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Pig-to-Human Xenotransplants Take Another Step Forward

By Bridget M. Kuehn



The longest-ever transplant of a genetically modified pig kidney into a human recipient, declared dead based on neurological function, wrapped up after 2 months on September 13, 2023. At the time of removal, the kidney had functioned well for 61 days.

“We have seen with good immunosuppression using drugs that are approved for humans by the U.S. Food and Drug Administration (FDA) [that] we seem to be able to hold off rejection, and we seem to be able to demonstrate that the pig kidney can do most of the tasks that the human kidney can,” said Robert Montgomery, MD, DPhil, chair of the Department of Surgery and director of the Transplant Institute at NYU Langone Health in New York City, in an interview in late August with *Kidney News*. “We are still waiting for some data to come back. But so far, it looks very promising.”

The experiment (1), which has yet to be published in a peer-reviewed journal, is the latest in a string of experiments testing the potential of pig-to-human xenotransplants. The transplant is the fourth pig kidney transplant into a decedent recipient by Montgomery and his colleagues. Another group, led by Jayme Locke, MD, MPH, director of the Division of Transplantation at The University of Alabama

at Birmingham, recently published a study demonstrating a successful, 7-day experiment showing that genetically modified pig kidneys not only produced urine but also cleared creatine and maintained hemodynamic stability—a vital role of the kidney—in a deceased individual maintained on mechanical ventilation (2). It was Locke’s team’s second and longest-running decedent pig kidney transplant.

The Parsons Model

In early 2022 (3), Locke and her team published the results of their first feasibility study of transplanting a genetically engineered pig kidney in a human patient who was declared dead based on neurologic criteria but maintained mechanical life support with consent from his family. The team coined the model The Parsons Model after the decedent recipient whose family generously agreed to let his body be used for the experiment. Montgomery published the results of two similar, short-term, experimental pig transplants using the model in May 2022 (4). Montgomery has since performed two more short-term pig kidney transplants, and his colleagues at NYU Langone Health have also published the results of two short-term pig heart xenotransplants using this experimental model (5).

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Kidney Week Scientific Sessions

THURSDAY

Tiny Conspiracies: Cell-to-Cell Communication in Bacteria and New Approaches to Antimicrobials
State-of-the-Art Lecture: Bonnie L. Bassler, PhD

Thrice Weekly Hemodialysis and Kt/V_{urea}: Carved in Stone?
Garabed Eknoyan, MD, Endowed Lectureship:
Laura M. Dember, MD, FASN

Novel Therapies: On the Mechanisms of Action
Robert W. Schrier, MD, Endowed Lectureship:
Thomas M. Coffman, MD, FASN

FRIDAY

How Do You Feel? The Molecules That Sense Touch
State-of-the-Art Lecture: Ardem Patapoutian, PhD

Toward Solutions! Pro-Resolving Lipid Mediators of Metabolism and Inflammation
Barry M. Brenner, MD, Endowed Lectureship:
Catherine Godson, PhD

Stone Prevention in Patients with Bowel Disease
Jack W. Coburn, MD, Endowed Lectureship:
Elaine M. Worcester, MD, FASN

Hypobaric Hypoxia and Its Cardiorenal Benefit for Weight Loss
Burton D. Rose, MD, Endowed Lectureship:
Biff F. Palmer, MD, FASN

Podocyte Lipid Handling as a Therapeutic Target for Collagenopathy
Michelle P. Winn, MD, Endowed Lectureship:
Alessia Fornoni, MD, PhD, FASN

Human Kidney Organoids for Disease Modeling and Regeneration
ASN-AHA Donald W. Seldin Young Investigator Award:
Benjamin S. Freedman, PhD

SATURDAY

Antibodies Against Emerging Infectious Diseases: Global Collaborations
State-of-the-Art Lecture: Erica Ollmann Saphire, PhD, MBA

Nephrology Practice and Therapeutics Through a Genomic Lens
Homer W. Smith Award Lecture: Ali G. Gharavi, MD

Metrics and the Challenge of Improving Access to Kidney Transplantation
Christopher R. Blagg, MD, Endowed Lectureship in Kidney Diseases and Public Policy: Sumit Mohan, MD, MPH, FASN

PROs and PROMs Are What Matter Most to Patients
Celeste Castillo Lee Endowed Lectureship: Amanda Grandinetti, MPH

Novel Therapeutic Targets to Control Humoral Responses in Desensitization and ABMR
Barbara T. Murphy, MB BAO BCh, Endowed Lectureship:
Flavio Vincenti, MD

SUNDAY

Too Hot: Human Bodies and Inhuman Temperatures
State-of-the-Art Lecture: Bill McKibben

Inside

Diagnostic developments

Noninvasive test may help diagnose acute interstitial nephritis



International collaboration

How a community helped resolve a rare case of unexplained acute kidney injury



Findings

New interventions to manage fatigue and pain symptoms for patients undergoing hemodialysis



Pediatric clinical trials

How can we work together to evaluate SGLT2 inhibitors in children?

