

US surgeons transplant a gene-edited pig kidney into a patient for the first time

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Massachusetts General Hospital transplant surgeons Dr. Nahel Elias, left, and Dr. Tatsuo Kawai perform the surgery of a transplanted genetically modified pig kidney into a living human, Saturday, March 16, 2024, in Boston, Mass. Credit: Massachusetts General Hospital via AP

Doctors in Boston have transplanted a pig kidney into a 62-year-old

patient, the latest experiment in the quest to use animal organs in humans.

Massachusetts General Hospital said Thursday that it's the first time a genetically modified pig kidney has been transplanted into a living person. Previously, pig kidneys have been temporarily transplanted into brain-dead donors. Also, [two men received heart transplants from pigs](#), although both died within months.

The patient, Richard "Rick" Slayman of Weymouth, Massachusetts, is recovering well from the surgery last Saturday and is expected to be discharged soon, doctors said Thursday.

Dr. Tatsuo Kawai, the transplant surgeon, said the team believes the pig kidney will work for at least two years. If it fails, Slayman could go back on dialysis, said kidney specialist Dr. Winfred Williams. He noted that unlike the pig heart recipients who were very sick, Slayman is "actually quite robust."

Slayman had a kidney transplant at the hospital in 2018, but had to go back on dialysis last year when it showed signs of failure. When dialysis complications arose requiring frequent procedures, his doctors suggested a pig kidney transplant, he said in a statement released by the hospital.



Surgeons perform the world's first genetically modified pig kidney transplant into a living human at Massachusetts General Hospital, Saturday, March 16, 2024, in Boston, Mass. Credit: Massachusetts General Hospital via AP

"I saw it not only as a way to help me, but a way to provide hope for the thousands of people who need a transplant to survive," said Slayman, a systems manager for the Massachusetts Department of Transportation.

The transplant surgery took four hours, with 15 people in the operating room who applauded when the kidney turned pink and started making urine, doctors said at a news conference. "It was truly the most beautiful kidney I have ever seen," said Kawai.

Dr. Parsia Vagefi, chief of surgical transplantation at UT Southwestern

Medical Center, called the announcement "a big step forward." But echoing the Boston doctors, he said studies involving more patients at different medical centers would be needed for it to become more commonly available.

The experiment marks the latest development in xenotransplantation, the term for efforts to try to heal human patients with cells, tissues, or organs from animals. For decades, it didn't work—the human immune system immediately destroyed foreign animal tissue. More recent attempts have involved pigs that have been modified so their organs are more humanlike—increasing hope that they might one day help fill a shortage of donated organs.



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More than 100,000 people are on the national waiting list for a transplant, most of them kidney patients, and thousands die every year before their turn comes.

Pigs have long been used in human medicine, including pig skin grafts and implantation of pig heart valves. But transplanting entire organs is much more complex than using highly processed tissue. The kidney implanted in Slayman was provided by eGenesis of Cambridge, Massachusetts. The pig was genetically edited to remove harmful pig genes and add certain human genes to improve its compatibility.

Slayman's case was challenging, doctors said. Even before his first transplant, he had trouble being on dialysis and needed dozens of procedures to try to remove clots and restore blood flow. He became "increasingly despondent and depressed over his dialysis situation. At one point ... he literally said 'I just can't go on like this,'" said his kidney doctor, Williams.

The Food and Drug Administration gave special permission for Slayman's transplant under "compassionate use" rules.

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