

—Technology Report—

Enhancement of Cytoplasmic Maturation of *In Vitro*-Matured Pig Oocytes by Mechanical Vibration

Yamato MIZOBE¹⁾, Mitsutoshi YOSHIDA¹⁾ and Kazuchika MIYOSHI¹⁾

¹⁾Laboratory of Animal Reproduction, Faculty of Agriculture, Kagoshima University, Kagoshima 890-0065, Japan

Abstract. The effects of mechanical vibration during *in vitro* maturation and/or *in vitro* culture after artificial activation of pig oocytes on maturation and development were examined. In addition, the optimal conditions were applied to *in vitro* production of blastocysts derived from miniature pig somatic cell nuclear transfer (SCNT) embryos. Mechanical vibration during *in vitro* maturation did not affect the rates (60.5 ± 1.9 – $69.5 \pm 2.2\%$) of oocytes reaching the metaphase-II stage. However, the blastocyst formation rates after activation of oocytes matured with mechanical vibration for 5 sec at intervals of 30–60 min or for 10 sec at intervals of 60 min were significantly ($P < 0.05$) higher than those of oocytes matured without mechanical vibration (25.7 ± 2.0 – $28.1 \pm 2.7\%$ vs. $12.3 \pm 1.4\%$ and $25.8 \pm 1.8\%$ vs. $15.7 \pm 1.9\%$, respectively). In contrast, mechanical vibration during *in vitro* culture after activation did not affect the blastocyst formation (11.6 ± 5.2 – $16.5 \pm 3.0\%$) of oocytes. Mechanical vibration for 5 sec at intervals of 60 min during *in vitro* maturation of oocytes did not affect fusion (66.8 ± 3.5 – $72.1 \pm 3.1\%$) with miniature pig somatic cells after enucleation. However, the blastocyst formation rate of SCNT embryos was improved ($P < 0.05$) by mechanically vibrating recipient oocytes for 5 sec at intervals of 60 min during *in vitro* maturation, regardless of the presence or absence of the same treatment during *in vitro* culture ($17.6 \pm 2.5\%$ vs. $9.4 \pm 0.9\%$ and $13.0 \pm 0.3\%$ vs. $7.4 \pm 0.9\%$, respectively). The results indicated that mechanical vibration enhances the cytoplasmic maturation of *in vitro*-matured pig oocytes, resulting in improvement of their parthenogenetic development. In addition, it was shown that *in vitro* maturation of oocytes with mechanical vibration can be applied to efficient production of blastocysts derived from miniature pig SCNT embryos.

Key words: *In vitro* development, *In vitro* maturation, Mechanical vibration, Nuclear transfer, Parthenogenetic activation