

ATP levels in immature oocytes obtained from small follicles were higher than those from large follicles

Goto H¹., Hashimoto S¹.; Iwata H².; Amo A¹.; Yamochi T¹.; Inoue M¹.; Morimoto Y¹.

¹ IVF Namba Clinic, ² Tokyo University of Agriculture

Abstract:

ATP level in oocytes has been postulated to be one of the important markers for their developmental competence. To assess the relationships among ATP levels in oocytes, ovarian stimulation procedures, donor ages, and the cell cycle and diameters of the oocytes, we measured ATP in immature oocytes obtained from Graafian (about 19 mm diameter) and small follicles (about 10 mm diameter). After maturation culture of oocytes, ATP levels were measured by the luciferin/luciferase method using 97 immature oocytes obtained from mature follicles after ovarian stimulation or natural cycles and 79 immature oocytes obtained from small follicles. This study was approved by the local IRB and the data were analyzed using student t-test and ANOVA followed by Fisher's PLSD test. Regression analysis was also performed. No significant difference was observed with the ATP levels in the oocytes between GV (6.7 pM) and MI stages (6.2 pM), and between stimulation (5.0 pM) and natural cycle (4.4 pM) groups. No significant relationship was found among ATP levels and oocyte diameter and age of donors (25~45 years). However, the ATP levels in the oocytes obtained from small follicles (8.6 pM) were significantly higher ($P < 0.05$) than those from mature follicles (4.8 pM). The ATP contents in the oocytes obtained from small follicles (8.6 pM) were significantly higher ($P < 0.05$) than those obtained from Graafian follicles (4.8 pM). This finding provides new insights into the implication of a decrease of ATP levels in oocytes during follicular maturation. The ATP levels in immature oocytes obtained from small follicles followed by maturation culture were significantly higher than those in immature oocytes obtained from Graafian follicles after ovarian stimulation and natural cycles. Pathophysiological significance of the difference in the ATP levels in oocytes obtained from large and small follicles is under our current investigation.

Keywords: oocyte maturation, oocyte diameter, ATP, mitochondrial DNA

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