Major advance in cell reprogramming technology

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In a paper publishing online April 23rd in *Cell Stem Cell*, a Cell Press journal, Dr. Sheng Ding and colleagues from the Scripps Research Institute in La Jolla, California, report an important step forward in the race to make reprogrammed stem cells that may be better suited for use in clinical settings.

Ding and his colleagues show that mouse cells can be reprogrammed to form stem cells with a combination of purified proteins and a chemical additive, thus avoiding the use of genetic material.

The discovery three years ago that adult cells could be reprogrammed to form induced pluripotent stem cells, or iPS cells, with similar properties to embryonic stem cells was a major scientific breakthrough. These cells hold enormous potential for drug development and even cell therapy processes, and this promise has garnered significant attention from scientists and the media worldwide. However, a major caveat to the eventual application of iPS cells is that until now all the methods used to generate them have required the introduction of genetic material to make the transcription factors needed for reprogramming. Although some research groups have recently generated iPS cells that lack genetic modifications, even the most advanced methods used genes in the form of plasmids, and thus the risk of genetic mutations caused by the introduced sequences remained.

In their new paper, Ding and co-authors avoid this risk entirely by adding specially modified versions of reprogramming proteins directly to

the growing fibroblasts. The proteins are broken down by the cells after they are added to the culture, so to sustain protein activity long enough to induce reprogramming the authors used repeated cycles of protein addition. Ding and colleagues named the reprogrammed cells that arise from this process "protein-induced pluripotent stem cells," or piPS cells.

The piPS cell protocol "represents a significant advance in generating iPS cells, and has several advantages over previous iPS cell methods" says Ding. Reprogramming without genetic material is a milestone that many in the iPS cell field have been seeking to achieve, and doing so will provide further fuel for the rapid progress of this highly exciting area of biomedical research.

Source: Cell Press (news : web)

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