

Editorial

An Unknown Piece of Early Work of Nuclear Reprogramming in Fish Eggs

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Published: 2010.04.21

In a party held on February 19, 2010 celebrating his scientific career of 60 years, Professor Hongxi Chen passed out to us a reprint of his early work of nuclear transplantation in fish eggs. The 80 year-old man told us that he had read a recent report about a group of scientists obtained 27 mice from iPS (induced pluripotent stem) cells derived from mouse skin fibroblasts [1]. This result demonstrated that the nuclei of somatic cells, like that of undifferentiated embryonic cells, are pluripotent after genetic manipulation and reprogram in vitro. Indeed, successful animal cloning has been reported from many mammals, which demonstrates that the nuclei of donor cells, under influence of recipient ooplasm, are able to undergo reprogramming and restore their totipotency [2]. It is now an accepted concept in the scientific field that the developmental potential of a differentiated nucleus and an undifferentiated nucleus is the same. But, this consensus does not come easily as professor Chen discussed. It actually took almost half a century of gradual improvement of the technology and accumulation of knowledge.

Briggs and King (1952) [3] showed their ground-breaking work that normal tadpoles could be obtained through transplantation of nuclei of blastula cells to enucleated eggs in the frog *Rana pipines*. Since then many developmental biologists have studied developmental potentiality of the nuclei of amphibians using this technology. In 1966, Gurdon et al. [4] obtained several sexually mature individuals through transplanting dissociated intestinal epithelial nuclei from feeding tadpoles of *Xenopus laevis* into enucleated eggs of the *Xenopus laevis*. This study provides

the first evidence that the differentiated somatic nuclei preserve their developmental totipotency. However, many investigators failed to obtain live animals beyond tadpoles stage from donor nuclei of various somatic cell. Thus, it remains controversial whether the differentiated somatic nuclei maintain their developmental totipotency. In 1982, a group of Chinese scientists, led by Hongxi Chen successfully obtained a sexually mature adult fish from a short-term cultured kidney cell nucleus of an adult crucian carp [5]. This study provides further evidence that the differentiated somatic nuclei, even from the kidney of an adult, indeed preserve their developmental totipotency. However, due to the isolation in the early period of after the Cultural Revolution, this work was only reported in a Chinese journal and it has been largely unknown by scientists in the field. In 1997, Wilmut et al. [6] obtained the famous sheep "Dolly" from the nucleus isolated from a mammary gland cell, which proves again that the nucleus for fully differentiated cells are totipotent. Since then, the somatic cloning has achieved enormous successes in both basic and applied sciences, demonstrating a great and bright future.

Looking back the history of the animal somatic cloning, we respect those who contributed great efforts in pioneering the fish somatic nuclear transplantation and demonstrated at first time that nuclei from adult kidney cells were able to undergo reprogramming and differentiation to form sexually mature adults. We believe it is necessary to translate their work, which was originally published in Chinese [5], into English and publish it in a hope more readers

now have an opportunity to know this excellent, yet largely unknown work [7].

Conflict of Interest

The authors have declared that no conflict of interest exists.

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