

Gene editing used to eliminate viruses in live pigs

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eGenesis, a biotechnology company focused on transforming xenotransplantation into a lifesaving medical procedure, announced the publication of a study in the journal *Science* by eGenesis scientists and their collaborators demonstrating the inactivation of PERV to prevent cross-species viral transmission and a breakthrough in producing the first PERV-free pigs, an important milestone for xenotransplantation.

Xenotransplantation, the use of animal organs for human transplant, is a promising approach to alleviate the severe shortage of organs for human transplantation but the risk of cross-species transmission of PERVs, among other issues, has to date impeded its use in humans. eGenesis is committed to harnessing CRISPR technology to deliver safe and effective human transplantable [cells](#), tissues and organs grown in [pigs](#), thus addressing a dire need for hundreds of thousands of patients worldwide.

"This is the first publication to report on PERV-free pig production," said Luhan Yang, Ph.D., co-founder and chief scientific officer at eGenesis. "We generated a protocol to enable multiplex genome editing, eradicated all PERV activity using CRISPR technology in cloneable primary porcine fibroblasts and successfully produced PERV-free piglets. This research represents an important advance in addressing safety concerns about cross-species viral transmission. Our team will further engineer the PERV-free pig strain to deliver safe and effective [xenotransplantation](#)."

This study examined the risk of PERV infectivity and demonstrated in vitro that PERVs infected human cells and were transmitted to [human cells](#) that had no history of contact with porcine cells, substantiating the need to address this issue in order to ensure safe xenotransplantation practice.

Researchers developed a strategy to enable efficient and precise genome editing in primary cells using CRISPR-Cas9 technology. In conjunction with a method to inhibit primary cell death during multiplex genome editing, researchers successfully produced viable PERV-free porcine embryos via somatic cell nuclear transfer, using engineered [primary cells](#). They then implanted the PERV-free embryos into surrogate sows and demonstrated the absence of PERV re-infection, initially in fetuses and finally in recently born piglets. These piglets are the first animals born free of endogenous virus and will be monitored for any long-term effects and impact by the eGenesis team.

The eGenesis team, having produced the first piglets free of active PERVs, is working toward combining the safety benefits of PERV-free pigs with additional gene editing addressing immunological response to increase organ immune and functional compatibilities.

More information: D. Niu et al., "Inactivation of porcine endogenous retrovirus in pigs using CRISPR-Cas9," *Science* (2017).
science.sciencemag.org/lookup/.../1126/science.aan4187

Provided by eGenesis

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