JNJ-7706621 IMPROVES THE IN VITRO DEVELOPMENT COMPETENCE OF PORCINE PARTHENOGENETIC ACTIVATION AND SOMATIC CELL NUCLEAR TRANSFER EMBRYOS

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Introduction

Oocyte activation by fertilization or parthenogenetic activation (PA) is mainly regulated by M-phase-promoting factor (MPF), a composite of cyclin and p34cdc2 (CDK1). Hunter (1995) reported that CDK1 activity is stimulated by the phosphorylation of Thr161, but is suppressed by phosphorylation of Tyr15. JNJ-7706621, a novel 3,5-diamino-1,2,4-triazole, can inhibit many protein kinases at different concentrations, such as CDK1, CDK2, and CDK4. Therefore, we speculate that the CDK1 inhibitor JNJ-7706621 can modulate the growth of pig PA or somatic cell nuclear transfer (SCNT) embryos in vitro by regulating the activity of MPF.

Materials and Methods

Cumulus-oocyte complexes were obtained from porcine ovaries derived from a local abattoir. This study focused on the effect of different concentrations of JNJ-7706621 on PA or SCNT embryo development. Comparison analysis of porcine embryo in vitro development competence, the phosphorylation of Tyr15 and Thr161, the level of MPF activity, the expression of apoptosis-related and pluripotency-related genes.

Results and Discussion

A significantly higher percentage of PA and SCNT embryos reached the blastocyst stage after exposure to 10 μM JNJ-7706621 for 4 h compared to embryos exposed to 5 μg/mL cytochalasin B for 4 h. The rate of Tyr15 phosphorylation of the CDK1 was significantly elevated and Thr161 phosphorylation of CDK1 was significantly lower in the JNJ-7706621-treated group compared to cytochalasin B or non-treated group. Similarly, the level of MPF in embryos was significantly lower in the JNJ-7706621-treated group compared to the cytochalasin B-treated and non-treated groups. The expression of Oct4 was significantly elevated in the JNJ-7706621-treated group compared to the cytochalasin B-treated group. Our results support the hypothesis that JNJ-7706621 improves the early development of PA and SCNT porcine embryos by suppressing the activity of CDK1 and a concomitant reduction in the level of MPF.