Researchers in the US create gene-edited, virus-free piglets

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This has cleared one of the biggest hurdles preventing pig-to-human organ transplants and has paved a way for pigs becoming a source for heart, lungs and other desperately needed organs.

A new research is opening the door to a future where pigs could become a source for heart, lungs and other desperately needed organs.

Researchers in the US have created gene-edited piglets that are free of viruses that could be harmful to humans. This has cleared one of the biggest hurdles preventing pig-to-human organ transplants.

It's an exciting development, Dr. Atul Humar, the medical director of the University Health Network's multi-organ transplant program, told CTV. If researchers can find ways to safely transplant pig heart, lungs, livers and other organs into humans, “it could really dramatically change” the organ donor shortage problem, says Dr. Humar, who was not involved in this study.

The immunological concerns involve difficulties with blood-clotting and issues of our immune systems’ attempts to reject the organs.

But the larger issue has involved safety — specifically disease transmission. Humar says pigs have several retroviruses that have embedded themselves into their genomes that are difficult to eliminate.

In all, pigs have more than 25 Pervs, or Porcine endogenous retroviruses, permanently embedded in their genomes (Humans have plenty of our own endogenous retroviruses in our genomes too, as do many other animals.)

The Pervs cause no harm to the pigs but if they are introduced into humans, they could transmit new difficult-to-treat diseases, in much the way that AIDS -- also caused by a retrovirus -- was introduced into humans.

But now, researchers say have found a way to use genetic engineering to deactivate these retroviruses.

Earlier this month, scientists published a report in the journal Science in which they described how they had been able to inactivate all 25 viruses in the pig genome using a gene-editing system called CRISPR–Cas9.

Egenesis, the Massachusetts–based biotechnology start-up that led the study, said their research” represents an important
advance in addressing safety concerns about cross-species viral transmission."

Dr. Humar says it will likely be a few years before the research could lead to clinical trials in humans, and years more before pig organ transplants could even begin.

But he says if the research goes well, pigs could become a new exciting source of donor hearts, lungs, kidneys, livers and more. That’s in part because pigs are plentiful and would only need to be a few months old before their organs would be ready for transplant.

“It’s also easy to grow pigs, to breed them, in large numbers to potentially have enough organs to meet that demand,” Dr. Humar said.

He notes there are of course ethical issues with raising pigs simply for their organs. But he points out we already slaughter more a million pigs a year simply for their meat. So growing a few thousand more in sterile conditions for their organs is not that much different.

There is “definitely mixed reactions to the idea” of using pig parts in humans, he said.

“But we have so many people on our waiting lists who are so sick and who can wait for years for a suitable human donor and often pass away waiting. So that puts it in a different ethical light,” he said.