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In vitro Maturation of Porcine Germinal Vesicle Oocyte can be enhanced by Co-culture with Mammalian Spermatozoa

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In most mammals including humans, the first meiosis of the oocytes initiate during fetal life and arrested at the diplotene stage of the prophase before birth. Oocytes maturation, characterized by germinal vesicle breakdown, formation of the first meiotic spindle, expulsion of the first polar body and arrest in metaphase of second meiotic division (MII stage), occurs in preovulatory follicles in response to the surge of gonadotropin and leads to an ovulated oocyte in vivo. To evaluate whether mammalian spermatozoa promote the maturation in vitro of germinal vesicle (GV) oocytes from small follicles, porcine follicular oocytes collected at slaughter were cultured in the tissue culture medium (TCM 199). When porcine GV oocytes were cultured in the TCM 199 with or without mammalian spermatozoa, the rate of oocytes reached MII stage were 15.0% and 31.9%, respectively. When 97 GV oocytes were cultured in the medium with $3\text{-}5\times10^3$ boar spermatozoa/ml, 15 (15.5%) oocytes matured to metaphase II stage. However, after culture of GV oocytes in the TCM 199 with $3\text{-}5\times10^6$ boar spermatozoa/ml, the proportion of oocytes reached MII stage was 43.1%. The maturation in vitro of mammalian immature oocyte may be enhanced by the addition of gonadotropin, growth factors, and steroid. We consider that mammalian spermatozoa used in this study may contain various growth factors, steroid hormones required for maturation.