4 for 5 year overall survival data after HLA-identical transplants, MUD transplants and autologous transplants for a variety of diseases. HLA-haplomatched (halfmatched) related donor allogeneic stem cell transplants have been performed in the new world as well as in the old world but in limited numbers. They are of the same difficulty as MUD transplants (read toxicity). The question, then, that Pete and I posed to each other was could mini-HLA-haplomatched allogeneic transplants be done using the same methodology as in his HLA identical sibling mini-transplants? If successful, there would be mixed chimerism, bi-directional tolerance, and dynamite GVT. At the time of this writing we have performed 13 of these HLA-haplomatched transplants. We are using a fixed number of CD34+ cells/kg and slowly escalating the number of T cells/kg in the graft after only 100 cGy of total body irradiation. Patients have tolerated the regimen very well so far. Patients with solid tumors and patients with hematologic diseases are both eligible. In the future, we will test donor ATC as opposed to quiescent donor T cells. GVT with quiescent donor T cells or donor ATC may be considered the allogeneic ultimate in the strategy of immunoconsolidation therapy.

The Closer

Now the closer, the ultimate in bringing the bench to the bedside, in combining immunology with experimental hematology, and in using adult stem cells to treat diseases other than those of the hematopoietic system or to attack cancer. We are working on a project in which adult stem cells will be targeted to ischemic myocardium with bispecific antibodies. If this troika of cardiology, stem cell biology, and immunobiology is successful, we'll be in the brave new world of treating ischemic heart disease and, potentially, congestive cardiomyopathies, in the future.

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Infections in the Transplant Recipient

Staci A. Fischer, MD

Despite advances in allograft matching, transplant surgical techniques, and immunosuppressive agents, infection remains a significant complication of renal transplantation. As recipients survive longer following transplantation, primary care physicians and nephrologists in the community must be aware of the epidemiology and clinical behavior of infection in the post-transplant patient.

Fever, considered a cardinal sign of infection in the immunocompetant host, is often absent in the transplant recipient, in whom corticosteroids attenuate the febrile response.[1,2] Leukocytosis may be absent as the result of azathioprine or mycophenolate mofetil therapy.[3] As a result, familiarity with the clinical presentation and timing of infections after transplantation are critical in reorganizing the presence of infection in these complex patients.

Presentation of Infection in the Post-transplant Patient

The clinical presentation of infections in renal transplant recipients may differ significantly from that in immunocompetant hosts.[4,5] Patients may present with vague symptoms such as fatigue, dyspnea, headache, malaise and/or chills, often without fever or leukocytosis. Notably, these symptoms are consistent with rejection as well as infection, so that aggressive diagnosis is warranted in evaluating these patients.

One of the most common focal complaints is that of nasal congestion. Azathioprine commonly causes this, and may increase the risk of upper respiratory infections such as sinusitis and otitis media in post-transplant patients. In addition to adenovirus, rhinovirus, *Streptococcus pneumoniae*, nontypable *Haemophilus influenzae* and other pathogens associated with such processes in normal hosts, more complex infections due to *Pseudomonas* species and fungi such as *Aspergillus* or the agents of mucormycosis may also be seen in the transplant patient. While empiric therapy for these and other infections may be necessary, antibiotics must be chosen carefully and patients followed closely for responses. If no response is seen in two to three days, or if symptoms progress, prompt referral to the transplant center should be obtained.

Diarrhea and other gastrointestinal symptoms (including nausea) pose another diagnostic dilemma in post-transplant patients. While taking numerous medications capable of producing gastrointestinal toxicity, these patients commonly present with cytomegalovirus and other infections with nausea or vague gastrointestinal complaints, often without significant fever. Early performance of stool studies (including examinations for white blood cells, enteric bacterial pathogens, ova and parasites, *Clostridium difficile* and *Cryptosporidium*) is indicated in the evaluation of diarrhea, with prompt endoscopic evaluation including biopsies in any patient with persistent gastrointestinal complaints.

Timing of Infections Following Transplantation

Because immunosuppressive therapy is most aggressive in the first year following transplantation, most patients are at greatest risk for opportunistic infection in the first twelve postoperative months.[5] Such pathogens include viruses such as **cytomegalovirus (CMV)**, **herpes simplex virus (HSV)** and **Epstein-Barr virus (EBV)**; fungi such as *Cryptococcus neoformans* and *Pneumocystis carinii*; higher-order bacteria such as *Nocardia asteroides*; and mycobacteria including *Mycobacterium tuberculosis*. Patients requiring additional immunosuppressive therapy or infected with certain immunomodulating pathogens such as CMV or hepatitis B or C are at greater and more prolonged risk for infection from these opportunists.

The time following transplantation has been divided into three periods: the early period (the first month post-transplant), when infections complicating the surgery itself, such as wound infections, urinary tract infection and pneumonia, occur; the middle period (1-6 months post-transplant), when more typical opportunists like CMV cause infection; and the late period (>6 months post-transplant), when opportunists such as *Pneumocystis carinii* and *Cryptococcus neoformans* typically cause disease.[5] (Table 1).

Renal transplant recipients are at particular risk for urinary tract infection, including pyelonephritis of the allograft.[6] In the immediate post-transplant period, infection may be the result of transmission of bacteria or fungi with the allograft itself. The presence of ureteral stents and bladder catheterization increases the risk of nosocomial urinary tract infections. Recipients of cadaver allografts with prolonged ischemic times are at particular risk for pyelonephritis as well as surgical wound infection.

Pathogens of Particular Concern in the Transplant Recipient

Legionella pneumophila is a fastidious gram-negative bacillus that is widely distributed in environmental waters and potable water systems and may cause sporadic or epidemic disease.[7] Patients typically present with fever, malaise and myalgias, followed by a dry cough which may be associated with pleuritic chest pain, abdominal pain, diarrhea and/or headache. Chest radiographs most commonly reveal unilobar alveolar infiltrates, although multilobar infiltrates and small pleural effusions may be seen. Hyponatremia may be a clue to the presence of *Legionella pneumonia*. Diagnosis requires growth on selective media. Direct fluorescent antibody staining of sputum or bronchoalveolar lavage specimens may be useful while cultures are pending. Treatment consists of 21 days of azithromycin or quinolone therapy. Due to significant interactions with erythromycin, this antibacterial drug should generally be avoided in the transplant setting.

Listeria monocytogenes colonizes the gastrointestinal tract and may produce bacteremia, meningitis or meningoencephalitis, typically in the middle or late periods.[8] Patients usually present with fever, headache and/or altered mental status. **Cerebrospinal fluid (CSF)** examination typically reveals a neutrophilic pleocytosis and hypoglycorrhachia; gram

staining generally fails to demonstrate the characteristic gram-positive organisms. Culture of blood and/or CSF remains the cornerstone of diagnosis. Penicillin or ampicillin (or trimethoprim-sulfamethoxazole in the penicillin-allergic patient) is recommended for 21 days.[9] Third generation cephalosporins, commonly employed as the empiric therapy of acute bacterial meningitis, are ineffective against Listeria.

Nocardia asteroides may cause pneumonia and/or brain abscess, usually in the middle period.[10,11] Fever and cough are common with nodular or cavitary infiltrates on chest roentgenogram. Metastatic abscesses may develop in the brain, skin, bone, liver, kidney or joints. Modified acid-fast staining of tissue specimens may reveal the characteristic beaded, branching filaments; culture is diagnostic. Trimethoprim-sulfamethoxazole is the antimicrobial of choice for *Nocardia* infection, typically administered for 12 months.

Cytomegalovirus **(CMV)** is the most common infection following transplantation, and usually develops in the middle period.[12,13,14] Disease is most common and severe in patients seronegative for CMV pretransplant who receive a CMV seropositive kidney. Patients may present with flu-like symptoms (CMV syndrome), nonproductive cough associated with bilateral interstitial and alveolar infiltrates (pneumonitis), nausea and bloating (gastritis), diarrhea or gastrointestinal bleeding (colitis), visual acuity changes (chorioretinitis), or more uncommonly, with hepatitis, pancreatitis, myocarditis or encephalitis. Prolonged fever or malaise may be symptoms of CMV infection of the transplanted kidney itself. Diagnosis generally requires histologic evidence of CMV, with the presence of characteristic intranuclear inclusions in tissue specimens; culture may be helpful. Treatment consists of intravenous ganciclovir administered for 14 to 21 days.

Epstein-Barr Virus (EBV) may cause a febrile mononucleosis-like syndrome, although splenomegaly and pharyngitis are uncommon and the heterophile antibody test is often negative.[15] Diagnosis requires culture of EBV from normally sterile body sites and/or positive immunofluorescence studies on tissue samples. Although acyclovir is commonly prescribed, its clinical utility has not been demonstrated in this setting. The most feared complication of EBV infection is **post-transplant lymphoproliferative disorder (PTLD)**, a proliferation of previously infected, transformed B lymphocytes that may be malignant. Most PTLD patients present with fever and lymphadenopathy, sometimes with pulmonary or hepatic involvement. As this entity often requires withdrawal of immunosuppression, patients with suspicion of PTLD should be referred to the transplant center for definitive diagnosis and therapy.

Patients may present with vague symptoms such as fatigue, dyspnea, headache, malaise and/or chills, often without fever or leukocytosis.

Pneumocystis carinii, now classified as a fungus, may present with fever, dyspnea and nonproductive cough of subacute onset, most commonly in the first year post-transplant.[16] Chest radiographs typically reveal diffuse interstitial infiltrates, and hypoxemia may be present. Bronchoalveolar lavage fluid or tissue specimens reveal the characteristic cysts upon silver staining. As fewer organisms are generally present in transplant patients than in those with HIV infection, examination of expectorated sputum is insensitive. Treatment consists of high dose trimethoprim-sulfamethoxazole for at least 14 days.

Aspergillus species may cause pneumonia in the early or middle periods.[17,18] Patients typically present with fever and a dry cough, although with vascular invasion, hemoptysis and pleuritic chest discomfort may develop. Hematogenous spread to the brain may result in confusion and/or focal neurological deficits. Computed tomography scans reveal low-density lesions with minimal contrast enhancement, and cerebrospinal fluid cultures are generally negative. Amphotericin B should be instituted immediately in these patients, as the mortality rate remains high (>90%).

Candida albicans and other candidal species, common gastrointestinal tract and skin colonizers in post-transplant patients, may cause wound infection, pyelonephritis, fungemia, esophagitis, or other serious infections. Amphotericin B should be used in acutely ill patients, or fluconazole in the patient with non-life threatening disease involving susceptible species.

Prophylactic Antibiotics

Some of the opportunistic infections discussed above are preventable. Patients are generally placed on daily or thrice weekly **trimethoprim-sulfamethoxazole (TMP-SMX)** for prophylaxis of *P. carinii* and *Toxoplasma gondii* in the first year following renal transplantation.

As mucocutaneous fungal infections, most notably oral candidiasis, are common in the early period, topical antifungal therapy with nystatin solution or clotrimazole troches is commonplace.

Patients may also receive prophylaxis against CMV and/or HSV infection. There are dozens of published trials of a variety of agents, often used sequentially or in combination, to prevent CMV disease. In general, recipients without prior evidence of CMV infection who receive a kidney from a similarly CMV-naïve donor do not require specific CMV prophylaxis, although any blood products administered to them should be CMV seronegative, irradiated or filtered to remove the white blood cells which latently carry the virus. Other kidney transplant recipients should be prophylaxed against CMV using antiviral agents such as ganciclovir, valganciclovir or valacyclovir for 3 to 6 months after transplantation.[19] Because the prevention and early diagnosis of CMV infection and disease is of utmost importance in the care of the transplant patient and represents an area of constantly changing diagnostic and therapeutic modalities, these aspects of the patient's care should be dictated by the transplant center.

Immunizations, important elements of infection prevention in all patients, are less effective and sometimes contraindicated in the transplant recipient.[20,21] While the influenza vaccine is typically administered to transplant recipients annually, their seroconversion rate is substantially lower than that of the healthy adult population. Live virus vaccines (i.e., the measles-mumps-rubella, yellow fever, Bacille-

Calmette-Guerin or BCG, and oral polio virus vaccines) are contraindicated in all immunosuppressed patients, as they have been associated with the development of disseminated infection in these settings. Studies of the Varicella vaccine are underway to evaluate its use in susceptible transplant recipients; many transplant centers are administering this vaccine to seronegative patients pretransplant.

Guidelines for the Care of the Post-transplant Patient

Care of the renal transplant recipient inevitably involves monitoring his or her household contacts — looking for signs of potentially transmissible infections from humans and pets alike. In general, frequent hand washing by all household members (especially children) is the most important intervention to be made. A veterinarian should evaluate pets regularly, and the transplant recipient should avoid direct contact with animal excrement, the source of many pet-transmitted opportunistic infections. Significant animal scratches and bites, including those from healthy-appearing cats or dogs, should be evaluated quickly in the post-transplant patient, as a number of serious infections (most notably those from *Capnocytophaga* species and *Pasturella multocida*) may result.

Children living with or in frequent contact with the renal transplant recipient should not receive the oral polio vaccine, which is associated with fecal shedding of live viral particles for weeks to months following administration. In these children, the parenteral, inactivated polio vaccine should be administered instead.

Transplant recipients should avoid ingestion of undercooked meats, unpasteurized milk products and raw seafood, and should seek infectious disease consultation prior to any trips outside the continental United States for specific infection prevention instructions.

Antibiotic Selection in the Post-transplant Patient

While antimicrobial spectrum is the primary consideration in choosing empiric therapy in this patient population, it is critical to recognize the potential drug interactions that may occur when some common antibiotics are used.[22]

Some macrolides, including erythromycin and clarithromycin, are metabolized via the cytochrome p450 system and may dramatically increase cyclosporine and FK-506 serum levels, resulting in nephrotoxicity. Azithromycin and clindamycin, which utilize alternate routes of metabolism, are considered safe to use. The use of itraconazole and ketoconazole may have similar effects.

The use of doxycycline, isoniazid and rifampin may accelerate cyclosporine and FK-506 metabolism, resulting in subtherapeutic serum concentrations. The use of nephrotoxic agents such as the aminoglycosides and amphotericin B should be approached with great caution in patients on cyclosporine or FK-506. With the increasing number of cephalosporins, quinolones and liposomal amphotericin B products available, avoiding more toxic antimicrobial drugs is becoming easier with time.

Conclusion

The care of the renal transplant recipient requires a team approach, with thorough patient education, aggressive surveillance and effective prophylaxis and treatment of the inevitable infections which develop. The primary care physician serves as a critical link between the patient and the transplant center. Armed with a general background in post-transplant opportunistic infections and a commitment to detailed evaluation, nephrologists and general internists may contribute more effectively to the life and care of these complicated patients.

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Live Donor Renal Transplantation

Paul Morrissey, MD, and Bette Hopkins-Garcia, RN, MS, CCTC

Kidneys can be purchased for live donor renal transplantation in Turkey, India, Iraq and other nations.[1] These "donations" are legal in some countries, overlooked in others and unfortunately often managed in a "black market" where the middleman (facilitator) takes a cut of the procurement fee. While this practice can be viewed from many sides (ethical, medical, social justice, utilitarian) it highlights the fact that most patients are not thriving on dialysis, the majority favor transplantation as an alternative, that there is a worldwide shortage of cadaver organs and that live donor transplantation is the best therapy for **end-stage renal disease (ESRD)**. I will explore these issues with reference to the state of renal transplantation in Rhode Island.

Historical Perspective

Prior to 1954 nobody survived ESRD. The successful identical twin kidney transplant performed at the Peter Bent Brigham Hospital on December 24, 1954, offered hope to those in need of renal replacement. Identical twin transplantation remained the only viable option for treating ESRD until 1960 when the first immunosuppressive therapies were added. Hemodialysis was introduced in the 1960s; by the end of that decade centers were established in many major medical centers throughout the United States.

Dialysis did not become widely available until Congress amended the Social Security Act in 1972 to provide Medicare coverage to people with ESRD. A patient was dialyzed on the floor of Congress to demonstrate this new therapy. Joseph Chazan, MD, established the first public hemodialysis unit in Rhode Island at the Rhode Island Hospital in 1970. Less than three years later the first "free-standing" unit opened in East Providence. **Continuous ambulatory peritoneal dialysis (CAPD)** was introduced shortly thereafter. Since that time patients with ESRD have had three treatment options: hemodialysis, CAPD and renal transplantation.

Steady progress has been made in the safety and efficacy of all renal replacement therapies. With the advent of new immunosuppressive agents, renal transplantation has become safer and more successful. One-year allograft survival rates of 50%, common in the 1970s, improved to 80% in the 1980s and are now >85% for cadaver renal transplants and >94% for live donor renal transplantation. In 1999, 12,485 renal transplants were performed of which 8011 were from cadaver donors and 4474 from living sources.[1]

ESRD affects persons of all ages. The average age of persons starting dialysis is 61 years old. The incidence of ESRD is increasing most rapidly in the older age groups with 35% of all new patients older than age 65. An increasingly difficult task is choosing the appropriate ESRD modality for older persons with hypertensive nephrosclerosis, type II diabetes mellitus and advanced arteriosclerosis. The prevalence of ESRD (1997) according to Medicare records was 1,105 per million. In Rhode Island, a state of 1,053,000 persons, approximately 900 persons are on dialysis and 400 have functioning renal transplants.

Living Donors

Live donor renal transplantation (LDRT) is the optimal therapy for most patients with ESRD.[3] Some patients are excluded due to comorbid illness, advanced age with limited life expectancy and social instability (noncompliance). Over 50,000 patients are on the national waiting list for a renal transplant, including 2000 patients in New England where we typically recover organs from 170 brain-dead organ donors per year. The typical wait for cadaver renal transplantation in New England is 2 years for ABO=A or AB and 3 - 4 years for ABO=O or B. Recent data suggest that the less time spent on dialysis the better the patient's outcome.[3] Given the long waits in New England, this can only be achieved by securing a live donor.

Nationally, living donors provide 36% of all kidneys transplanted and the number is steadily increasing. (Table 1) However, this pattern is not seen worldwide with the number of LDRT per million population reported in 1997 as: USA (14.1), Canada (9.5), UK (2.8), France (1.2) and Spain (0.5). At RIH, 119/256 (46 %) transplants have come from a living donor and LDRT comprised more than half of the transplants in the past two years.

Kidneys from live donors provide superior results to cadaver sources. (Table 2) Both one-year and long-term success rates are excellent. Immediate function of the kidney occurs in 19/20 cases and 98% of transplanted patients have a functioning allograft at one month. Initial immunosuppressive requirements are less than for cadaver renal transplants, as is the risk of early acute rejection. As a result, the attendant infectious complications and the predictable side effects of chronic immunosuppression are decreased. In

Table 1. Growth in Live Donor Renal Transplants (LDRT) in the U.S. and Outcomes

	Number of Transplants		One-Year Graft Survival	
YEAR	LDRT	CRT	LDRT	CRT
1991	2393	7281	90	81
1993	2851	7510	91	83
1995	3359	7689	93	85
1997	3907	7767	94	87
1999	4474	8011	95	89

Table 2. Live Donor (LDRT) versus Cadaveric (CRT) Renal Transplantation.

Item	LDRT	CRT
Allograft half-life	16-19 years	10-12 years
Waiting time	2 - 4 months	24 - 48 months
Donor Age	18 - 60	4 - 80
Quality of kidney	Excellent	Good to excellent
Immediate function	95 %	50 %
Average hospital stay	5 - 7 days	7 - 14 days
Immunosuppression	Lower doses	Standard
Risk of acute rejection	5 - 10 %	15 - 20%

contrast to cadaver renal transplantation, a live donor transplant can be scheduled electively, typically within 2-3 months of initiating evaluation, and is more likely to be an early or even the initial ("preemptive") treatment for ESRD.

The Living Donor

The benefits of LDRT must be balanced with the risk of major surgery in an entirely healthy person. The donor's benefit is slightly less tangible - derived from the satisfaction of helping a loved one. Potential living kidney donors must meet five basic requirements: (1) good to excellent health, (2) ABO-compatible with the recipient, (3) two kidneys with normal function, (4) crossmatch negative (nonreactive) - no lysis of donor lymphocytes by recipient's serum and (5) properly motivated without evidence of financial remuneration or coercion. In short, a potential donor for an unsensitized (lacking preformed antibodies) recipient must be a healthy, willing, and ABO-compatible individual with normal renal function.

In our experience, the donor source has been sibling (46), child (25), parent (15), spouse (9), distant relative or in-law (9), friend (11) and stranger (4). Thirty-three of the donors were unrelated to the recipient. The four "stranger" donors included a Buddhist priestess from Vermont who contacted our program in 1998 wishing to donate a kidney to anybody on our list.[5] After proceeding with a psychological evaluation and the routine medical work-up the New England Organ Bank was contacted to assist in selecting the appropriate recipient. On May 22, 1998 the live donor transplant occurred from an "anonymous" donor who never crossed paths with the fortunate recipient of her good will. Two other "strangers" were part of a two-way swap agreed upon to match ABO incompatibilities. Two children, each unable to donate to his mother, donated a kidney to the other family in a series of simultaneous surgeries. A fourth stranger donation took place under a novel program, "Hope Through Sharing", which allows persons waiting for a kidney transplant to move to the top of the list when a relative, with an incompatible kidney, donates to a stranger on the list. On August 27, 2001, a woman donated her kidney to the top ABO-compatible patient at Rhode Island Hospital and her ABO-incompatible husband became the top listed person in his blood group for all of New England. This gentleman, listed for only four months, received a cadaver kidney 11 days later. As a result of this living donor, two persons were transplanted - the donor's husband and a fortunate second patient who received a living donor allograft.

Kidneys from live donors provide superior results to cadaver sources.

Morbidity and Mortality of LDRT

Although widely accepted as standard practice in the U.S., some centers continue to be reluctant about the use of live donors for transplantation. This is a truly unique circumstance in medical practice - placing an individual "at risk" for the benefit of another. While our society accepts individuals taking risks and occasionally losing their lives for an overall good (fire fighters, soldiers and police officers), some believe that the medical profession should operate under a different standard. Major concerns for the donor include the potential morbidity and mortality of the donor nephrectomy, long-term function of the remaining kidney and the psychological well being of the donor. Donor mortality, typically from pulmonary embolism or a peri-operative cardiac event, is about 0.03 - 0.05%.[6] Previous studies have reported morbidity rates of 8 - 24%. Long-term follow-up (20 - 30 years) demonstrates that renal function remains stable. Occasionally the donor will develop insignificant microscopic proteinuria years after nephrectomy. Quality of life studies and psychological assessments after kidney donation reveal that most (> 93%) were happy to have donated and > 95% would or probably would donate again given the same circumstances. Quality of life studies show that kidney donors surpass the national norms even years after donation. One recent study also reveals that the life expectancy for kidney donors is greater than average.

Experience with LDRT at RIH

Our overall experience at RIH with LDRT has been excellent. The donor and recipient operations are performed simultaneously in adjoining

operating rooms. The kidney is recovered from a flank incision between the 11th and 12th ribs. Immediate function occurred in 113/119 transplants with two cases each of slow graft function, delayed graft function (one dialysis session required after surgery), and primary graft nonfunction. The overall initial success rate was 98% and graft survival at one year was 93%. The primary reason for graft failure was recipient death with a functioning renal transplant (6 cases). Two grafts never functioned and two were lost to recurrent acute rejection.

Of primary concern in this venture is the wellbeing of the healthy donor. Operative complications following 119 donor nephrectomies were limited to one wound infection, one UTI, two cases of pneumothorax and one blood transfusion. Five cases were performed laparoscopically with the kidney removed intact through a 3-inch incision in the pubic hairline. This procedure provides a quicker postoperative recovery, better cosmesis and has encouraged some people to donate who would not have agreed to an open procedure. In our hands, laparoscopic donor nephrectomy has been performed with a level of safety that mirrors the open procedure. Following donor nephrectomy the average patient uses parenteral narcotics for 2 - 3 days and oral narcotics for one week. Donors have been discharged home in 3.85 ± 0.67 days and typically return to work in 2 - 6 weeks. In Rhode Island most donors qualify for **Temporary Disability Insurance (TDI)**. Although the entire cost of kidney donation is covered by the recipient's insurance, many donors lose vacation time and wages.

Efforts to Increase the Rate of Transplantation

For most persons with ESRD kidney transplantation and in particular kidney transplantation from a live donor represents the best option for long-term survival, a high quality of life and reduced complications. We are limited by the availability of kidneys to transplant. Cadaver donors are increasing in age and many kidneys considered unacceptable five years ago are being transplanted into appropriately matched recipients as "marginal" organs or even as dual renal transplants (two marginal kidneys transplanted into a single recipient). Efforts continue to increase the availability of live donor kidneys as we extend the social acceptability of unrelated and stranger organ donation. Interestingly, in a Gallup poll this year 80% of respondents supported stranger kidney donation. Furthermore, respondents answered that they would (24%) or probably would (21%) donate a kidney to a stranger in need for free. This remarkable response has not been realized in practice (only a few hundred altruistic donations have occurred), but it implies an untapped resource. At RIH, we have formed a committee of hospital staff and social workers to review potential altruistic donors. More information is available at our website www.lifespan.org/transplant/donor/altruistic.

Future Consideration

Despite the generosity of the public and their good intentions expressed in the Gallup poll, we have a critical shortage of organs for transplantation. Innovative practices have led to increased rates of donation, but the supply does not match the need. We may be entering a time where economic reimbursement for the donor is a practical, safe and fair means to solve this problem. In the current system the donor often pays travel expenses and then loses wages and vacation time while recovering from the surgery. Even paying $20 for analgesics upon hospital discharge is a burden for some donors. Such disincentives need to be removed to encourage this act of heroism (donating an organ). Regulating payments to donors or their families offers the best opportunity to eliminate current injustices and abuses in the system. The suggestion that rewarding their gift reduces these persons to commodities supposes that the transplant team can be removed from their obligation to "care about the patient". It has been suggested that all organ donors (cadaver and living) be awarded a Gold Medal from the government. The worth of this medal may be $3000 (less than 1/6 of the current kidney acquisition fee). This money could be used to defray funeral costs for cadaver donor families or used by the living donor to supplement lost wages. The reward may encourage some to donate who would not. For others, not desiring financial compensation, the medal could be saved and cherished as a reminder of their heroism. Careful oversight of this program would protect donors from exploitation and increase the availability of living donors - the optimal therapy for ESRD.

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