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Embryonic stem cells still gold standard

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The technical challenges of using retroviruses to reprogram cells to a pluripotent state could be worked out within the year, researchers said today in a press conference at the annual meeting of the International Society for Stem Cell Research in Philadelphia. However, they stressed, human embryonic stem cells are still, and will continue to be, the gold standard for research on pluripotency and differentiation.

The speakers, including George Daley of the Harvard Stem Cell Institute, Shinya Yamanaka from Kyoto University, and Rudolph Jaenisch from the Whitehead Institute, agreed that while differentiated cells reprogrammed for pluripotency hold massive promise, continued research on human embryonic stem cells is essential. Indeed, noted Yamanaka, whose group first published on reprogramming somatic cells into stem cell-like cells last November, without earlier research on how human embryonic stem cells maintain pluripotency and differentiate, the reprogramming studies could never have been done.

"We need new human embryonic stem cells," said Jaenisch. "They differ enormously from iPS cells," and understanding the reprogrammed cells will be impossible without good human embryonic stem cells. In particular, these two types of cells are derived in completely different ways and therefore, a clear understanding of how safe iPS cells are, or how they may behave in therapies, is still a long way off.

To move away from using retroviruses, some groups are experimenting with adenoviruses, chemicals, and proteins to transfect cells without genetically altering them. The panelists agreed that, thanks to the dozens of labs working on this problem, an alternative to using retroviruses will be revealed within a year.

At this time embryonic stem cells are the only appropriate cells to be considered for therapies in the clinic, said Ian Wilmut from the University of Edinburgh, who was also at the conference. Even so, Jaenisch added that some clinical trials will have to proceed without full knowledge of what controls pluripotency and differentiation. And right now, just how reprogramming works in iPS cells, in nuclear transfer, and in oocytes is still a big black box.