The effects of artificial activation timing on the development of SCNT-derived embryos and newborn piglets

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Abstract

This study investigated the effects of two different activation regimens on the developmental potential of somatic cell nuclear transfer (SCNT) embryos and postnatal survivability of the cloned piglets. In vitro matured oocytes were enucleated and reconstructed with porcine fetal fibroblasts. On the basis of the activation regimen used, the reconstructed porcine embryos were allocated into two groups: Group 1—simultaneous electrical pulses and activation group (SFA group); and Group 2—electrical fusion without calcium followed by electrical pulses with calcium after colcemid and cytochalasin B treatment for 5 h (DA group). Embryonic development in both SFA and DA groups was determined at day 6 of culture in NSCU-23 medium. To investigate the post-implantation development after the two activation methods, embryos were cultured for 1 day and then transferred into the oviducts of estrus-synchronized recipients. DA group had significantly (p < 0.05) higher cleavage rates than SFA group. However, the developmental rate to the blastocyst stage and the mean cell number of blastocysts did not differ (p > 0.05) between SFA and DA groups. Moreover, the pregnancy rate of SFA group was not significantly different compared to DA group. A total of 20 cloned piglets (SFA group-8 live piglets, DA group-11 live piglets and one stillborn) were obtained in the present study. The birth weight of the cloned piglets (live births) did not differ (p > 0.05) between the two groups. Furthermore, no difference was observed in the postnatal survival rates of the cloned piglets obtained using two different activation regimens. These results suggest that the timing of artificial activation and additional chemical treatments do not affect the developmental rate of porcine SCNT embryos. Remarkably, the pregnancy rate and postnatal survivability of the cloned piglets did not vary between SFA and DA groups.

Keywords

Somatic cell nuclear transfer; Oocyte activation; Embryo development; Postnatal survivability; Pigs