From somatic cell to stem cell: Applications in Medicine and in Agriculture

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Dolly the sheep [1], the world's first mammal to be cloned in 1995 from a somatic cell was a greatest scientific achievement of the 20th century, which fundamentally changed the basic knowledge of mammalian cell biology. In 2006, Shinya Yamanaka make a groundbreaking discovery that adult somatic cells can be reprogramed to become pluripotent cells by the introduction of four pluripotent genes into somatic cells – so-called induced pluripotent stem (iPS) cells [2]. Those discoveries has opened promising in the research and applications of genomic reprogramming for regenerative biomedicine, biopharmaceutical, stem cell therapy, bio-organ, conservation of the rare and endangered animals etc… Currently, there are three basic methods to reprogram an somatic cells into totipotent stem cell or pluripotent stem cells: first method is somatic cell nuclear transfer (SCNT) by injection of a somatic cell into an enucleated oocyte in order to produce totipotent cell (cloned animals) [3-10], second is fusion of somatic cell with embryonic stem cells, and the third method is introduce 2 to 4 pluripotent genes, Oct4, Sox2, Klf4 and c-MyC into somatic cell [2]. Recently, we found that treatment of somatic cells with germinal vesicle (GV) oocytes extracts could reprogram somatic cells to stem cells, we named these cells "gviPS" Cells [4]. In this presentation we will focus on the most advanced technology in the world and the latest research technologies in cell reprogramming and the applicability of those technology in medicine, recombinant human protein applications in pharmaceuticals. In addition, we also discuss our recent research on female germ line stem cells as well as embryonic stem cell lines developed from a blastomere biopsied from an 8-cell embryo [10].

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