Somatic cell nuclear transfer in swamp buffalo

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Swamp buffaloes are an important livestock species that provides milk, meat and draft power, and thus significantly contributes to the economy in Southeast Asia. The population of swamp buffalo in Thailand has been dramatically decreased due to their low fertility and less demands from people. Several assisted reproductive techniques such as artificial insemination, embryo transfer, *in vitro* fertilization (IVF), genome resource banking (semen, oocyte, embryo, somatic cell banks) and somatic cell nuclear transfer (SCNT) have been implemented in buffalo production. Although the SCNT buffaloes were successfully produced, the success rate is still extremely low. Most recently, our studies have revealed that donor cells from fetal, ear skin, granulosa and cumulus cells had the similar potential to support the development of SCNT buffalo embryos. However, the blastocyst formation rate of SCNT buffalo embryos was lower than that of bovine SCNT embryos using the same source of somatic cells from cattle.

On the other hand, in vitro matured bovine oocytes, which can be easily obtained from slaughtered cattle with a large number, have been used to support interspecies SCNT (iSCNT). Thus, considering that Swamp buffaloes have the limitation of available oocytes and surrogate mothers, iSCNT would be a valuable tool for their production. In previous reports, iSCNT in buffalo using bovine oocytes as recipients could succeed in blastocyst production. However, so far iSCNT buffalo calf has not yet been produced. There has been a debate on the use of iSCNT for preserving endangered animals, because “incompatibility between the donor nucleus and the recipient mitochondria” and “heteroplasmy of mitochondrial DNA (mtDNA) occurred after the fusion of whole donor cell with enucleated recipient oocytes” might affect the development of resultant iSCNT embryos. Our studies found that the mtDNAs from donor cell and recipient cytoplast in iSCNT buffalo embryos constantly coexisted throughout the cloning process until 8-cell stage. However, the effect of mitochondrial incompatibility or heteroplasmy on iSCNT embryos is still unclear. Taken together, further studies should be performed to establish the effective SCNT and iSCNT technique for buffalo production.

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