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Health

Mix, Match, and Switch

Kidney exchanges between strangers are helping to ease the organ shortage and could save thousands of lives

By Josh Fischman

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BALTIMORE-Chantal Adamson is bouncing up and down on her bed with excitement. That's hard, since she's tethered to an IV. Plus the small patient bed in her room at Johns Hopkins Hospital isn't exactly a trampoline. But Adamson, a 29-year-old with kidney failure slowly dying on dialysis, can't sit still just before 7 o'clock this September morning. "Oh, I can't wait. I've been sick for so long, for three years," says Adamson, who lives in Deland, Fla. "And now I'm finally going to get a kidney."

Tammy Williams, resting in another bed one floor away, is a lot calmer. That's no real surprise, for the 40-year-old from Petoskey, Mich., isn't sick and isn't waiting for an organ. She's the donor. "Donating is such an easy thing to do," says Williams. "It's just a 3-inch incision." Williams had seen a letter from Adamson's mother pleading for a donor to save her daughter's life on a website called Matchingdonors.com. "It really touched me," says Williams. "It's like seeing someone in a burning building-you want to rush in and help them." Months of phone calls and E-mails between the two, sharing details of their lives and their hopes, cemented the relationship, the decision to travel to Hopkins for treatment, and Williams's determination to donate.

But Williams isn't giving her kidney to Adamson. She's giving it to Melanie Balhatchet, a 35-year-old from Spanish Fort, Ala., with a degenerative kidney disease who also depends on a dialysis machine for survival. Williams doesn't know Balhatchet's name or almost anything else about her. What she does know is that she and Adamson are a bad match: Adamson will reject her kidney. And she knows that if she gives her kidney to this woman she's never met, the woman's husband-a bad donor for his wife-will give his healthy kidney to Adamson, who matches up well with it. "Lock and load, let's go," Williams says, sinking back on her pillow.

Kidney swaps like this, called paired exchanges, are a new and growing trend. Instead of waiting years on the United Network for Organ Sharing list for a compatible kidney-as 67,962 people currently are-someone with kidney failure and a willing but incompatible donor can ask a hospital to find them a pair in similar straits, and the hospital can mix and match. (Liver swaps have been done in South Korea but not yet in the United States.) There have been 109 such swaps since Rhode Island Hospital in Providence did the first one in 2000. "It's a great concept," says surgeon Mark Aeder, director of kidney transplants at University Hospitals-Case Medical Center in Cleveland, which has done 12 swaps. "You don't want your patients sitting on a transplant list. You want to help them," says Aeder. "And they do better with a transplant than on dialysis." Plus, live kidneys simply work better than kidneys donated by dead people. The failure rate for kidneys from cadavers, five years after a transplant, is about 30 percent. But that rate drops to about 16 percent for live transplants. Swaps can increase the number of live transplants sixfold for people with hard-to-match blood or tissue types, according to a study published last year in the *Journal of the American Medical Association*.

The evidence has become so compelling that at the end of August, UNOS proposed a plan for a national swap system. There is, however, a small hurdle. Kidney exchanges may violate a federal law against selling body parts. "We're very excited about exchanges," says Bill Lawrence, director of patient affairs at UNOS, "but we can't move ahead until Congress clarifies the law." And Congress, consumed by the run-up to the November elections, hasn't leapt at the chance to bring clarity yet. In the meantime, hospitals have begun to band together to create larger pools of pairs on their own.

The biggest nonlegal barrier standing between patients and a new kidney, and the one that kidney swaps aim to surmount, is biological: the immune system. That intricate defense network comes armed with antibodies-molecules that mark other cells for destruction-and after identifying a body part as a foreign object, the system tries to kick it out.

One reason that body parts appear strange to the immune system is blood type. There are four types: A, B, AB, and O. If they don't match between donor and recipient, the organ may be rejected. Body parts also need to be in sync on tissue type. "There are six common 'flavors' of tissue," says Robert Montgomery, chief of the transplant center at Hopkins. "And if you have antibodies against one of those flavors, it's very hard to find someone who will match you." More than one type of antibody, or just high levels of one type, make a match almost impossible. It's called being highly sensitized. People develop sensitivities against other tissue types because they are exposed to them. Mothers, for example, get exposed through pregnancy-the fetus carries genes from the father, after all-and anyone can get exposed through blood transfusions.

Most hospitals do not have enough expertise with sensitivity to try to work around it. So

these cruel immunological twists are why many loved ones, willing to sacrifice almost anything to save the life of a father, a sister, a wife, or a best friend, remain sidelined, unable to donate a needed organ. Paired donors are a way around this. "Instead of having just one recipient and one mismatched donor, we can put them into a whole pool of donors and find them a better match," Montgomery says. These are not perfect matches, he adds, but the level of antibodies is low enough that they can be controlled by immunosuppressive drugs and a treatment called plasmaphoresis that filters antibodies out of the blood.

Separation. It's a little after 8 a.m. Montgomery is in his scrubs, preparing to enter Adamson's operating room. Down the hall, another surgical team is already working on Williams. And in an adjacent hospital building, two more teams are starting surgery on the Balhatchets. "We keep the pairs completely separate and anonymous," says Kathy Dane, one of the hospital's transplant coordinators. "We really don't want them getting entwined in each other's lives before the surgery, because that could lead to pressure on someone to go through with surgery even if they have some doubts."

At 12:45, Montgomery has Shane Balhatchet's kidney in his hands, preparing to implant it into Adamson. At 1:30, Keith Melancon, another surgeon, is holding Williams's kidney, getting it ready for Shane's wife. "This looks good. The arteries look nice and healthy," says Melancon. By 4 p.m., both kidneys have been sewn into their new homes, are flushing pink as blood flows into them, and have begun doing what kidneys do best—making urine—something that Adamson's and Melanie Balhatchet's kidneys haven't done for years.

The math of making matches gets better as the pool of donors and incompatible recipients gets larger. Hopkins has perhaps 75 such pairs in its pool at any one time, and by mixing them around it might be able to find good matches for about 40 percent of them. Increase the pool to 250 pairs, and the rate climbs to 50 percent, according to theoretical models developed by Sommer Gentry, a mathematician at the U.S. Naval Academy in Annapolis, and her husband, Dorry Segev, a transplant surgeon at Hopkins. At 5,000 pairs, the match rate hits about 55 percent. "It just gets better because there are more possible combinations," says Segev.

The most combinations would be possible in a national system, of course. It could be optimized to produce the highest number of tissue matches, closest ages between donors and recipients, and the least amount of travel time for all involved.

But there is no national matching system. And one reason is a phrase in a 1984 law, the National Organ Transplant Act, which says that exchanging organs for "valuable consideration" is a criminal act. The intent was to prohibit the sale of body parts. "Some people worry that the promise to donate in return for another organ fits that 'valuable'

category," says Lawrence, "so we need that cleared up." Earlier this year, Democratic Sen. Carl Levin of Michigan introduced a bill to eliminate that murk. "It doesn't remove or alter any current provision" from the law, Levin says. It simply adds a line "which states that paired donations do not violate it." The UNOS proposal letting the federally funded agency utilize its waiting lists, its data on donors and recipients, and its computers to take kidney swaps national can't kick in unless Levin's legislation passes.

David Goldfarb is already moving to create a bigger pool without government help. "People are getting sick and dying while waiting," says Goldfarb, the head of kidney transplants at the Cleveland Clinic. "But we're not the federal government. We're the private sector, and we can try and do this without federal resources." Enter the Paired Donation Network, which has grown out of an Ohio group that started four years ago with eight hospitals, including Goldfarb's. This year it's expanding to 18 states and more than 100 hospitals. "We have multiple institutions sharing data, covering a wider area. We've done calculations that show if we draw donors and recipients from a pool of 30 million people, we'll get the best matches," says Goldfarb. "Plus, if you have lots of hospitals, you have hospitals closer to the patients." So far, hospitals in this group have done 18 transplants through pairing. Another consortium, the New England Paired Kidney Exchange Program, has 14 hospitals, which have done 17 transplants.

Adamson and Balhatchet are the 33rd and 34th patients to receive transplants at Hopkins. After a somewhat uncomfortable night, all four patients were resting better the next day. Shane Balhatchet even sneaked out of his room to visit his wife. "She looked beautiful," he says. "It was so good to see her."

By Friday, three days post-surgery, Adamson was making plans to visit Williams, who she feels is her real donor, in Michigan. On Saturday night, Williams met the person who actually got her kidney, Balhatchet, for the first time. "It was exciting. We hugged, and we talked about our families," says Williams. "I wasn't quite prepared for the emotion. It feels weird, too, that we're all connected now." It is a strange way to come together, she says, but a good one.

And last week, the Paired Donation Network turned on its computers to start its largest match run ever, on 160 donors and recipients. With more matchmaking among strangers, incompatibility—at least in terms of organs—may become a thing of the past.

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