On the Forefront

Urologists and nephrologists working together: an emerging model of patient care

Boosting Renal Transplantation with Kidney Paired Donation

BY DAVID GOLDFARB, MD

The fundamental problem in transplantation is a shortage of transplantable organs. More than 90,000 candidates are on the national waiting list. It is estimated that about one third of kidney transplant candidates may have a willing, medically fit living donor, but the donor is incompatible because of an unfavorable blood type or the patient has antibodies to the donor's tissue antigens.

In the past five to 10 years, researchers have developed several techniques to overcome incompatibility. One is desensitization, which involves performing extra manipulation of the immune system by removing the antibodies (plasmapheresis), blocking the antibodies (intravenous immunoglobulin), or suppressing antibody production (anti-CD20 antibodies). Desensitization does not always work, and the results achieved are not as good as with compatible donors and conventional immunosuppression. Still, it is better than waiting on the list. Another solution to incompatibility is called paired donation.

A successful paired donation

Below is a case illustrating the collaborative efforts between nephrology and urology at the Glickman Urological and Kidney Institute. Cheryl, whose blood type is O, wanted to donate to her older sister, Jackie, who is on dialysis and is a blood type A patient. Cheryl is highly motivated and is very healthy. Although she is blood type compatible with her sister, a direct transplant was not possible because Jackie had antibodies to tissue antigens on Cheryl's kidney, a positive cross match test. At the same time in another Northeast Ohio community, Cindy wished to donate to her mother, Pat who was suffering from end-stage renal disease. Cindy was also highly motivated and healthy. Cindy is a blood type A and her mother Pat a blood type O making this combination incompatible. Both incompatible pairs enrolled in a paired donation registry jointly operated by the institute's urologists and nephrologists. Medical information on the incompatible pairs was placed into the computer. A specialized program of the Paired Donation Network identified a match where Cindy could donate to Jackie and Cheryl could donate to Pat. Cindy's tissue type antigens were compatible with Jackie and the two were the same blood type. Both Cheryl and Pat were blood type O with a negative cross match test, making transplantation possible. Both transplants occurred simultaneously and all are doing well.

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Computer registry

The core of a paired donation program is the computer registry of donors and willing, medically suitable but incompatible donors. The computer matches up donors with compatible recipients so that reciprocal pairs can swap their donor's kidneys (**Figure A**). If recipient A and donor A are incompatible but recipient A is compatible with donor B and recipient B compatible with donor A, then a straight swap will get both recipients transplanted without desensitization. Both recipients are transplanted with compatible donors. For this to occur, many incompatible pairs have to enter a registry to generate sufficient matches to be successful. The straight forward swap described in Figure A requires donors to travel and for operations to occur simultaneously, which may be logistically challenging. In the case above, all participants lived close to Cleveland Clinic. To improve transplant rates, chains of non-simultaneous transplants are now acceptable (**Figure B**). Such chains have improved transplant rates compared with simple paired exchange. Furthermore, instead of donors traveling, the living donor kidney can travel much in the same way as deceased donor organs. In other words, if a recipient from Cleveland finds a donor match in Los Angeles through an incompatibility registry, the donors may donate closer to home and have the kidney travel to the recipient destination.

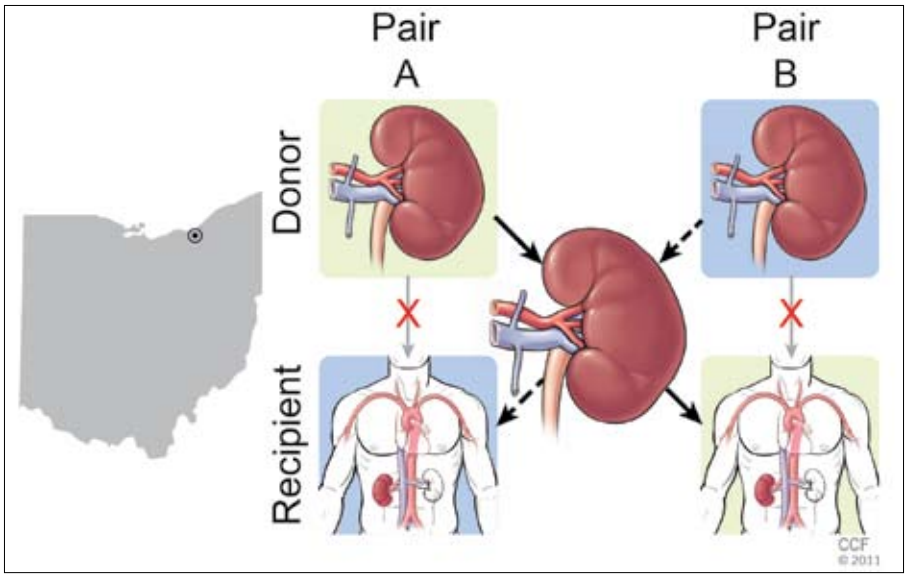

Figure A. In paired donation, a computer matches donors with compatible recipients.

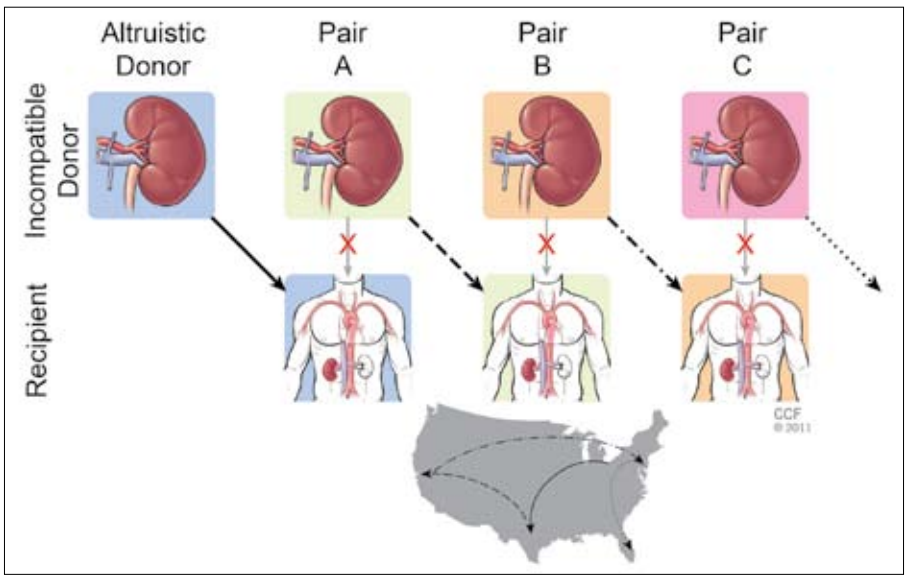

Figure B. Chains of non-simultaneous transplants have improved treatment rates.

Nephrologists and urologists at the institute recently have become involved with a paired donor registry known as the National Kidney Registry. Since 2008, this registry reports that 68% of the patients listed have been transplanted. This is the highest percentage of any registry in the United States today. The high transplant rates are due to a very strong computer matching program with careful oversight, the use of chain paired donation, and travel of the kidney instead of the donor. We are beginning to enter pairs in this program now and are already looking at potential transplants for our patients. We hope that this will offer an opportunity at transplantation to an otherwise underserved group of kidney disease patients with willing, medically fit but incompatible donors. ■

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