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Generating embryos from stem cells

By Life Scientist Staff

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Scientists at Children's Medical Research Institute (CMRI) have developed a method to generate mouse embryos from stem cells without the need to use live mutant mice. Published in the journal *Differentiation*, their study has the potential to fast-track the study of gene function in growth and development.

The research focuses on epiblast stem cells, learning what signals induce these cells to become particular cell types. Normally, this work would require the production of mutant mice. Not only does the new technique reduce the need for animals, it also takes six months off the time required to get usable mutant lines for study.

The method takes mouse embryonic stem (ES) cells in which the desired genes are modified using CRISPR-Cas9 genome-editing technology. The embryos are then allowed to develop in a mouse to the appropriate stage, at which point epiblast cells are collected for the production of stem cells. These epiblast cells can be used to model development or differentiated into a cell type of interest for study.

While conventional mouse ES cells are very different from reprogrammed human stem cells, known as induced pluripotent stem (iPS) cells, the mouse epiblast cells are a very close parallel to the human system. They are useful for modelling inherited diseases through genome editing and the bioengineering of tissues and mini-organs. The knowledge gleaned from the study could therefore lead to better cell-based gene therapy and other treatments for human diseases.