Effect of duration for oocyte growth on acquisition of meiotic competence of porcine oocytes derived from early antral follicles

Takayuki Yamochi¹, Shu Hashimoto¹, Masaya Yamanaka¹, Yoshiharu Nakaoka¹ and Yoshiharu Morimoto¹,²

¹) IVF Namba Clinic, Osaka 550-0015, Japan
²) HORAC Grand Front Osaka Clinic, Osaka 530-0011, Japan.

Objectives
In vitro growth of growing oocytes (GOs) has a potential to supply mature oocytes for reproductive medicine and animal reproduction. For in vitro growth of mammalian oocytes, a culture period is one of important factors to obtain meiotic competence. However, proper culture period for porcine GOs has not been determined to attain their meiotic competence.

Materials and Methods
Porcine GOs were obtained from early antral follicles, and were cultured for 10, 12, 14 and 16 days. After the culture, survival, meiotic competence, chromatin configuration and fertilization competence of oocytes were assessed.

Results
The survival rate of oocytes after 10-day culture (62.8%) was similar to that of oocytes after 12-day culture (55%) and significantly higher than those of oocytes after 14- and 16-day culture (52.9 and 24.3%, respectively). The maturation rates of survived oocytes after 10- and 16-day culture (38.4 and 22.7%, respectively) were significantly lower than those after 12- and 14-day culture and in vivo counterparts (52.8–62.4%). There was no significant difference in the diameter of ooplasm among culture duration (117.4–118.3 μm). The rate of oocyte with surrounded-nucleolus chromatin after 10-day culture (78.4%) was significantly lower than those of oocytes after 14-day culture and in vivo counterparts (93.6 and 95.1%, respectively). After in vitro maturation and intra-cytoplasmic sperm injection, there was no significant difference in the rate of fertilization among culture groups and in vivo counterparts (10–47.2%).

Conclusion
Data of this study showed that porcine GOs required at least 12 days to acquire meiotic and
fertilization competence and that the culture duration to maximize the number of mature oocytes was from 12 to 14 days.