Chapter 12

KIDNEY TRANSPLANTATION
A Guide for Patients

Brigham & Women’s Hospital
Kidney Transplant Staff

The Most Commonly Asked Questions About Transplantation

What is a kidney transplant?
A kidney transplant is a surgical procedure in which a healthy kidney from one person is placed into another whose kidneys have stopped working.

Who is a candidate for a kidney transplant?
Any patient whose kidneys have permanently stopped working is a potential candidate for a kidney transplant. However, many factors must be considered in choosing between transplantation and chronic dialysis for a given individual. Among these factors are age, other medical problems, and personal considerations of work and lifestyle. You should discuss the options with your doctor and attempt to obtain as much information as possible in reaching your decision.

Where do kidneys for transplantation come from?
There are three sources of kidneys for transplantation: living related, living unrelated, and cadaver donors. Living donors are usually members of the

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recipient’s immediate family, such as siblings, parents or children. Only such close relatives are likely to have an acceptable tissue match, although recent data suggests that success with living unrelated kidneys is closer to that of related grafts than that of cadavers. This may be due to better state of the donor and less storage time. Cadaver donor kidneys are removed from victims of brain death, usually the result of an accident or a stroke.

Can an unrelated living person donate a kidney?

As the results seem better, and the supply of cadaver kidneys remains low, living unrelated kidneys are being considered increasingly. Spouses are the usual donors, although rarely, friends can be used if extensively screened.

What are the chances my transplanted kidney will work?

The success rate following transplantation depends upon the closeness of the tissue match between donor and recipient. A kidney from a brother or sister with a “complete” match has a 95% chance of working at the end of one year. A kidney from a parent, child, or “half-matched” sibling has an 85% chance of working for at least one year. Finally, a cadaver donor kidney has an 80% chance of working at least one year.

All of these statistics assume this is your first transplant, and that you will be taking the anti-rejection drugs described elsewhere in this chapter. If you are having a repeat transplant, the success rate will be 10%-15% less.
These kidneys are not immortal, however, with 50% of cadaver kidneys declining over 6 – 10 years, a rate faster than the relatively stable success of related kidneys.

If the transplant fails, patients return to dialysis as before. The transplant will be removed only if it is causing symptoms, such as fever or pain. This is often necessary if the kidney fails soon after transplant, but rarely if it fails after several months. You may be able to have another transplant later, if you desire.

One of the major achievements in the field of transplantation in the last ten years has been a major reduction in the risk of death. Currently at this hospital, the risk of death in the first year after a kidney transplant is about 3 – 5%, occurring primarily in high risk patients, particularly those over 60 – 65 and, to a less extent, those with juvenile diabetes. This includes death from any cause, whether or not related to the transplant. This risk is not significantly different from that sustained during a year of dialysis. During your transplant evaluation, any risk factors you may have that will increase your risk for transplantation will be identified and discussed with you.

Advanced age is a significant risk factor. Generally, patients over the age of 60 have done less well than younger patients. Significant heart disease, particularly a history of angina or prior heart attacks, will also increase the risk.

Because of the high incidence of heart disease in diabetic patients, all
diabetics must undergo an exercise stress test before being accepted for transplantation. Chronic lung disease increases the risk of pneumonia after transplantation.

Smoking will also increase this risk, and all potential transplant patients are urged not to smoke. Patients who are significantly overweight are more likely to have complications in any surgical procedure, and should attempt to reduce before transplantation. A history of other systemic diseases such as cancer or hepatitis may also affect the risk; indeed, many patients with a history of cancer or abnormal liver enzymes secondary to hepatitis may not be accepted for transplantation. All of these factors vary in importance in different individuals, and should be discussed with your doctor, as well as with the transplant surgeon when you have your transplant evaluation.

**Will my own kidneys be removed?**

It is rarely necessary to remove your own kidneys prior to transplantation. This may be required if you have severe high blood pressure uncontrollable by medication and dialysis, or if your kidneys are chronically infected. However, whenever possible, your own kidneys will be left alone. Even if not functioning normally, they continue to make erythropoietin, a hormone your body requires to make red blood cells, and they may make some urine. This is particularly important if your transplant should fail.

**What is rejection?**

The body has a normal defense mechanism, called the immune system, which protects it from foreign substances, such as bacteria and viruses. The body sees a kidney transplant as foreign and attacks it to get rid of it. This process is called rejection, and is a
normal response of the body’s immune system. Even though rejection may be prevented by medication, the possibility of rejection never goes away. The body will not adapt to the kidney, nor will the kidney change to accommodate the body, although after the first 3 - 6 months, rejection is less of a problem.

How is rejection prevented?

To prevent rejection patients are given drugs, called immunosuppressive medications. These drugs work by lowering the body’s immune response, making it incapable of destroying the kidney. There are now several immunosuppressive medications available, giving transplant physicians new flexibility in treating recipients. Most patients will receive a combination of drugs. The newest of these medications is called cyclosporine, a highly effective drug which has considerably improved the results of transplants of all sorts.

Much of the early testing of this drug was done at the Brigham and Women’s Hospital. Cyclosporine works by interfering with the ability of your lymphocytes to cooperate normally in attacking the transplant. It is now given in pill form in combination with prednisone, a steroid medication with anti-inflammatory properties. The combination of cyclosporine, Imuran (an older drug), and prednisone, all in low doses, is used currently at the Brigham and Women’s Hospital for all recipients of unrelated kidney transplants, and for all living related donor transplants that are not perfectly matched.

The additional immunosuppressive drug mentioned above is azathioprine or Imuran. Occasionally, patients are switched from cyclosporine to Imuran several months after transplant to avoid some potential side effects of long term cyclosporine administration. Your
doctor will advise you if this is necessary.

It will be necessary for you to take some immunosuppressive medication for as long as you have the transplant. Because the body never accepts the kidney as part of itself, rejection can occur even years later, particularly if you stop your medicines. However, it will be possible to reduce the dosage of medications gradually over time, as the risk of rejection lessens with time.

All currently available immunosuppressive medications have side effects. Some of these are common to all such drugs, and some are particular for the individual drug. The most important side effect these drugs have in common is that by reducing the body’s immune defenses, they may actually increase the risk of infection. Because they depress the body’s immune system in a non-specific way, the body is less able to fight off some kinds of infection. This does not mean that you will be ill frequently, but rather that there are some kinds of infection only contracted by patients taking these or similar drugs. Most of these infections are treatable, if detected early enough. Therefore, it is very important that you report any symptoms such as fever or a cough to your doctor without delay. Despite the risk, these infections are not common; only about 15% of transplant recipients ever have any significant infection.

Cyclosporine has a number of special side effects, of which the most important is kidney toxicity. Sometimes cyclosporine will cause your creatinine to rise, even in the absence of any other problem. Usually this improves with a reduction in the dose. Serial
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Cyclosporine blood levels are currently available to help decide the best dose for an individual patient. Other side effects rarely caused by cyclosporine include mild hand tremors, hair growth, and inflammation of the gums. These generally improve if the dose is lowered.

Side effects secondary to prednisone occur much less commonly now than they did years ago, because so much lower doses are used. The most common side effect now rarely seen is a tendency to gain weight and develop a fat face. Other possible effects include fluid retention, stomach irritation or ulceration, thinning of the hair, acne, mood swings, bone disease, and delayed wound healing. Sugar control will be more difficult for diabetics, and an occasional borderline diabetic may require insulin for the first time. Many of these side effects improve as the prednisone dose is lowered over the first year and, in general, are infrequently seen.

Is any research being done to improve the treatment and prevention of rejection?

Considerable research is being done across the country to improve the immunosuppressive medications available. Much of that work has been and continues to be done at Brigham and Women’s Hospital. When you receive a transplant, you may be asked to help in a research project. Complete information will be furnished before any research is undertaken, and you will be under no obligation to participate.

What is tissue typing?

Tissue typing is a series of laboratory blood tests which compare the genetic makeup, the natural differences and similarities between the recipient and donor. These tests cannot compare all genetic differences, but look at those which have been found to be important.
for the success of a transplant.

**HLA** *(human lymphocyte antigen)*
typing examines a set of six antigens, three of which are inherited from each parent. Four of these are the A and B antigens which have been known for a long time; two are the Dr (region) antigens which have been more recently discovered. Cadaver donor kidneys may be matched for from 0 to 6 of these antigens. Living related donor kidneys are generally matched for three or six of these antigens, because they are inherited in groups of three. Individuals are classified as high or low responders.

Tissue typing enables your doctor to determine if a relative is an appropriate kidney donor. The tests also help to predict the outcome of a transplant. Tissue typing is also used to determine who would be the best recipient when a cadaver donor organ becomes available, particularly if there is a six antigen matched donor available.

**How does tissue typing help?**

**How is the operation done?**

General anesthesia is most frequently used for kidney transplantation, although occasionally a spinal or epidural technique may be recommended by the anesthesiologist. Antibiotics are given to prevent infection, and a catheter is placed in your bladder after anesthesia has been given. The transplanted kidney is placed in the pelvis just above the pelvic bone, on either the right or the left side. The kidney’s artery and vein are sewn to
to your iliac artery and vein, which are the large blood vessels leading to your leg. The ureter is connected directly to the bladder. This technique is illustrated in the drawing on this page. The operation normally takes about three hours.

Is the operation risky?

The kidney transplant operation itself is quite safe. Over 1,500 kidney transplants have been performed at Brigham and Women’s Hospital, the technique is well established, and technical complications are rare. Nevertheless, as with any operation, difficulties may arise.

During the operation, you may require a blood transfusion, particularly if you are already anemic. After surgery, the most common complication is a urine leak, occurring about 5% of the time. This may occur because of damage to the ureter during harvesting of the donor kidney that was not recognizable at the time of the transplant. The problem is almost always correctable, but may require a second operation. Wound infections are very uncommon, thanks to modern
antibiotics.

Most patients will remain in the hospital for one to two weeks following transplantation. Recovery from the surgery itself is generally rapid. Patients are encouraged to be out of bed on the day following surgery, and many are eating solid food within two or three days. However, the possibility that the kidney may not work right away, and the risk of rejection, may prolong your hospitalization.

Most patients return to work after six to eight weeks. This will vary with each individual, depending upon your response to the transplant, any complications which develop, the type of work you do, and most importantly, how you feel. Because close follow up is particularly important during the first three months after transplantation, you should plan on frequent visits to the transplant clinic and your own physician during this period.

However, transplantation is intended to return you to as normal a lifestyle as is possible, and you will be encouraged to return to your usual activities as soon as you are able.

After a successful transplant you will have a wider variety of food choices and will no longer need to restrict fluids, protein, or phosphorus. However, you may need to restrict sodium if you have high blood pressure. You may also need to limit potassium, as some patients have high potassium levels while taking cyclosporine. A feeling of well being and increased appetite may follow transplant and cause you to gain weight, and you may need to watch your calories.
Will my new kidney work right away?

About half of cadaver donor kidney transplants do not make urine right away. During the process of removing the kidney, storing it as long as one or two days, and placing it in the recipient, some damage may occur. This damage is called *acute tubular necrosis* (ATN), and is almost always reversible. It may be one to three or more weeks before the kidney begins to make urine. During this time you will require dialysis. ATN can also occur after living related donor transplantation, but it is much less common.

What is a rejection episode?

Sometimes your body may make an extra effort to reject the kidney despite the immunosuppressive medications. This is referred to as a *rejection episode*. The symptoms and signs of such an episode may be decreased urine output, fever, tenderness over the kidney, high blood pressure, and a rise in creatinine, although not all of these will necessarily be present. Sometimes a biopsy of the kidney is required to make the diagnosis. This is done with a needle under ultrasound guidance and is a minor and non-painful procedure.

When a rejection episode occurs, an addition to your immunosuppression is required. Normally, this is a steroid pulse, three daily intravenous injections of high doses of a steroid drug called *Solu-medrol*. Administration of a pulse requires hospitalization. Rejection episodes can also be treated with *monoclonal antibodies*, which are designed to destroy the cells which trigger rejection. The transplant team will discuss these options with you. Many rejection episodes can be successfully reversed, but not all. Limitations on the amount of treatment for rejection are observed in order to prevent complications of overimmunosup-
pression. No more than three pulses are given in the first six months after transplantation.

Almost all cadaver donor organs in the six New England states are distributed through the New England Organ Bank, an independent organization that serves the transplantation centers in the region. These centers have agreed on an objective set of rules to determine who gets a particular organ. When a donor becomes available, tissue typing is performed to determine the characteristics of the donor. A computer then compares this information with a list of the available recipients to determine the best match.

The place of a patient on the list depends on the length of time waiting; those waiting longest are on the top. In addition, if a 6-antigen match becomes available anywhere in the country, this will go to the most appropriate local matched donor. Other factors determining the average waiting time for a kidney include the number of donors, red blood cell type of the recipient, and the level of sensitization.

Your body is capable of making antibodies against other people’s HLA antigens. These antibodies may arise because of blood transfusions, prior transplants, pregnancy, or for unknown reasons. The more people against whom you have antibodies, the more highly sensitized you are.

Sensitization levels are measured by reacting a sample of your serum with a panel of lymphocytes from many people. The results are expressed as the percent of the panel to which you react, and are sometimes called PRA’s (panel reactive activity). It may be difficult to find a kidney for you if you are highly sensitized.
sensitized, because you cannot receive an organ from a person against whom you have antibodies. Such a graft would be rejected immediately. To prevent this possibility, patients waiting for cadaver organs are requested to send a monthly serum sample to the tissue typing laboratory. These samples are screened for antibody levels and stored. If the computer assigns a kidney to you, these serum samples will be tested directly against the prospective donor. This final test for antibody against the donor is called a crossmatch.

A number of factors enter into this decision, including success rates following transplantation and the availability of donors. The best results following transplantation are obtained with HLA-identical (6 antigen matched) living related donors, which almost always come from a sibling, rarely from a cadaver. As noted before, the available results on living unrelated donor kidneys show them to be better than those for cadavers.

A major advantage of living donor transplants is the ready availability of the donor. This allows the transplant to be performed without a long waiting period, as there are currently more potential recipients than available cadaver donors. For this reason, we encourage living related donation whenever the family situation is appropriate, and, if circumstances are correct, donations for spouses.

Potential living related donors usually are identified in discussions with your family and your doctor. Tissue typing is then scheduled; the required tests include blood group typing, HLA typing, and a mixed lymphocyte cul-
ture. Based on these tests it is frequently possible to identify the donor most likely to result in a successful transplant. Choosing the donor is best done in consultation with your doctor and the transplant team.

The selected donor is then scheduled for admission to the hospital for a donor evaluation. This evaluation is primarily on an out-patient basis and involves a wide variety of tests to ensure the health of the donor. Included in these tests is an arteriogram, an x-ray procedure in which dye is injected into the arteries supplying the kidney. This test allows the surgeon to decide which kidney would be best to remove. After completion of all tests, the physician responsible for the donor evaluation, who is not a member of the transplant team, will discuss the results with the potential donor privately. Only donors who are healthy and have two completely normal kidneys will be accepted.

Are there any risks to the donor?

The short term risks of donation are those associated with major surgery, including the risks of general anesthesia, wound infection, and the possible need for a blood transfusion. These risks are very small in healthy people. The donor evaluation process is designed to identify any special factors which would place a donor at increased risk; such donors would not be accepted. The longer term risks are slightly more uncertain. Some studies of donors 10 – 15 years following donation have suggested a slightly higher incidence of mild high blood pressure and protein in the urine; although these changes are not particularly different from the general aging population.

The significance of these studies is unknown, and there is no evidence of
renal failure in prior donors. The remaining kidney expands and takes over the function previously performed by two. Because most kidney diseases affect both kidneys simultaneously, the donor is not at increased risk of kidney failure should he or she contract such a disease. Donors are cautioned to avoid contact sports or other activities which could cause major trauma to the remaining kidney. We believe that donors will lead perfectly normal lives. It is fair to state, however, that possible consequences of donation after more than twenty years are unknown, primarily because transplantation of kidneys in significant numbers only began about twenty years ago.

Who pays for kidney transplantation?

Medicare and/or your private insurance will cover the expenses of your kidney transplant. After the transplant, Medicare will pay for 80% of your outpatient clinic visits. Your Medicare will terminate 36 months after your transplant, unless you have restarted dialysis before that date. In addition, Medicare pays for 80% of the cost of FDA-approved immunosuppressive medications for one year following hospital discharge after the transplant. No one will be denied the best possible medical care because of his or her financial circumstances. The transplant social worker is available to assist with any financial or insurance concerns.

How does one enter the transplant program at Brigham and Women’s Hospital?

Inform your physician of your interest and ask him to arrange a referral for transplant evaluation. This can be arranged conveniently through our transplant coordinator. Prior to your appointment, the following information should be sent to us:

1. A recent medical summary and/or
copies of pertinent hospital and office records
2. SMA 20 (serum chemistry tests)
3. Report of a chest x-ray within the last year
4. Report of an EKG within the last year
5. Report of a recent urine culture
6. Blood transfusion history
7. Record of blood type (ABO)
8. Hepatitis screening tests
9. Names and blood types (ABO) of potential living donors.

During your evaluation you will meet with one of the transplant surgeons, a transplant nurse, a social worker, and the transplant coordinator. Your medical condition will be reviewed and further information about transplantation will be provided. Tissue typing is frequently performed during this visit. A tour of the transplant unit can be arranged if you desire. You are encouraged to ask as many questions and to spend as much time with us as you like. We believe it is very important for you and your family to be as well informed about transplantation as is possible.

After your evaluation, a letter will be sent to your physician informing him of the results and requesting any further information needed. If you are to receive a living donor transplant, arrangements for both the donor evaluation and the transplant will be completed by the transplant coordinator. If you are to receive a cadaver donor transplant, your name will be listed with the New England Organ Bank. You will be required to send one red top tube of blood to the tissue typing laboratory each month for sensitivity screening; instructions for this will be
What do I do if a cadaver donor kidney becomes available for me?

Normally, you will not be informed of the possible availability of a cadaver kidney until it has been assigned to you. Occasionally, you may need to be told before the final crossmatch has been completed, particularly if the kidney has already been stored for a prolonged length of time. Normally, a cadaver donor kidney can be safely stored for 48 hours. About 12-18 hours are required for tissue typing, leaving 30-36 hours to make arrangements for and to perform the transplant.

Once the kidney has definitely been assigned, you should not have anything further to eat or drink. If you are a diabetic, be sure to discuss this with the physician who notifies you of the transplant. You may need to be dialyzed before the transplant, depending upon when you were last dialyzed, your blood chemistries, and your general medical status. This dialysis will be arranged at either your own unit or here, depending on the dialysis schedule and the timing of the operation. You should make arrangements to travel to the hospital as quickly as possible. However, extreme speed is not required, so please drive normally and safely. It would be preferable to have someone else drive for you.

How can I check my status on the transplant list?

You will automatically be placed on the transplant list as soon as all your tests are completed and the tissue typing laboratory has received two monthly screening samples. You will then remain on the list as long as monthly screening blood samples are sent, until such time as you receive a transplant. If you develop medical problems which require that you be
temporarily removed from the list, please be sure your doctor notifies us when you are able to be relisted. Your position on the list will not be affected by temporary inactivation. If you have any questions about your current status, please contact the transplant coordinator.