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# Man's New Best Friend

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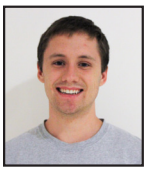
# Man's New Best Friend

## *Over 60 genes altered in pigs in hope of transplanting organs into humans*



*by Charles Simmons*

Each and every day, an average of sixteen people in the United States die waiting for an organ transplant. This number could soon be lowered significantly, thanks to an unlikely source: pigs. Dr. George Church of Harvard Medical School has cofounded a company that is working to modify genes in pigs to allow the human body to accept porcine-derived (pig-derived) organs. Church and colleagues announced at a US National Academy of Sciences meeting on October 5th they have modified over 60 genes in porcine embryos that could cause disease in humans, and modified additional genes in separate porcine embryos that could trigger an immune response in humans.

Aortic valves, structures that separate the heart and the aorta (the artery that sends oxygenated blood from the heart to the entire body), from pigs have been transplanted into humans since 1969. The use of these valves does not pose the same challenge as using whole organs. Valves are unlike organs as they are mostly non-vascular, meaning they do not have much blood flowing through them; therefore, they are not highly exposed to the immune system, the system that causes rejection.

> "…they have modified over 60 genes in porcine embryos that could cause disease in humans…"

So how can porcine organs just be inserted into humans? Although the sizes of porcine organs are comparable to human organs, the porcine genome encodes for many porcine, porcine-derived, endogenous retroviruses (PERVs). PERVs are viruses that are embedded in the porcine genome and cannot be neutralized. Retroviruses are particularly dangerous since they integrate their genetic material into random places in the host genome, possibly interrupting important gene functions. Seeing as PERVs cannot be neutralized or treated, the best possibility to make the transplant viable is to delete the genes coding for the PERVs. In addition to the retroviruses, proteins on the surface of porcine cells called antigens can cause blood clotting and trigger an immune response in the human host.

To delete the necessary genes, an innovative molecular biology technique, dubbed CRISPR, was employed. CRISPR allows for researchers to quickly and cheaply alter the DNA of almost any organism. The challenge to create both sets of deletions in a single embryo lies ahead of the researchers, which they note is necessary for pigs intended for organ transplants.

If pigs can help save an average of 16 lives per day, they may surpass dogs as man's true best friend.