commit time and other essential resources:

- Extensive research aimed at new drug development
- Funding support for research grants and continuing education for healthcare professionals
- Enhanced patient assistance and reimbursement services
- Educating patients through the Transplant Experience program—with 75,000 members
- Donor awareness and community outreach programs

Like you, Astellas is devoted to advancing the future of transplantation.

Judy

Kidney transplant, 2002

Multiple Organ Transplants

Ken Woodka had been active his entire life, so it came as a shock when he discovered he had cardiomyopathy, a serious condition that would require a heart transplant. Unfortunately, doctors told him that his kidneys were not strong enough to undergo the transplant. Most probably he would end up on dialysis following surgery. As a result, he was rejected by six different hospitals as a poor transplant candidate. He eventually came to the University of Chicago Medical Center, where the transplant team offered a heart and kidney transplant, something that other hospitals could not handle.

Under the care of Allen Anderson, M.D. head of the cardiac transplant team, he was placed on the transplant waiting list. Five days later he found himself flat on his back being kept alive by two heart pumps. He was in desperate need of new heart and very lucky that a suitable donor was found at that time. He received his heart as well as a kidney from this donor. His kidney surgeon, Richard Thistlethwaite, M.D. explains, "When somebody needs a multiple transplant, they get organs based on the priority of the most necessary organ," in this case the heart. This is not typical as most patients wait a long time for a compatible donor. Dr. Anderson states that Mr. Woodka's

case was "quite unusual!" While he felt surprisingly weak following surgery, he eventually made a full recovery.

Mr. Woodka's story is not unique. Transplant team surgeons at the University of Chicago Medical Center have been performing multiple organ transplants since the 1990's and are among the top centers in the world for them, particularly for cardiac transplants. In fact, they have performed a total of 32 heart-kidney transplants, tying them for first in the nation with Cedars-Mount Sinai. The hospital also performed the first ever heart-liver-kidney transplant in the U.S.

According to Dr. Anderson, heart-kidney transplants such as Mr. Woodka's

are the most common, not only because kidney problems can result as a complication of many heart conditions, but also because immunosuppression drugs required after the heart transplant can cause serious kidney damage in patients with severe renal dysfunction. While multiple organ transplants are inherently more complicated than single organ transplants; the post-surgical treatment for multiple organ transplant patients is similar to patients receiving single organ transplants. Dr. Anderson says that "recipients of multiple organ donations have lower risk of organ rejection than single organ transplants," although the reasons for this are unclear.

Today, Mr. Woodka says he is back in the same condition he was in before becoming ill. While he still has to take immunosuppressive medications and has had to retire from work, he remains active, working out five days per week and playing golf. He says he doesn't feel any different physically, but he finds he appreciates his life more and is more upbeat. He is quite pleased with the care he has received. The hospital is also very happy with his recovery. "I'm their poster boy!" he says, noting several articles about him on their web site. While he has not had any post transplant complications, he has had to make some changes in his life. He tries to stay away from stress and can no longer drink alcohol, but he considers these to be small sacrifices. He is grateful for his new chance at life and belongs to IOPAL, an organ donation organization where he goes to schools to speak about the need for organ donors. Educating young people on why they should become organ donors has become his new mission in life. A life he credits to his doctors, as well as his wife, a bastion of support throughout the entire procedure.

BY: KEN GOLDSTEIN, PHD



Ken Woodka

COULD A
SNOW FLEA
REVOLUTIONIZE
ORGAN
TRANSPLANTS?

WE BELIEVE IT COULD.

By studying a protein found in snow fleas that acts like anti-freeze, physician-scientists at the University of Chicago Medical Center hope to find a way to preserve organs at lower temperatures without damaging them. Could an insect be the key to giving us more time to transport healthy organs to their recipients?

At the University of Chicago Medical Center, we ask questions like this every day.

Since performing the first organ transplant in an animal model, University of Chicago Medical Center transplant surgeons have pioneered new ways to save lives. We are the only Medical Center in the area taking part in the testing of a Liver Assist Device (LAD) that could offer patients a bridge to transplant — or possibly even a long-term solution — and our expert team is a leader in living-donor transplants. It's how we're changing the lives of those with liver failure all over the world. **How can we change yours?**

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AT THE FOREFRONT OF MEDICINE®

New Links: *The Kidney Transplant Chain*

BY: MARLENE PITURRO, PHD

The 82,601 people nationwide that the United Network for Organ Sharing (UNOS) estimates are awaiting a kidney transplant hope they will be as lucky as the 16,520 people who received a kidney in 2008.

They know the odds are against them because of the scarcity of kidneys relative to the number of people who need them. Of those organ recipients, about two-thirds received them from cadavers; the remaining 5,968 from living donors. "In a nation of about 350 million people we ought to do better than just shy of 6,000 live donors," says Bryan Becker, MD, National Kidney Foundation (NKF) President and Professor of Medicine at the University of Wisconsin School of Medicine and Public Health.

Dr. Becker, other kidney transplant surgeons, and various transplant advocates at some of the 250 transplant centers around the country are encouraging those willing to donate a kidney to a family member to consider alternatives when their blood types or antibodies are incompatible with the intended recipient's. Their options include a paired exchange or an altruistic donor chain. A paired kidney donation

happens when one donor agrees to give a kidney to a stranger, expecting that another stranger will donate a kidney to his or her loved one in return. According to UNOS statistics there were 127 paired kidney exchanges in 2007 and 248 in 2008.

Dr. Becker hopes that paired exchanges will grow to between 500 and 1000 in the next several years, which can be achieved more readily if UNOS meets its goal of developing a national registry of potential donor-recipient matches to replace the small medical center and regional registers that currently exist.

One obvious risk to a paired exchange is that the donor gets cold feet and backs out at the last minute. Dr. Becker explains that all donors are screened thoroughly physically and psychologically, and that last minute cancellations are very rare. Members of the transplant team explain the possible implications of living with

one kidney. According to Dr. Becker they include a higher likelihood of developing hypertension within five years, problems for obese donors, and 82 percent versus 100 percent kidney function. The procedure for donors is not major surgery; 92 percent of donor kidneys are removed laparoscopically and require a two or three day hospital stay. The medical costs are covered either by the recipient's insurance or through the transplant center's organ acquisition program.

On an even grander scale than paired exchanges are altruistic donor chains. Beginning with one altruistic donor, someone who is willing to donate a kidney without the expectation that a loved one will receive one in exchange, the chain starts as the first recipient's willing donor gives to another waiting recipient, and so on. So each living donor in the chain gives a kidney to a stranger waiting for a transplant. Such chains are not limited to the U.S.

Physicians such as Jochen Hayer, M.D., a German transplant surgeon, donated his kidney to an anonymous recipient to begin a chain in his country.

Large transplant centers with extensive years of experience such as Johns Hopkins Comprehensive Transplant Center and U.C.L.A. Transplantation Services have combined the mechanisms of paired exchange with the idea of a chain, choreographing a number of donors and recipients paired by surgeons into a transplant chain. Each link in the chain represents a donor-recipient pair managed by their respective transplant center's teams. Hopkins and U.C. L.A. have performed eight and 18 paired kidney exchanges, respectively.

Although the number of paired exchanges and altruistic chains is still small, the potential exists to reduce the 12 deaths daily of patients waiting for a kidney transplant. Coupled with UNOS' national registry, which may be operating in 2010, there is new hope.

Ask The Expert

How does an external artificial liver device, also known as Extracorporeal Liver Assist Devices or ELAD, help those in liver failure?

Liver assist devices assist the patient and the medical team in two ways. One is that it provides a bridge for patients who are in desperate need for a liver transplant potentially critical hours or days while a liver may not be available so they can stay in a shape in which they can still receive a transplant.

For a few patients, it may provide the ability and the time for the liver to recover so they may not need a liver transplant at that point in time. The liver may be able to fully recover. And in other patients, it may be able to get them over an episode in which they have become sick. But if they could recover from that, they could potentially go months or years without a liver transplant.

The University of Chicago Medical Center is the only hospital in the Chicago-land area where the liver device or ELAD is currently offered in a clinical trial.



Dr. J. Michael Millis; chief of the Section of Transplantation, professor of surgery, Director of the Transplant Center

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Alyssa Smith (second from left) and her mother, Teri celebrated her landmark surgery with 80 guests, including the physician who performed the surgery, Christoph Broelsch, MD (far left), as well as J. Michael Millis, MD, chief, Section of Transplantation at the Medical Center. Photo by David Christopher.

A Medical First, 20 Years Later

Twenty years ago, infant Alyssa Smith underwent a surgery that drew an entire country's attention.

Alyssa needed a new liver. However, patients who required liver transplants had to wait for cadaver donors. This created a long waiting list for infants—700 when Alyssa joined in 1988—because they could only receive livers from donors closer to their size. Approximately one-third of all children placed on the list died while waiting, according to J. Richard Thistlethwaite, MD, a surgeon and professor of transplant.

But Christoph Broelsch, MD, then-chief of the Medical Center's liver surgery service, had an idea.

Because the liver can regenerate, he reasoned, why not take part of a healthy, living adult's liver and transplant it into a child?

"Alyssa and (her mother) Teri were just the right patients to begin with," Broelsch said, remembering the historic surgery he performed 20 years ago this year. Mother and daughter were healthy and the right ages. In addition, Teri was eager but not overly nervous; she understood how the success of her daughter's surgery would impact future children and their families waiting for transplants.

At the time, the media were heralding the transplant: "If successful, the operation at the

University of Chicago would provide a solution to a severe shortage of organs for children who need transplants," wrote the Associated Press.

On November 27, 1989, Broelsch escorted Teri into the operating room. "(We) were at the same time calm and excited with anticipation because of the extensive preparation," said Thistlethwaite, who assisted in the operations.

For over 13 hours, surgeons removed Alyssa's liver and replaced it with one-third of her mother's. By 9 p.m., Alyssa's new liver was in place and functioning.

When reporters asked Teri why she decided to risk her life for her daughter, Teri responded, "Once you've given someone a big piece of your heart, it's easy to throw in a little bit of liver."

Alyssa graduated high school in 2006, and Broelsch—who

had left Chicago to return to Germany—wrote to her, encouraging Alyssa to "forget about the past and look upon (her) future."

Currently, Alyssa studies social work at Meredith College in Raleigh, N.C. and dreams of opening a support center for families and children who have undergone transplant surgeries.

The experience has changed the Smith family, and the Medical Center. Thistlethwaite said that the incidence of infant death while waiting to receive transplants has fallen to below 2 percent here, and that the transplant program "became the preeminent referral center for pediatric transplants."

On October 16, the Medical Center celebrated Alyssa's ongoing success and the 20th anniversary of her historic transplant with an all-day symposium on the legacy of organ donation.

Learn more at discover.uchospitals.edu or 1-888-UCH-0200.

Cornea Transplants A New View

Since 1947 the Illinois Eye-Bank, a division of Midwest Eye-Banks, has played a vital role in restoring sight for thousands of people. Dan Reynolds, the Eye-Bank's Communications Director, said that the role of the organization has evolved but that its core mission remains.

“We recover, evaluate and distribute eye tissue for transplantation and research. The Illinois Eye-Bank is responsible for almost half of the 4,000 corneal tissues distributed by

Midwest Eye-Banks for transplant each year,” Reynolds noted, adding that the cornea is the only part of the eye that can be transplanted.

Technological advances in corneal transplants have made it more avail-

able and speed patient recovery. According to Reynolds, “a major advance in corneal transplantation surgery occurred in the last four to five years with the introduction of endothelial keratoplasty (EK). Instead

of replacing the entire cornea, only the innermost layer is replaced.”

The Eye-Bank prepares corneal tissue for EK by slicing a very thin layer (only a few microns thick) to send to the surgeon. Rather than a major incision, a tiny one allows that small layer of corneal tissue to be inserted. The patient's own ocular pressure holds the graft in place and often provides better outcomes for the patient.

Tissue rejection, a substantial con-

cern with major organ transplants like kidney or heart occurs far less with corneal transplants than other organs. Reynolds explained that “cornea transplants are the oldest transplant procedures. The first successful one was done in 1905. Since the cornea is not nourished by blood, extensive matching and typing are not required.”

New Hope for Patients with Failing Hearts

Recent successes with VADs (ventricular assist devices) offer new hope to patients with failing hearts. According to John Herre, M.D., Co-Scientific Director of the Sentara Cardiovascular Research Institute and Director of the Sentara Advanced Heart Failure Program in Norfolk, Virginia, VADs are quickly becoming a permanent or “destination” therapy rather than being used exclusively as a bridge to transplant.

“At Sentara, our VAD patients are doing extremely well,” Dr. Herre said, reflecting survival results recently published in the *New England Journal of Medicine* following the HeartMate II Destination Therapy Trial.

Sentara participated in both the bridge to transplant and the newest destination therapy trials. The new study showed after two years, 46 percent of patients on the new pump and 11 percent of those on the older

pump were alive, without device failure or strokes.

Sentara numbers are consistent. Of the 21 Sentara patients who received VADs since 2005, 19 are still alive. “One patient, in his 50s with a variety of medical problems who would have been difficult to transplant, has been on a VAD for over three years, and is doing remarkably well,” Dr. Herre said. “His is the perfect example of future treatment for end stage cardiac disease. More patients will live longer, healthier

lives on VADs,” Dr. Herre noted. This is significant since only about 2,000 of the 75,000 Americans with end stage disease needing a transplant actually receive one.

Jeffrey B. Rich, M.D., Co-Scientific Director of the Sentara Cardiovascular Research Institute and cardiac surgeon concurs. “The newest generation of VADs are technology game changers and represent a cultural shift in the way patients with congestive heart failure are treated,” Dr. Rich said. He

sees the new VADs as being smaller, easier to implant and useful clinically to a broader patient population.

VADs are viable alternatives to transplant because technological improvements reduce the risk of stroke and infection. Generally, VADs have one wire connected to a controller with two batteries on the patient's belt. Because the batteries of newer VADs can sustain a charge for 18 hours, patients live active, normal lives. Dr. Herre predicts that by 2010 more than 4,000 American cardiac patients will receive VADs, more than double the number this year. “I believe we'll have a fully implantable VAD with an improved pump, battery and charger within five years,” Dr. Herre added.

For those patients who do use VADs as a bridge to transplant, the news is also good. VADs are improving the

health of patients once considered ineligible for transplants, making them candidates for new hearts. Sentara recently celebrated the 20th anniversary of its heart transplant program. Sixty percent of Sentara transplant patients are still living.

“The common age for transplant is 50-60. Our second patient received his heart in 1989 and is now 79 years old. It's amazing that some of our patients are in their 70s, living healthier and happier lives because of heart transplants and VADs,” notes Dr. Herre.



Ranked In 5 Specialties, Sentara Is Among The Nation's Best Hospitals.

For the past decade, Sentara has become a regular on the *U.S. News & World Report* annual list of America's top hospitals. This year, 4,861 hospitals across the country were surveyed. The magazine ranks only the “Top 50” hospitals in each specialty.

Sentara was recognized in five specialties – Sentara Norfolk General Hospital was ranked for Heart and Heart Surgery (Sentara Heart Hospital - 26), Kidney Disorders (42),

Geriatric Care (45), and Diabetes and Endocrine Disorders (45). Sentara Leigh Hospital made the 'Top 50' in Orthopedics (38) for the first time.

Sentara's exceptional physicians, nurses and clinical teams are to be commended for their expertise in achieving these rankings. This type of clinical excellence should be a major source of comfort and pride for our patients.



Pediatric Organ Transplants

Saving the Lives of the Youngest Patients

BY: EMILY Z. DAYTON

Pediatric surgeons who specialize in transplantation face complex obstacles to finding and implanting an organ into a child only weeks old and weighing five pounds.

New surgical techniques, better support devices and integrated transplant teams now increase the survival rate of children pre- and post-transplant.

Pediatric Heart Transplants

Children at risk of suffering heart failure due to congenital heart disease are often in urgent need of a pediatric heart transplant. However, it can take months to find a size-appropriate donor, and doctors must prevent the child's heart from deteriorating further during the waiting period. "One of the biggest impediments to the treatment of severe heart failure in kids has been the lack of reliable, long-term mechanical support," says Sanjiv Gandhi, MD, director of the Pediatric Heart Failure program at St. Louis Children's Hospital. Although various ventricular assist devices are available for adult patients, no such devices are FDA approved for use in children in the U.S.

The Berlin Heart, a ventricular assist device developed in Germany that is currently approved by the FDA for clinical trials and compassionate use, offers a promising solution for sustaining children awaiting a new heart. This small device mechanically pumps blood to the child's body to compensate for non-functioning ventricles. Dr. Gandhi is currently conducting research on the effectiveness of the Berlin Heart at St. Louis Children's Hospital, one of the institutions approved to participate in the U.S. clinical trial. "The Berlin Heart allowed us to save a lot of kids that we would not have otherwise saved because there was no reliable way for them to just sit here and wait for a donor organ," noted Dr. Gandhi. The Berlin Heart is also very effective in rehabilitating pediatric patients because children are mobile, gain strength and improve their condition before the transplant, which

results in a smoother recovery after the surgery. Although adverse effects such as infection and blood clotting can result from Berlin Heart use, Dr. Gandhi warns that the cost of waiting too long for a transplant outweighs these risks.

Pediatric Liver Transplants

Liver transplants in pediatric patients are most often performed because the child is born with biliary atresia, a congenital disease in which the bile ducts of a developing liver do not form properly and become blocked. New surgical advances along with the liver's natural ability to regenerate itself allow select transplant centers to offer different types of liver transplants and reduce the donor waiting time.

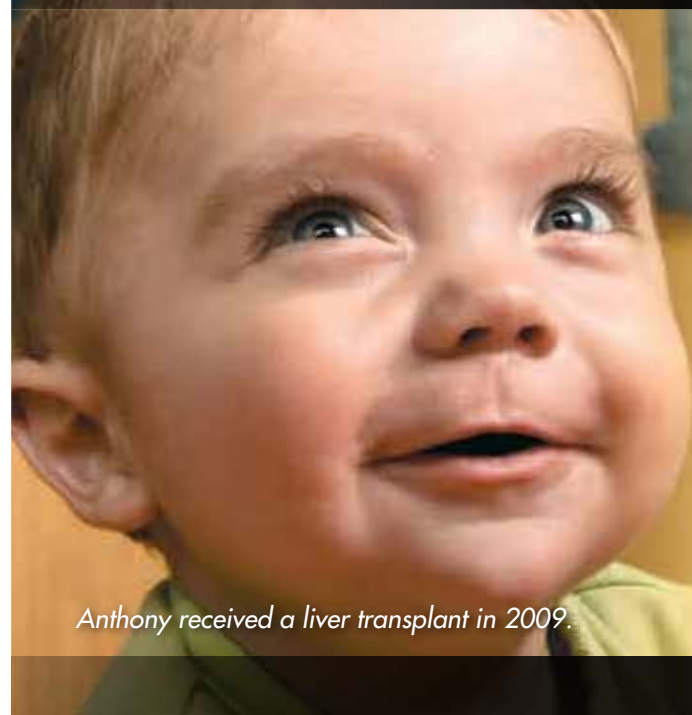
"A short waiting time is very important because the longer you wait, the sicker you get, and sometimes you can be too sick for a transplant," says Jef-

frey Lowell, MD, chief of the Pediatric Liver Transplant program at St. Louis Children's Hospital. "One way to have good options is to be able to use all the different potential donor sources that are available." Hospitals, like Children's, that offer the full range of liver transplants, including whole, reduced, split, and living donor, maximize the recipient's chances of the right transplant choice. Parents of children in need of a liver transplant can seek a second opinion from these hospitals and be placed on multiple donor lists. "If you're going to be listed at more than one center, it is better to choose one that has a shorter waiting time, otherwise it won't necessarily give you much of an advantage," recommends Dr. Lowell.

Dr. Lowell urges parents to research the offerings and success rates at various transplant centers and determine whether they have dedicated specialists and multidisciplinary transplant teams onsite who can provide quality care for both the child and the family before and long after the transplant.



We Love Giving Kids a Second Chance



Anthony received a liver transplant in 2009.

St. Louis Children's Hospital is at the forefront of pediatric organ transplantation in the United States,

thanks in part to its close association with Washington University School of Medicine. Centrally located in the Midwest, the hospital has an important geographic advantage over many other transplant centers, with the ability to retrieve organs from virtually anywhere in the country. It is also at the forefront of stem cell transplantation for both malignant and non-malignant disorders.

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Stem Cells and Type 1 Diabetes

Dr. Jon Odorico believes stem cells can cure type 1 diabetes, making kidney failures and subsequent transplant a thing of the past.

"Type 1 diabetics are deficient in pancreatic beta cells, which are destroyed by an autoimmune reaction," says Dr. Odorico, a surgeon with the transplant program at UW Hospital and Clinics in Madison. "Currently, doctors replace the function of damaged or lost beta

cells with injectable insulin or by transplanting the entire pancreas or insulin-producing beta cells from deceased donors. Our goal through regenerative medicine is to harness the power of human embryonic stem cells (HESC) to produce plentiful beta cells that function properly," he explains.

While Dr. Odorico's research goal is perhaps five to ten years away from reaching the clinical trial stage, he's right to think big. HESC research originated at the University of Wisconsin in 1998, led by the pioneering scientist Dr. James Thomson, who today is director of the university's Regenerative Biol-

ogy Institute. "The promise of stem cell therapy is still huge. Ultimately, we need much more transplantable tissue and organs than are available. If we can get stem cells to differentiate into specific cell types, we'd have a renewable source of replacement cells and tissues to treat a host of diseases," explains Dr. Odorico.

Researchers such as Dr. Odorico can already make abundant precursor beta cells, but that's still far from the ultimate goal: unlocking the mechanism that

BY: DR. MARLENE PITURRO

transforms the patient's own stem cells into the desired tissue or organ, such as beta cells or a kidney, to replace the patient's diseased organ. An organ created from the patient's own stem cells would not be rejected as foreign, thereby eliminating the problems involved with immunosuppression.

Adult Stem Cells *Repairing Damaged Hearts*

During a heart attack, the heart muscle sends a desperate signal to the bone marrow, telling it to release undifferentiated stem cells, which then rush to the heart to repair its damaged myocardium and muscle.

The injured heart stops signaling for stem cells after about a week, leaving the mending job incomplete. Dr. Takushi Kohmoto, director of the mechanical assist device program at University of Wisconsin Hospital and Clinics in Madison, suggests that in the days when human life expectancy

was only 30 or 40 years, the stem cells' short-term work was enough to get the job done. With modern man living to 70, 80, and 90 years, physician-researchers will have to engineer stem cells to extend their efforts to meet the aged heart's demands.

Dr. Kohmoto and his colleague, Dr.

Entela Bua Lushaj of UW's division of cardiothoracic surgery, are using mice to help them discover how to get stem cells to fully regenerate damaged heart cells, called cardiomyocytes.

"We are injecting different kinds of adult stem cells into damaged mouse cardiac tissue, hoping that

they differentiate into three types of cardiomyocytes. It is working to some extent, but not yet enough to regenerate the heart," explains Dr. Lushaj. A major challenge is producing enough stem cells to get the job done, because many stop growing and die while others continue to function.

According to Dr. Kohmoto, human clinical trials involving stem cells and cardiomyocytes are probably at least two years away. He and his colleagues hope that some day, patients with

BY: DR. MARLENE PITURRO

hearts that have been severely damaged by myocardial infarction or heart failure can use their own stem cells to regenerate heart tissue and avoid more serious consequences. "Our goal is that patients on LVADs [left ventricular assist devices] would improve enough with stem cell therapy to repair the left ventricle, thereby avoiding the need for a heart transplant," says Dr. Kohmoto.

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To review program data visit uwhealth.org/transplant

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Life After Transplant

For many organ transplant recipients, surgery opens the door to a new life.

It is also the first step in the road to recovery, and organ transplant recipients must take extra care to ensure the long-term health of their newly transplanted organs. "Detailed education for transplant recipients and their families is an integral part of making the transplant a success," said M. Roy First, M.D., Vice President and Therapeutic Area Head of Transplantation at

Astellas Pharma Global Development. The patient must know what to expect after the procedure, understand the importance of taking their medications exactly as prescribed, and appreciate the importance of a healthy lifestyle for the years ahead.

In order to prevent organ rejection and infection, patients take a combination of medications tailored to the type

of transplant they received and to their individual needs. "It is crucial to take these drugs precisely as prescribed, and the dose should never be missed," said Dr. First. Patients should check their medications to ensure they match what their doctor prescribed. Patients should also be aware of organ rejection and infection signs, which include flu-like symptoms, high blood pressure,

sudden weight gain and shortness of breath.

"Good nutrition is essential after an organ transplant," added Dr. First. "Most transplant recipients have a better appetite after their transplant, but they need to monitor their diet to avoid problems such as excessive weight gain and high cholesterol." Exercise helps to lower blood pressure, improve cardiovascular health, maintain a normal weight and regulate blood glucose

BY: EMILY Z. DAYTON

levels. It also makes it easier for transplant patients to sleep and relax, and for many, "improves the overall feeling of wellbeing after the transplant," said Dr. First.

Organ transplant recipients, their families and caregivers may visit www.TransplantExperience.com to learn more about what to expect after a transplant and how to maintain good health.

A Mother's Gift

Carolyn and Joshua Nelson have a unique bond that transcends a typical mother and son relationship.

Carolyn gave her son one of her kidneys, and a second chance at life.

Joshua, now 13, was born with one kidney that did not work and another kidney that functioned at only 12 percent capacity. He underwent his first surgery at 4 days old when a peritoneal dialysis catheter was implanted in his

stomach. From that day forward until he was 3 years old, Joshua underwent dialysis from seven o'clock at night until seven o'clock in the morning each day. Doctors stopped the dialysis treatments when Josh's condition improved, but soon after, Joshua's single, semi-functional kidney was unable to sustain him further, and doctors re-

sumed dialysis when he was 6 years old.

Joshua's doctors discussed kidney transplantation with Carolyn and Joshua from the time they first diagnosed his disease. His condition worsened again at 6 years old and the search for an organ donor began quickly as the need for a transplant was imminent. They started searching within the fam-

ily and his mother, Carolyn, turned out to be a strong match. Doctors agreed that Carolyn was the best candidate to donate a kidney. "I think my mom was more scared than I was about the transplant," said Joshua. He was 7 years old when he received the new kidney and he recovered fully three months after surgery. Today, Joshua is a Passion Panel member with Mid-America Transplant Services, for which he speaks to schools about organ donation and transplant.

Most recently, he entered the Astellas

BY: EMILY Z. DAYTON

Pharma US, Inc. Ride of a Lifetime 2010 essay contest, which awarded him a trip to Pasadena to ride on the Donate Life float in the Rose Parade. "They told me that I won and I was about ready to scream," said Joshua.

Learn more about the Ride of a Lifetime contest, read inspiring stories, and access your state donor registry. Become a fan of the official Donate Life America Facebook page at www.Facebook.com/DonateLife.

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