Using CRISPR to grow a human pancreas in a pig

7 June 2016, by Bob Yirka

Domestic pig. Credit: Scott Bauer, USDA

(Medical Xpress)—A team of researchers at the University of California, Davis, the BBC is reporting , has begun conducting experiments designed to learn how to use the CRISPR gene editing technique to grow human organs in live pigs. Thus far, they have allowed a human pancreas to grow inside of a test pig for up to 28 days before ending the pregnancy.

Over the past several decades various ideas have been put forth to allow us humans to use animals as organ incubators, but to date, all have ended in failure. In more recent years, the problem was fear of introducing animal diseases into humans. If researchers use gene editing techniques, than that should not be a problem however, but it does cause another problem—fear that some of the human genetic material could wind up in the brain of the pig, resulting in a pig with a partly human brain. Thus far, the researchers report, that scenario does not seem likely. Still, the folks at the National Institutes of Health have been worried enough about the problem to refuse to fund such studies.

The team at UoC appears undaunted, as they continue to pursue their goal of creating a never-ending supply of human organs. The technique is not new, it has been tried on other animals with other animals, what is new is the use of human DNA.

To cause a human pancreas to grow inside of a developing pig inside of its mother's womb, the researchers use CRISPR gene editing to remove the genetic portion of a pig embryo that encodes for a normal pig pancreas. They then replace the removed portion with human stem cells. The end result should be a pig embryo that develops into a pig fetus and if allowed, to a fill sized pig after birth. At that time, the pancreas, which should be all human, would be removed and placed in a human suffering from pancreatic failure—offering a cure for diabetes and other pancreas ailments. Even more exciting is the possibility that if the process works, and is approved, a human in need of a new organ could donate the stem cells, which would mean the organ grown would have his or her DNA, which would mean they would not have to take anti-rejection drugs once the new organ is placed inside them.

Thus far, the team is reportedly meeting with success in their initiative, though there is much more work to do—also it is not clear what sort of tests would have to be passed for the technique to be approved by the government.