

## Paired Kidney Exchange for Kidney Transplantation

**K**idney transplant specialists at the Penn Transplant Institute have initiated a paired kidney exchange program. Paired kidney exchange offers an alternative to deceased donor transplantation for kidney recipient and donor pairs who aren't blood and/or tissue-type compatible. With paired kidney exchange, kidneys can be exchanged between two incompatible pairs, resulting in two or more compatible living donor transplants. While it isn't possible to find a compatible donor/recipient pair for everyone, enrollment in this process has the potential to expand the opportunity to receive a transplant and the available population of living kidney donors.

The process of paired kidney exchange begins when it is determined that a donor/recipient pair has incompatible blood types or the recipient has been sensitized because of previous blood transfusions, previous organ transplants, or previous pregnancies. At this point, the pair is offered the opportunity to explore the option of paired kidney exchange with another incompatible donor/recipient pair. In this process, donor one is compatible with recipient two, and donor two is compatible with recipient one. If the recipients and donors are willing to participate in the exchange, a comprehensive medical evaluation begins. During this stage, the kidney transplant and living donor transplant teams complete medical tests to determine if the procedures are safe and appropriate for the respective recipients and living donors. When the team feels it is safe to proceed, the donor and transplant surgeries are scheduled on the same day.

Paired kidney donation can begin with a donor who has not previously been paired with a recipient. This donor begins a chain of transplantations when he or she is matched with a recipient (Fig. 1), thus freeing that person's unmatched donor to offer a kidney to another person, and so on. A donor without a matching recipient from a prior chain may later donate to start a new chain—in this case he or she is called a "bridge" donor.

The linchpin to the chain is the availability of a large enough pool of potential donors and recipients to ensure matching between independent pairs. To encourage a substantial donor/recipient pool, Penn Medicine belongs to the United Network for Organ Sharing (UNOS) and other national registries. In addition, the Penn Transplant Institute has a large enough waiting list to initiate donor chains within the institution. Penn will soon participate in a UNOS pilot program for organ exchanges across the country.

### Case Study

On learning that his nephew, AJ, had end-stage renal disease, Mr. G volunteered to donate a kidney to him. He was disappointed, however, when tests at the Penn Transplant Institute revealed that he was not a match for his nephew. AJ was placed on the waiting list for

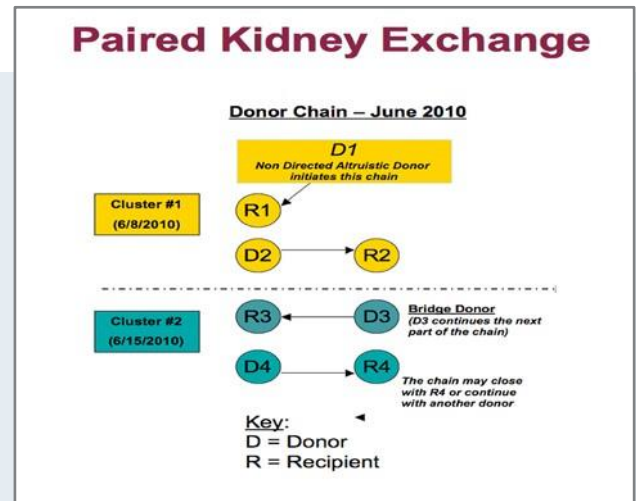


Figure 1. Paired kidney donation initiated by a single altruistic donor who has not previously been paired with a recipient.

a deceased kidney and entered the home dialysis program at Penn. Several months later, a transplant coordinator at Penn contacted Mr. G and AJ to ask whether they would be interested in participating in a paired kidney exchange. She explained that an altruistic donor had been matched with AJ and asked that Mr. G consider donating his kidney to a recipient for whom he was compatible. Mr. G agreed to this arrangement. At Penn, he was paired with a compatible (and anonymous) recipient. All four participants in the resulting chain of transplantations were found to be physically and psychologically prepared for transplant surgery.

The surgeries were scheduled to take place at the Hospital of the University of Pennsylvania in three operating rooms. On the day of surgery, Mr. G had surgery in OR#1 while the recipient for his kidney was being prepared for surgery in OR#2. When prompted by the surgeon in OR#1 an hour later, Mr. G's kidney was transferred to OR#2 and transplanted to recipient patient #1. Approximately two hours after Mr. G's surgery, the altruistic donor arrived in OR#3 and AJ was moved into OR#1. An hour later, the kidney from the altruistic donor was transferred to OR#1 and transplanted into AJ.

The recuperation for all four patients was without incident. In the days after surgery, Mr. G and AJ decided to meet the pair with whom they had been matched. All donors recovered well. Currently, all recipients have functioning transplants, due in large part to a single altruistic donor. In addition, the exchange resulted in a "bridge" donor who went on to initiate a second chain of paired exchange kidney transplants two months later.