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In Vitro Production of Pig Embryos

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First of all, *in vitro* production (IVP) of porcine embryos is an important as initial step to improve bio-technical applications such as transgenesis and cloning for xenotransplantation. In recent years, considerable progress has been achieved in the IVP embryos using advanced methods for *in vitro* maturation (IVM) and fertilization (IVF). Despite this progress, efficient production of porcine embryos through IVM and IVF techniques has been plagued by the incompletion of cytoplasmic maturation, the high incidence of polyspermy and the poor quality of blastocysts. Cytoplasmic maturation of porcine oocytes has been improved by modifications of IVM culture conditions. Especially, to induction of efficient maturation, there should be considered on the correlations with nuclear and cytoplasmic maturation. Then, the high polyspermic event has been suggested that increasing sperm concentrations and extending sperm-oocyte coincubation period tend to increase sperm-oocyte interactions resulting in a high incidence of polyspermic penetration. And also, a reduction of the absolute number of spermatozoa during coincubation with oocytes increases the monospermic penetration rate, but, this is usually accompanied by the reduction of penetration rates. Therefore, under the control of various fertilization conditions, discrepancy on the fertilization parameters and blastocyst formation should be corrected. Another detrimental problem is blastocyst quality resulting from various embryonic compaction patterns. It has been showed abnormal compaction or non-compaction patterns in numerous porcine embryos produced *in vitro*. Therefore, significant differences in morphology and numbers of cells have been observed in IVP blastocysts compared with *in vivo*-derived blastocysts. These results indicate that it should be regulated on a viewpoint of the culture conditions and the expression control of compaction related genes for improving blastocyst quality. Further research efforts should be directed to improve embryo quality by modifications of overall IVP procedures above mentioned.