

Human-pig hybrids offer patients hope of surviving transplant organ shortage

Scientists seeking solution to critical lack of donors make breakthrough by growing tissue in animals

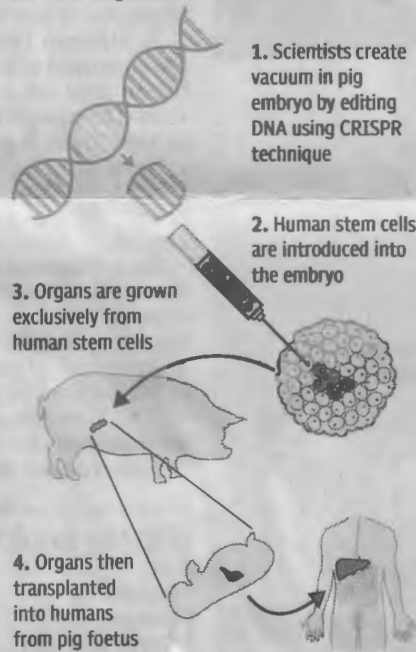
By Sarah Knapton SCIENCE EDITOR

SCIENTISTS have created the first human-pig hybrids in a breakthrough that could pave the way for doctors to grow an unlimited supply of organs for transplants.

Britain is currently facing a crisis in organ donation because the number of deceased donors is dropping as advances in medical care mean more lives are saved. In the past, scientists thought they might be able to use the organs of pigs, which are roughly the same size of those of humans, but they could not prevent the immune system rejecting animal tissue.

An alternative idea was to use stem cells - which can become any cell in the body - and simply grow new organs

How the process works



in the lab. But scientists have struggled to coax stem cells into complex three-dimensional structures.

Now a team at the Salk Institute in the US has combined both concepts and shown it is possible to grow human tissue within a pig. The achievement took four years, 1,500 pig embryos and the stem cells from 40 people.

"We underestimated the effort involved," said lead investigator Professor Juan Carlos Izpisua Belmonte, of the Salk Institute of Biological Studies' gene expression laboratory. "This is an important first step. Our next challenge is to guide the human cells into forming a particular organ in pigs. The ultimate goal is to grow functional and transplantable tissue or organs."

To reach the current point, scientists first created a rat-mouse hybrid by introducing rat cells into mouse embryos to see if animals could still develop using the DNA of another species. After the tests were successful, the team genetically edited out part of the mouse DNA, which is critical for the growth of organs, and repeated the experiment in the hope that the rat DNA would fill in the gaps.

As predicted, the rat cells completed areas that were missing in mouse DNA, forming a rat heart, eyes and pancreas within the mouse.

The team then set about introducing human cells in pigs, a far more complicated procedure because pigs have a gestation period that is only one third as long as humans, so cells must be placed with perfect timing to match the developmental stage of the animal. They used the CRISPR technique, which works like molecular scissors to snip away parts of DNA code that are not wanted. "It's as if the human cells were entering a freeway going faster than the normal freeway," added Dr Izpisua Belmonte. "If you have different speeds, you will have accidents."

The human cells survived and formed a human/pig hybrid embryo, which was then implanted into a sow and allowed to develop for between three and four weeks. Crucially, the surrogate cells only impacted muscle formation.

The idea of creating human/animal hybrids has met ethical opposition, with some claiming scientists are creating 'monsters.' "I find these experiments disturbing," said Dr David King, director of Human Genetics Alett, the secular watchdog group.

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