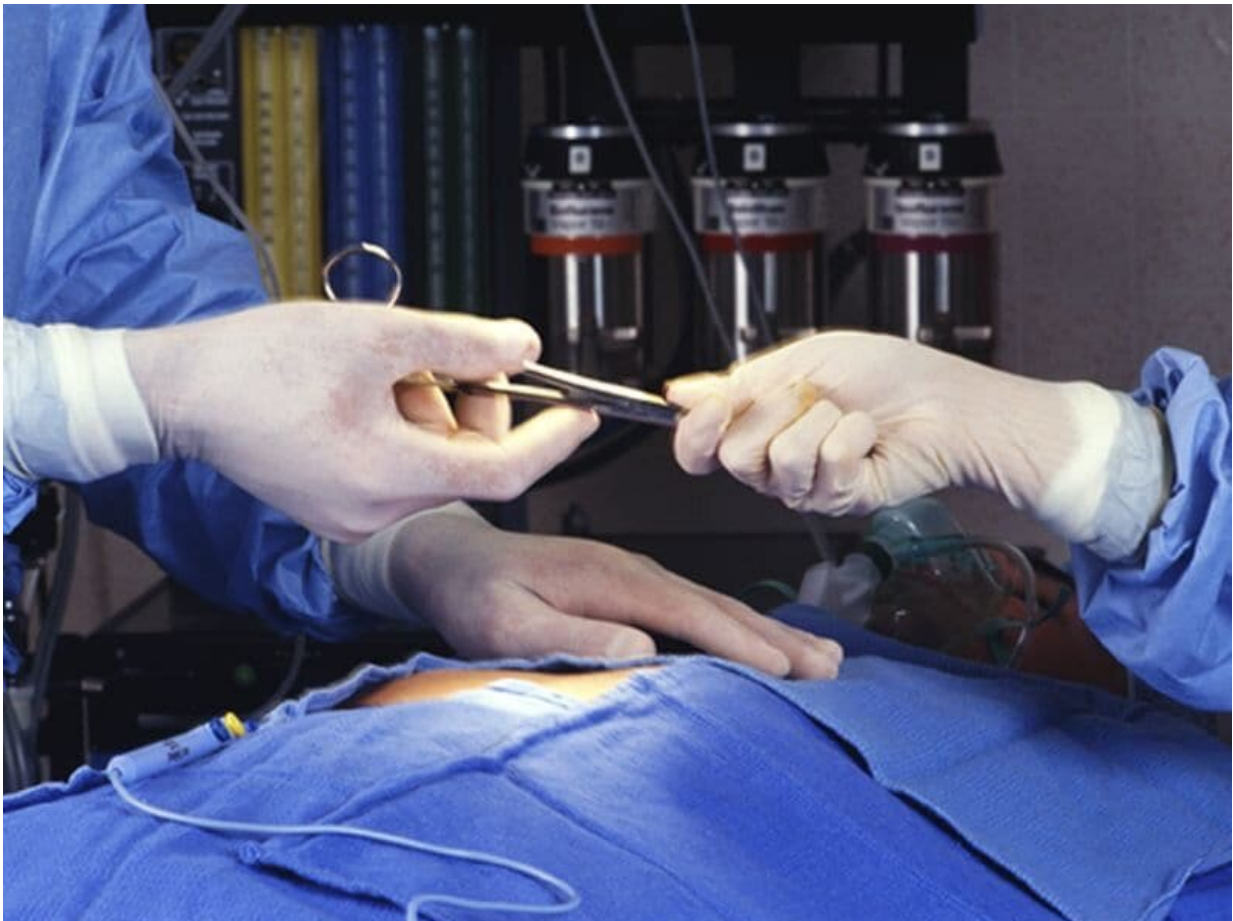


Someday, a pig's heart might save a child's life

January 28 2019, by Amy Norton, Healthday Reporter



(HealthDay)—The supply of donor organs for infants needing a heart

transplant is critically low, but researchers have taken a first step toward using pig hearts to fill the need.

The concept of using animal organs to save human lives has been around for years. With donor organs in short supply, the hope is that animal organs can keep patients alive while they await a human donor.

One major hurdle, though, is that the [human immune system](#) is primed to launch a massive reaction against an organ from another species.

But in a preliminary study, scientists found evidence that babies' immune systems might tolerate a [heart](#) from a genetically modified pig. Specifically, the modifications "knock out" three genes that would provoke the immune system's immediate antibody response against a pig organ.

The researchers found that when they exposed infants' blood samples to cells from the [pigs](#), there was "almost zero" reactivity.

"We found that there was no strong human immune response to these triple knock-out cells," said senior researcher Dr. David Cleveland, who specializes in [congenital heart surgery](#) at the University of Alabama at Birmingham.

"This gives us hope moving forward," he said.

However, Cleveland stressed, there is a long road ahead. As a next step, his team wants to do more testing of infant blood samples.

And before any human trials could happen, Cleveland said, researchers will need to reliably show that hearts from the modified pigs function well when transplanted into non-human primates.

"Right now, what I'd say to parents is, researchers are continuing to work hard on the problem of congenital heart disease," Cleveland said. "I'm not saying xenotransplantation is the answer. But it may become an option in the future."

Xenotransplantation refers to implanting an organ from one species into another. And it's far from a "new concept," Cleveland noted.

Back in 1984, doctors implanted a baboon heart into an infant with a critical congenital heart defect known as hypoplastic left heart syndrome (HLHS). The baboon heart was not genetically altered in any way, and the infant—known as "Baby Fae"—died 20 days later.

But in the past few years, new gene-editing technology has allowed scientists to start producing triple knock-out pigs "rapidly," Cleveland said.

The hope is that organs from those animals could fill a critical need. There are few human donor hearts available for babies and [young children](#) with congenital heart disease, Cleveland said.

A xenotransplant, he explained, might allow those children to survive while they await a suitable human organ.

Dr. Carl Backer is surgical director of the pediatric [heart transplant](#) program at Ann & Robert H. Lurie Children's Hospital of Chicago.

"There are children born with cardiac disease that we can't fix," he said. "The only option is a heart transplant."

Just over 100 babies younger than 1 year undergo a heart transplant in the United States each year, according to Backer. "But probably many more could use one, if a donor heart were available," he said.

To put the need into perspective, Backer noted that every year around 1,000 children are born with HLHS alone.

When an adult is awaiting a heart transplant, doctors can implant a mechanical device to help the heart keep pumping until a suitable donor is found.

"The problem is," Backer said, "those devices don't work well in infants."

He called the new findings "an interesting step forward." But only time will tell if genetically altered pig hearts will ultimately offer a viable option, Backer said.

For the study, Cleveland's team exposed serum samples from 70 babies to red blood cells taken from the triple knock-out pig. Overall, they found, only four samples showed an antibody response to the pig cells—and those reactions were "very weak."

Cleveland was to present the results Monday at the annual meeting of the Society of Thoracic Surgeons, being held in San Diego. Such research is considered preliminary until published in a peer-reviewed journal.

Beyond asking whether xenotransplantation is scientifically possible, Cleveland said, there is another question: Will it be socially acceptable?

He said his team is sensitive to the ethical issues, and they're conducting surveys of health care providers and families of children with congenital heart disease, to gauge their opinions.

More information: David Cleveland, M.D., clinical assistant professor, University of Alabama at Birmingham School of Medicine; Carl Backer, M.D., surgical director, pediatric heart transplant program,

Ann & Robert H. Lurie Children's Hospital of Chicago; Jan. 28, 2019, presentation, Society of Thoracic Surgeons annual meeting, San Diego

The Society of Thoracic Surgeons has more on [pediatric heart transplants](#).

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