EFFECTS OF CYCLIC ADENOSINE MONOPHOSPHATE MODULATORS ON MATURATION RATES AND QUALITY OF GERMINAL VESICLE OOCYTES AFTER THAWING WHEN APPLIED BEFORE VITRIFICATION

Lee, Dayong; Lee, Jung Ryeol; Jee, Byung Chul; Kim, Seok Hyun

Germinal vesicle (GV) can be retrieved irrespective of menstrual cycle when cryopreserving oocytes for fertility preservation. In addition, there is no need for administration of hormones to control ovarian hyper-stimulation, which has the advantage of fewer side effects. If GV is frozen shortly after retrieval and then in vitro maturation (IVM) is performed at the point when fertilization is needed, the time, effort, and expense involved in IVM of whole oocytes can be saved. Several studies reported that oocyte maturation and developmental competence are enhanced by regulating meiotic resumption through cyclic adenosine monophosphate (cAMP) modulators. Another proved that addition of cAMP modulator to IVM media improved the developmental potency of mature oocytes. We performed experiments to prove if treating cAMP modulators immediately after GV retrieval before vitrification enhances maturation and developmental capability after thawing. GVs of mice were divided into cumulus oocyte complexes (COC) and denuded oocytes (DO). Then, GVs were cultured with or without dbcAMP and IBMX during pre-vitrification period for 30 minutes. One hour after thawing, the ratio of oocytes stayed in intact GV stage was significantly higher in groups treated with cAMP modulators regardless of the presence of cumulus cells. After 18 hours of IVM, the maturation rate was significantly higher in the COC group treated with dbcAMP. The expression of F-actin which is involved in chromosomal translocation is also increased in that group. However, there was no difference in chromosome and spindle organization integrity or developmental competence between the MII oocytes of all groups. In conclusion, increasing the intracellular cAMP level by administering cAMP modulator before vitrification of the GV maintains the cell cycle arrest, and this process may facilitate oocyte maturation after IVM by preventing cryo-damage and synchronizing maturation between nuclei and cytoplasm. The role of cumulus cell seems to be essential for this mechanism.