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Evaluation of oxygen consumption in human vitrified and warmed pre-antral follicles after prolonged low temperatures

Koichi Kyono, Yusuke Nakamura, Yukiko Nakajo, Nobuya Aono, Masakazu Doshida, Mayumi Toya, Tomoko Hashimoto, Tsuyoshi Okuda and Takumi Takeuchi
Kyono ART Clinic, Japan

Overview: Cryopreservation of ovarian tissue (after transport on ice 4°C for 18 hours) performed at reproductive medicine centers is very promising alternative to preserve fertility for women who undergo chemotherapy.

Introduction: It's been reported that measuring the oxygen consumption rate (OCR) using a scanning electrochemical microscope (SECM) may be effective as a non-invasive evaluation of oocyte/early embryo quality of various mammalian species, including human oocyte/early embryo. The purpose of this study was to evaluate the effect of transportation at prolonged low temperatures on the survival of pre-antral follicles.

Methods: Ovarian tissue was removed from six women with gender identity disorder. Tissues were stored in an icebox at 4°C for 6 or 18 hours prior to vitrification. After warming, those were cultured for 24 hours and follicle survival was assessed via a viability/cytotoxicity kit. Morphological features and OCR were evaluated by SECM.

Results: Survival rate of isolated primordial follicles was 95.7% and 100% and that of primary follicles was 91.7% and 81.8% in the 6 hour and 18 hour groups respectively. There was no difference in morphology between the 6 hour and 18 hour storage groups. After being vitrified and warmed and then cultivated for 24 hours, the OCR in primordial follicles was significantly higher than prior to cultivation in both 6 hour (0.02 ± 0.02 vs. 0.07 ± 0.04 , $P < 0.05$) and 18 hour groups (0.02 ± 0.02 vs. 0.11 ± 0.10 , $P < 0.05$).

Conclusions: This strongly suggests that prolonged transportation of ovarian tissue at low temperatures is useful when there are no available local systems for fertility preservation.

Biography

Koichi Kyono received his MD from Fukushima Medical College in 1978 and his PhD in obstetrics and gynecology (reproductive biology) from Tohoku University in 1984. He was a member of the Tohoku University team which achieved the first IVF pregnancy and delivery in Japan in 1983. He is currently the president of Kyono ART Clinic in Sendai and Tokyo. His long-term research interests include studies on cryopreservation (oocytes, ovarian tissue and testicular spermatozoa), in vitro culture, andrology (Micro-TESE, IMSI) and endocrinology (ovarian stimulation).

kuzuno@ivf-kyono.or.jp

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