Written by Luis Miguel on August 18, 2023



Success of Pig Kidney in Man's Body Brings Us Closer to Animal Transplants

The potential that genetically modified animals offer for organ transplants is rapidly expanding, raising many questions about the future of such procedures.

In a case that is making waves in the scientific community, surgeons at NYU Langone Health announced on Wednesday that a pig's kidney that they transplanted into a brain-dead man is still working normally after a month — the longest a pig kidney has properly functioned in a human body.

As the <u>Associated Press</u> reports, researchers are going to continue the experiment and will keep tracking the kidney's condition into a second month. The team harbors hope that this will open up the door for eventually trying the procedure on living patients.



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Upon making the replacement of the deceased man's two kidneys with one pig kidney on July 14, Dr. Robert Montgomery, director of NYU Langone's transplant institute, said the animal kidney "looks even better than a human kidney."

One month later, Montgomery told AP, "Is this organ really going to work like a human organ? So far it's looking like it is."

The subject of the experiment is Maurice "Mo" Miller, a resident of upstate New York who suddenly died at age 57 of previously undiagnosed brain cancer. The cancer prevented a routine organ donation, but researchers saw the potential for this novel procedure.

"I think this is what my brother would want. So I offered my brother to them," said the deceased man's sister, Mary Miller-Duffy. "He's going to be in the medical books, and he will live on forever."

One of the hurdles to performing animal-to-human transplants, also known as xenotransplantation, has been that the human immune system instinctively attacks foreign tissue. Researchers are bypassing this through the use of genetically modified pigs whose organs better match human bodies.

Other recent experiments have yielded comparable results to the Miller case, suggesting that progress is being made on the xenotransplant front. Last year, surgeons at the University of Maryland received special permission from regulators to transplant a gene-edited pig heart into a dying man. He lived for two months after that, the heart ultimately failing for reasons the researchers say they do not fully understand, but this episode is educating their future attempts at the procedure.

Also on Wednesday, the University of Alabama at Birmingham concluded a similar experiment to NYU's — two pig kidneys they transplanted into a donated body lasted for seven days.

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AP described the process behind the NYU experiment:

The operation took careful timing. Early that morning Drs. Adam Griesemer and Jeffrey Stern flew hundreds of miles to a facility where Virginia-based Revivicor Inc. houses genetically modified pigs — and retrieved kidneys lacking a gene that would trigger immediate destruction by the human immune system.

As they raced back to NYU, Montgomery was removing both kidneys from the donated body so there'd be no doubt if the soon-to-arrive pig version was working. One pig kidney was transplanted, the other stored for comparison when the experiment ends.

One other trick: Surgeons attached the pig's thymus to the transplanted kidney in hopes that the gland, which helps train immune cells, would increase human tolerance of the organ. Otherwise, the team is relying on standard immune-suppressing drugs used by today's transplant patients.

"You're always nervous," Griesemer said. To see it so rapidly kickstart, "there was a lot of thrill and lot of sense of relief."

Dr. Jayme Locke, a transplant surgeon at UAB, said their seven-day experiment showed the pig organs can "provide life-sustaining kidney function." She said there are several factors to determine how long these experiments should last, among them ethical considerations such as the grieving process of the family. Another matter to consider is the fact that maintaining a brain-dead person on a ventilator is a challenge, meaning the stability of the body comes into play.

In light of recent advances the FDA is now debating whether to allow small studies of pig hearts and kidneys in volunteer patients, as opposed to only using deceased or brain dead bodies.

More than 100,000 patients are on the national transplant list, and thousands of these end up dying while waiting due to the shortage. Dr. Montgomery, the NYU surgeon, has had a heart transplant himself and attests to the lack of sufficient organs for transplants.

The possibilities raised by these advances in turn raise many questions. While, at present, animal gene modification is being used for the purpose of saving human lives, once the technology is perfected, what other applications could it have?

It's not difficult to imagine that genetically modifying animals to be more like humans will not stop at creating life-saving transplants. Given scientists' tendencies to create technology "just because they can" without regard to ethics, could this lead down a road to creating human-animal hybrids?

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