

Rejuvenescent of defective oocytes from age-related infertile females by ooplasm replacement using nuclear transfer

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INTRODUCTION: Two experiments were conducted to know that the developmental ability of the defective oocytes from old infertile females can be improved by ooplasm replacement using germinal vesicle transfer (GVT) in cattle and human.

MATERIALS AND METHODS: In exp.1, GV stage oocytes were obtained by OPU from old infertile cattle (15 to 19 years old) and young donors (3 years old). After the ultra-centrifugation with 20000xg in cytochalasin B solution, GV karyoplast was removed from the old oocytes and transferred into the enucleated young oocytes and fused by the repeated electric pulses. After IVM culture, the reconstructed oocytes were fertilized by a conventional IVF method, and cultured in vitro for 7 days. The resultant blastocysts originated from the GVT oocytes were vitrified for a month and transferred to the synchronized recipients.

In exp.2, GVs from >44 years old infertile patients (with informed consent) were transferred to enucleated young intact oocytes according to exp.1. After IVM culture, the MII oocytes were fertilized by the standard ICSI and cultured with P1/G2.2 medium at 37C under the atmosphere of 5% O₂, 5% CO₂ and 90% N₂ for 6 days.

RESULTS: In exp.1, 11% of reconstructed oocytes by GVT (GVT: old GV to young ooplasm) developed to blastocysts on day 8. When 4 vitrified-thawed blastocysts originated from GVT were transferred to 4 recipients, 2 of them became pregnant (120days of ET, on going), and resulted in one healthy delivery. However, no blastocyst was obtained those in both positive and negative control groups. In Exp.2, no blastocyst was obtained after ICSI/IVC of the human old oocytes, however 15% of GVT oocytes developed to blastocysts.

CONCLUSION: The result in the present study is the first evidence of a positive effect of improving the developmental ability of the defective old oocytes by whole ooplasm replacement using nuclear transfer. This indicates the strong possibility of rejuvenescent of defective oocytes from age-related infertile women by germinal vesicle transfer.