


5-1-2018

Genome Editing Technology, CRISPR Cas-9, Provides a Potential Future for Xenotransplantation: Can Pigs Become Our New Organ Donors?

Shelby Smith, BS
Thomas Jefferson University

Emanuel Rubin, MD
Thomas Jefferson University

Follow this and additional works at: <https://jdc.jefferson.edu/phsrs>

 Part of the [Medical Anatomy Commons](#), [Medical Cell Biology Commons](#), and the [Medical Pathology Commons](#)

[Let us know how access to this document benefits you](#)

Recommended Citation

Smith, BS, Shelby and Rubin, MD, Emanuel, "Genome Editing Technology, CRISPR Cas-9, Provides a Potential Future for Xenotransplantation: Can Pigs Become Our New Organ Donors?" (2018). *Department of Pathology Honors Program Student Research Symposium*. Poster 35. <https://jdc.jefferson.edu/phsrs/35>

This Article is brought to you for free and open access by the Jefferson Digital Commons. The Jefferson Digital Commons is a service of Thomas Jefferson University's [Center for Teaching and Learning \(CTL\)](#). The Commons is a showcase for Jefferson books and journals, peer-reviewed scholarly publications, unique historical collections from the University archives, and teaching tools. The Jefferson Digital Commons allows researchers and interested readers anywhere in the world to learn about and keep up to date with Jefferson scholarship. This article has been accepted for inclusion in Department of Pathology Honors Program Student Research Symposium by an authorized administrator of the Jefferson Digital Commons. For more information, please contact: JeffersonDigitalCommons@jefferson.edu.

Genome Editing Technology, CRISPR Cas-9, Provides a Potential Future for Xenotransplantation: Can Pigs Become Our New Organ Donors?

Shelby R. Smith, B.S., Emanuel Rubin, M.D.

Organ shortage has been a significant issue in United States for many decades. There were over 116,000 people on the transplant waiting list as of August 2017, with a new person added every 10 minutes. Animals have been considered as potential organ donors for humans, with the pig being the most ideal candidate because of its excellent breeding profile, low maintenance costs, large litters, rapid growth and organ similarity. A notable challenge that comes with porcine organs are endogenous retroviruses that establish themselves in the DNA of offspring in utero, thereby allowing for no time to prevent infection and integration. Porcine endogenous retroviruses (PERVs) have the ability to infect human cells and therefore must be removed or inactivated before considering transplantation. Genome editing technology, CRISPR-cas9, has been recently successful in targeting and inactivating PERVs in porcine fetal cell lines. Using PERV-inactivated cells, reproductive technologies have allowed for fertilization, implantation and the successful birth of 37 PERV-inactivated piglets from 17 sows. At this time, 15 piglets remain alive with the oldest piglet being 4 months of age. The success of this technology takes us one step closer to finding potential organ donors outside of our own species and instilling hope back into those who may need an organ transplant in the future.