Severe Combined Immunodeficiency (SCID) in Pigs

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What it could mean for human health...

Story by Fred Love, ISU News Service

Animal science researchers at Iowa State University have identified a pair of genetic mutations that cause immune deficiencies in pigs that make them uniquely good models for testing potential medical therapies for people.

The discovery of the mutations will pave the way for researchers to further develop a genetic line of pigs with severe combined immunodeficiency (SCID) at Iowa State and to improve husbandry and management practices for the pigs.

Christopher Tuggle, a BCB faculty member in the Animal Science Department, said pigs born with SCID make ideal models for studying vaccines, potential cancer treatments and stem cell therapies for human medicine. That's because their deficient immune systems can't reject cells introduced experimentally.

"The pig is known to be an excellent model for human biology due to its similar size, physiology and genetic make-up," Tuggle said. "This shows it has high potential as a model for many areas of testing in regenerative medicine, a new medical specialty that repairs disease instead of treating symptoms."

Tuggle was part of a research team that published findings recently in the Journal of Immunology, a peer-reviewed academic publication, identifying two genetic mutations in pigs that lead to offspring with SCID. The editors of the journal highlighted the publication for its importance.

In collaboration with researchers at Kansas State University, ISU scientists first identified pigs with SCID around four years ago as part of an ongoing study of feed efficiency in pork production and the impact of infectious disease. The project, led by animal scientist Jack Dekkers, did not set out to breed a line of pigs with SCID, but the researchers quickly realized their value when some pigs did not show an immune response when exposed to a viral disease.

The National Institutes of Health awarded the researchers a $2.5 million grant earlier this year to improve management practices for the SCID pigs, which require a range of special considerations. "A major challenge now is to figure out how to raise these pigs in

extremely clean environments," Tuggle said. "Our new NIH-funded project aims to meet that challenge, as well as improve upon the existing model."

The project has attracted the interest of medical researchers across the country who want to test new regenerative therapies, Tuggle said. The SCID pigs hold particular promise for gauging the ability of stem cell-derived therapies to repair damaged tissues.

Tuggle said scientists are working on methods to use someone's own stem cells to help heart attack victims, but mice with SCID are unreliable models for testing such advances. The SCID pigs might have a role to play in developing such therapies, he said. "The data from pigs is likely much more accurate for predicting what stem cell derivatives will do in humans," he said. - See more at: http://www.news.iastate.edu/news/2015/10/14/scidpigs#sthash.2EiCaRnt.dpuf

https://www.bcb.iastate.edu/severe-combined-immunodeficiency-scid-pigs

Christopher Tuggle