Scientists have successfully grown kidneys made of mostly human cells inside pig embryos — taking researchers yet another step down the long road toward generating viable human organs for transplant.

The results, reported September 7 in *Cell Stem Cell*, mark the first time a solid humanized organ, one with both human and animal cells, has been grown inside another species.

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Stem cell biologist Liangxue Lai, of the Guangzhou Institutes of Biomedicine and Health in China, and his team spent more than five years refining their methods to enhance the human stem cells’ survivability.

While the pig embryos were still just single cells, the team used the gene-editing tool CRISPR/Cas9 to edit out two genes necessary for kidney development. That created a niche in which the human iPSCs, once injected into the space, could develop into kidney cells. The human stem cells were also tweaked to have especially active genes that dampen apoptosis, or cell death, to keep the cells alive long enough to gain a foothold and begin forming the kidney.

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While the stem cells did differentiate into several cell types, including kidney tubular cells and developmental tissue, the human kidney has more than 70 unique cell types that scientists will need to recapitulate.

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