The Johns Hopkins Comprehensive Transplant Center
Incompatible Kidney Transplant Programs

The Johns Hopkins Comprehensive Transplant Center's Incompatible Kidney Transplantation Program allows many patients previously thought to be "incompatible" to receive the gift of life. The program is comprised of several elements:

- Blood Type Incompatible Kidney Transplant Program
- Positive Crossmatch and Sensitized Patient Program
- Paired Kidney Exhange Program
- Altruistic Donor Program

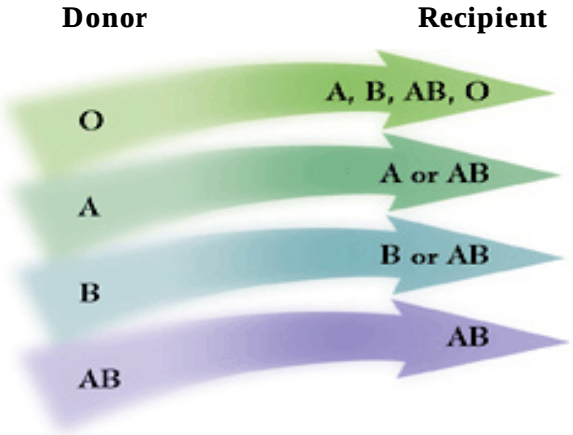
Blood Type Incompatible Kidney Transplant Program

More than one-third of willing live donors are turned down because their blood types are not compatible with the person to whom they wish to donate their kidney.

Most of us have natural antibodies against organs from people with different blood types. These antibodies can rapidly destroy a transplanted kidney.

The Blood Type Incompatible Transplant Program allows patients to receive a kidney from a live donor who has an incompatible blood type (see fig1.). Patients in this program must be willing to undergo all prescribed treatments before and after the transplant to remove harmful antibodies and decrease the risk of rejection.

Figure 1: *Blood Type Compatibility Chart*



How are harmful antibodies removed?

Harmful antibodies are removed with a process called plasmapheresis, a procedure similar to dialysis that removes the plasma portion of the blood where antibodies are located. The number of plasmapheresis treatments required by the recipient before surgery varies depending on the amount of harmful antibodies in their blood.

After each plasmapheresis the recipient receives an intravenous infusion of immune globulin to replace antibodies needed to fight infections and help prevent harmful antibodies from returning. Once the antibodies against the donor's blood type decrease to very low levels, the transplantation can take place.

Do harmful antibodies return and damage the new kidney?

To prevent the antibodies from returning and damaging the kidney, the recipient has several plasmapheresis treatments and doses of immune globulin after the transplant. In addition, the recipient's spleen may be removed during the transplant procedure through tiny incisions. The spleen is the organ where antibodies are produced. (Please refer to the glossary for further explanation of the role of the spleen). A low level of antibodies may return after the transplant but does not appear to damage the new kidney.

How are antibodies detected?

After the transplant, the Hopkins team closely monitors the recipient for signs of rejection. This monitoring consists of regular clinic visits and twice weekly blood work to detect rising antibody levels, or decreasing kidney function. A kidney biopsy, in which small pieces of tissue are examined, also can detect rising antibody levels.

Recipients return to The Johns Hopkins Hospital several times during the first year after transplant to have kidney biopsies.

Does the recipient need extra immunosuppressive medication?

Normally, a kidney transplant recipient takes three immunosuppressive medications. A recipient who has received a blood type incompatible kidney transplant takes these same three medications, as well as five doses of a fourth medication. If rejection is suspected, the recipient may need additional plasmapheresis treatments and a kidney biopsy to determine if the rejection is due to antibodies coming back.

How successful are blood type incompatible kidney transplants?

At The Johns Hopkins Hospital, these transplants have been very successful and our results are comparable with those achieved with compatible transplants. Worldwide experience shows that 82 percent of blood type incompatible kidney transplants are working one year after transplant and 78 percent are functioning five years after transplant. We believe the Hopkins Protocol has features that produce better results than those achieved by others in the past.

What are the requirements for transplantation?

All transplant patients undergo a standard pre-transplant evaluation at The Johns Hopkins Hospital and must be medically and surgically cleared to receive a transplant. This will involve both laboratory and X-ray testing. Some additional blood work will be necessary for patients receiving plasmapheresis. There may be some medical conditions that will need to be treated prior to the initiation of plasmapheresis. Rarely, these conditions could exclude the patient from participation in these programs. Patients who live more than three hours driving distance from The Johns Hopkins Hospital are encouraged to stay locally for a month after the transplant.

What are the requirements for potential donors?

All donors must undergo a thorough evaluation that includes laboratory testing, X-rays and urine tests for kidney function. In addition, a nephrologist (a doctor who specializes in kidney disease), a transplant surgeon, and a psychologist evaluate potential donors. The donor receives no additional therapy. They undergo the same preparation and operation as any live donor. The donor kidney is removed using a minimally invasive technique called a laparoscopic nephrectomy that was pioneered by the Johns Hopkins transplant team in 1995.

Positive Crossmatch and Sensitized Patient Program

Are you Sensitized?

If you are, you are not alone. About 30 percent of patients waiting for kidney transplants are considered sensitized. Sensitized patients have developed harmful antibodies in their blood against foreign tissue. A person can develop antibodies through previous exposure to foreign tissue resulting from pregnancies, previous transplants, or blood transfusions. Sensitized patients may wait three or four times longer than unsensitized patients for a compatible cadaveric kidney.

What is a Positive Crossmatch?

The level of harmful antibody is quantified by panel reactive antibodies or PRA. A potential recipient who has a PRA greater than 30 percent is considered sensitized. Many sensitized patients have live donors willing to give them a kidney, but the transplant has little chance of success. When the recipient's blood is mixed with the donor's blood (a test called a crossmatch), the sensitized recipient's antibodies react against the donor's cells. This is called a positive crossmatch, which means the recipient probably will reject the kidney immediately following transplant. A negative crossmatch is needed between the recipient and the donor prior to the transplant.

If the antibodies in the recipient's blood can be removed prior to the transplant and be prevented from coming back, a successful live donor transplant is possible. To do this, physicians and scientists at The Johns Hopkins Hospital have developed a protocol to remove harmful antibodies from patients who have a Positive Crossmatch and are Sensitized to their live donor.

What does the treatment involve?

As in the blood type incompatible program, sensitized patients undergo plasmapheresis treatments to help remove harmful antibodies from the blood. On average, patients receive about four treatments before the transplant but the actual number required is determined by the level of harmful antibodies in the recipient's blood. An intravenous infusion of immune globulin is given after each plasmapheresis treatment to help prevent harmful antibodies from coming back after the transplant. Recipients undergo plasmapheresis and immune globulin treatments every other day starting one to two weeks prior to the transplant. For example, if the number of treatments needed is four, the recipient begins plasmapheresis eight days prior to the transplant. The recipient receives these treatments on an outpatient basis without disruption of their dialysis schedule.

Do harmful antibodies return and damage the new kidney?

After the transplant, recipients have several additional plasmapheresis treatments, followed by intravenous immune globulin, to prevent harmful antibodies from coming back. The level of antibodies in the recipient's blood is checked frequently following the transplant to determine if more plasmapheresis treatments are needed. After all the plasmapheresis treatments are completed, these patients receive the same medications as any other transplant patients.

Janet Hiller, a transplant clinical nurse specialist and Dr. Robert A. Montgomery, Director of the Incompatible Kidney Transplant Program meet with new patients and family members to discuss treatment options.

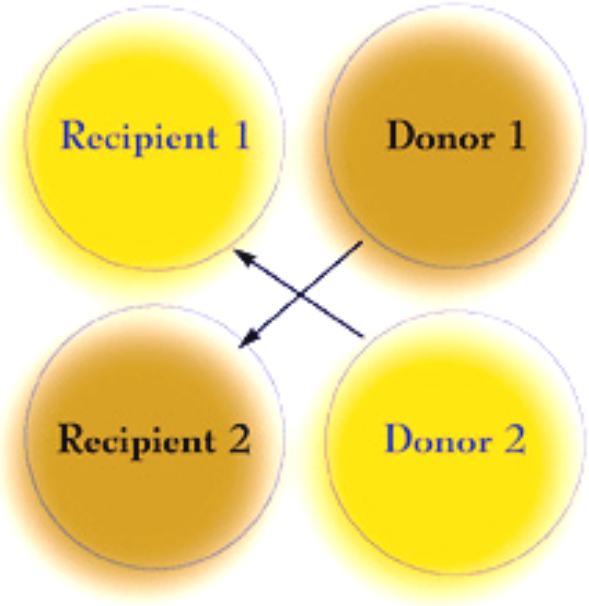
Paired Kidney Exchange Program

People with kidney failure who find a willing donor whose blood type is not compatible would need to undergo treatments described in the Blood Type Incompatible Transplant portion of this website before they can receive a kidney. However, if a donor and recipient can be found who have the opposite blood type incompatibility, kidneys can be exchanged between the two pairs and two compatible live donor transplants are possible. This is called a Paired Kidney Exchange Transplant. It can be very difficult for us to find a suitable exchange pair for certain blood types and most patients do end up having blood type incompatible transplants but, if desired, we will look for a suitable exchange pair.

How does a paired kidney exchange work?

A paired kidney exchange consists of two donor/recipient pairs whose blood types are not compatible. In the first pair, Recipient 1 is not compatible with Donor 1. In the second pair, Recipient 2 is not compatible with Donor 2. However, Donor 1 is compatible with Recipient 2 and Donor 2 is compatible with Recipient 1. If you and your donor are willing to "exchange," you are matched with another donor/recipient pair.

Paired Kidney Exchange Chart



Once the evaluations of all donors and recipients are completed, the transplant is scheduled. The two kidney transplants occur on the same day. The two donor and recipient operations occur simultaneously.

Can Donors and Recipients Meet?

It is possible for the donors and recipients to meet or contact each other after the transplants. This is arranged by the transplant coordinator and must be agreed upon by both donor and recipient pairs.

Altruistic Donor Program

In September of 1999, a transplant coordinator from the Midwest named Joyce Roush became the first known person to donate a kidney to a stranger. She and the child who received her kidney underwent the successful procedure at The Johns Hopkins Hospital. Her gift inspired many others to follow in her footsteps prompting us to initiate the Altruistic Donor Program, which matches willing donors with our most needy recipients. Because kidney disease prevents children from growing properly they are given preference for these kidneys. John Temple, a United States Air Force retiree, read an article in the Indianapolis Star about Joyce Roush and was himself inspired to donate a kidney. A child unknown to him was given the gift of life as a result of his kindness.

“I knew little about the operation or kidney disease in general,” says Temple. “[But] I knew people were dying every day [who] could be saved if additional kidney donors could be found. Becoming a living kidney donor is a serious decision, with some risks, but many rewards. I couldn’t get past the idea that the slim chance that this surgery might affect my quality of life was more than offset by the knowledge that my kidney might mean all the difference to some child who would have no life at all if I backed away.”

What can an anonymous donor expect?

Over the next 15 months Mr. Temple had two intensive days of screening in Baltimore, numerous blood tests—often with little notice, several potential candidates that didn’t work out, and a great deal of patience. The process can be frustrating for anonymous donors because there is no emotional connection with a specific patient over the months of waiting.

Temple’s wait ended when his kidney was transplanted on a Friday in early November 2000. He was able to leave the hospital Sunday afternoon, and within three weeks he was “almost 100 percent.” With the new kidney, the recipient, a young boy named Ryan whom Temple later met, was able to discontinue dialysis and lead a normal life.

“Once I really understood all he [Ryan] faced, it put my poor sacrifice to shame. It also convinced me ...to become a more vocal advocate of anonymous organ donation,” says Temple. “Despite the obstacles, I consider it one of the best decisions of my life.”

What are the benefits of live kidney donation?

- Recipients receive a live donor kidney transplant and an enhanced quality of life.
- A live donor kidney lasts about twice as long as a cadaveric kidney on average.
- A willing donor is able to fulfill the wish to donate.
- The gap between patients waiting and kidneys available for transplantation is closed.
- A deceased donor kidney is made available for someone who has no live donor.
- The benefits double for paired kidney exchanges as two people receive live kidney donations.

Glossary

Antibodies: a protein that is part of the body's immune system. Antibodies are produced in response to foreign tissues. Some antibodies are harmful to transplant patients and can cause them to reject organs they are "sensitized" to or incompatible with.

Crossmatch: the mixing of blood between donor and recipient to detect harmful antibodies.

Immune Globulin: an intravenous medication which help protect the body from disease and prevents harmful antibodies from returning.

Immunosuppressive medications: medications used to suppress the recipient's immune system and prevent rejection of the transplant.

Kidney biopsy: a procedure in which a needle is used to obtain small pieces of tissue from the kidney for examination under a microscope.

Plasmapheresis: a procedure in which the plasma portion of the blood is removed along with harmful antibodies and replaced with a plasma-like substance.

PRA (panel reactive antibodies): a gauge to measure the amount of antibodies in the recipient. The higher the PRA, the more difficult it is to find a compatible organ for transplant.

Spleen: a soft, spongy purplish organ that houses cells that produce antibodies. In adulthood, the spleen is less important but does continue to play a role in filtering the blood of certain bacteria. Patients who have had their spleen removed are immunized to protect them from bacteria.

From the Director

The critical shortage of deceased donor kidneys for transplantation is not expected to change in the near future; in fact, each day the gap between available kidneys and the number of patients waiting for a transplant widens. The only real hope to close this gap is utilization of live donors.

Physicians and researchers at Johns Hopkins continually develop new ways to increase the number of patients who receive kidneys from live donors. In 1995, Johns Hopkins surgeons developed a new procedure called the laparoscopic donor nephrectomy which makes donating easier because the kidney is removed through small incisions. Since the advent of this procedure we have seen a sharp rise in the number of people willing to donate a kidney. Live kidney donations not only help critically-ill patients, they tend to last twice as long as cadaveric transplants and they free up deceased donor organs for others on the waiting list who have no eligible live donors.

The transplant team at Hopkins has pioneered several new innovations that now make it possible for any patient with renal failure to receive a kidney from any donor, regardless of their blood or tissue type.

The Blood Type Incompatible, Positive Crossmatch/Sensitized Patient, and Paired Kidney Exchange Programs will allow many patients previously thought to be "untransplantable" to receive the gift of life. The Altruistic Donor Program makes kidneys from anonymous live donors available to patients, usually children, who are disproportionately disadvantaged on the waiting list.

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Director, Incompatibile Kidney Transplant Program