

# Shipping kidneys for transplant is safe, research finds

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Kidney transplants using organs from live donors work just as well if the kidneys are shipped -- be it across town or across the country -- as when the donors and recipients are operated on at the same hospital, new Johns Hopkins research suggests.

The findings, published online in the [American Journal of Transplantation](#), bolster the growing practice of [kidney](#) paired donations, which allow incompatible donors to give a kidney on a loved one's behalf and ensure that loved one gets a compatible kidney from someone else — usually a stranger — in return. Johns Hopkins researchers pioneered the practice, which allows more people to get the lifesaving transplants they need.

“We have found that shipping live [donor](#) kidneys is perfectly safe and helps facilitate more transplants for patients in need,” says transplant surgeon Dorry L. Segev, M.D., Ph.D., an associate professor of surgery at the Johns Hopkins University School of Medicine. “There was no difference in how well the kidneys functioned compared to those transplanted immediately from someone in a nearby operating room in the same hospital.”

In order to enlarge the pool of kidneys available for donation and provide organs to patients who might have died waiting for them, the first so-called kidney swaps were done about a decade ago. In these exchanges, a donor whose blood or tissue type doesn't match the intended recipient agrees to participate in a swap with another

incompatible pair. The friend, relative or altruistic donor still donates — only to a stranger — and that stranger’s loved one also donates a kidney in return. By exchanging kidneys between pairs, each sick person involved gets a compatible — and lifesaving — kidney.

Until 2007, hospitals and surgeons required donors and recipients involved in kidney exchanges to have surgery at the same hospital. This was often a hardship. For donors, it could mean traveling to an unknown hospital and being cared for by an unknown surgeon, away from a support network. It could be costly to fly the donor out of state to participate in the transplant. And, for many recipients, it would mean being separated from the donor, often a relative or a close friend, at a crucial time.

At the same time, doctors had concerns about shipping kidneys. They worried that extending a kidney’s cold ischemic time — the time the donor organ was kept outside the body — would take away some of the benefits of getting a kidney from a live donor, Segev says.

So Hopkins researchers studied whether the length of time the kidney was kept viable on ice had any harmful effects on long-term graft survival. Their research found none.

That set the stage for April 27, 2007, when, as part of a paired donation, a kidney from a live donor was shipped — in this case from California to The Johns Hopkins Hospital in Baltimore.

“As soon as we showed it could be done,” Segev says, “the practice took off. Nobody wanted to make the donors travel. Now, almost all kidney exchanges between centers occur with the shipping of organs.”

Over the next three years, Segev’s study shows, 56 live-donor kidneys were transported among 30 transplant centers across the U.S. and

Canada. All of the grafts survived. The newly transplanted kidneys quickly began making urine and clearing creatinine out of the recipients' systems, he found.

The kidneys in Segev's study traveled an average distance of 792 miles, with a range of less than one mile to 2,570 miles. On average, they spent an average of 7.6 hours outside the body, with a range of 2.5 to 14.5 hours. Nearly 13 percent of the organs were transported by motor vehicle, while roughly 87 percent were transported by air.

The Johns Hopkins Hospital has participated in more than 100 kidney exchanges. Johns Hopkins has made these matches possible using a computer program developed by Segev and his wife, Sommer Gentry, Ph.D., an applied mathematics professor at the United States Naval Academy. Last fall, the Organ Procurement and Transplantation Network (OPTN) expanded on that, launching a national pilot program using the Hopkins software that Segev expects to match many more people with needed kidneys.

“As the national system expands, shipping kidneys will become more and more necessary,” he says. “Kidney exchanges have gone from being something you do at your own center to something done by working together nationwide. And now we know kidneys can be safely transported anywhere.”

Provided by Johns Hopkins University

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