Technique of Animal Clone

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1 Introduction

Clone is a hot topic but the definition of clone sometimes is confused. Here are the several reasonable explanations for the clone:

As a none:

(1) A cell, group of cells, or organism that is descended from and genetically identical to a single common ancestor, such as a bacterial colony whose members arose from a single original cell.

(2) An organism descended asexually from a single ancestor, such as a plant produced by layering or a polyp produced by budding.

(3) A DNA sequence, such as a gene, that is transferred from one organism to another and replicated by genetic engineering techniques.

(4) Individual organisms that arise asexually from the somatic, or body, cells of the parent rather than from the specialized sexual cells.

As a verb:

(1) To make multiple identical copies of (a DNA sequence).

(2) To create or propagate (an organism) from a clone cell.

(3) To reproduce or propagate asexually.

(4) To produce a copy of one thing.

According to the report of American Cable News Network (CNN) on 2 February 12, 2004, South Korean researchers reported they have created human embryos through cloning and extracted embryonic stem cells, the universal cells that scientists expect will result in breakthroughs in medical research. But, it is illegal to clone human cells in the United States and the offense is punished in Michigan of USA with $1 million fine and 10 years in jail. However, it is legal to study the animal clone.

Seventy years ago, cloning was a work used mainly in pant research and application. Now, the clone can be done in all the kinds of living things, including human being. Cloning creates a genetically identical copy of an animal or plant. Transgenic animal and clone for the study of gene regulation and expression has become commonplace in the modern biological science now (Pinkert, 1999). The sheep Dolly was the world's most famous clone animal, but it was not the first one. Many animals - including frogs, mice, sheep and cows had been cloned before Dolly. Plants have been often cloned since ancient people. Human identical twins are also clones. Dolly was the first mammal to be cloned from an adult cell, rather than an embryo. This was a major scientific achievement of Dolly, but also raised scientific and ethical concerns. Since Dolly was born in 1996, many other animals have been cloned from adult cells, such as mice, pigs, goats and cattle, etc. Cloning by interspecies nuclear transfer offers the possibility of keeping the genetic stock of those species on hand without maintaining populations in captivity (Lanza, 2002), but also possibly creates the risk of biological calamity.

Recent years, many various species and cells from which viable somatic cell were cloned offspring have been produced. Production of mammals by nuclear transfer has become a useful tool for propagating valuable animals and can be used as a method to produce genetically modified animals (Niemann, 2003). But, the use of the technology has been limited because of the low survival rate of fetuses during the last trimester of gestation and compromised postnatal health of the offspring. There are many factors for the inefficiencies not fully understood, which may be related to many factors such as the oocyte-donor cell interaction, the stage of the donor cell cycle, inadequate placentation, inappropriate or incomplete nuclear reprogramming following nuclear transfer, and the type of donor cell used. Now, the high rate of fetal loss in the third trimester and the increased calf loss in the first month of life in clones compared with conventional pregnancies and calves are primary limitations for the widespread application of this technology (McEvoy, 2003).

The stage of the donor cell cycle is a major factor in the success of nuclear transfer in mammals. Quiescent donor cells arrested in the G0 or G1 stage of