

## Mini-Symposium on Intracytoplasmic Sperm Injection in Laboratory and Farm Animals

### Preface

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Intracytoplasmic sperm injection (ICSI) is a powerful technique for exploring complicated mechanisms of fertilization in mammals. At present, ICSI is most successful in humans and mice. Human ICSI has become the method of choice for overcoming male infertility when all other forms of assisted fertilization have failed. Although animals except mice in which ICSI has produced normal offspring include many species, the success rates remain low. However, its application has recently been expanded to generate transgenesis in farm and laboratory animals and also to produce offspring derived from freeze-dried spermatozoa.

This mini-symposium focuses on transgenesis and the generation of offspring from freeze-dried spermatozoa via ICSI in laboratory animals. In addition, ICSI in farm animals is highlighted, since it is expected to produce viable zygotes in less time and with less cost, thereby contributing to the enhancement of animal industries such as meat and milk production.

The first paper by Dr. Hirabayashi *et al.* focuses on transgenesis via ICSI in mice and rats. The method termed ICSI-mediated DNA transfer, in which the sperm or sperm heads and transgene solution are mixed and

co-injected into ooplasm, is as efficient as conventional DNA microinjection into pronuclei. Recent studies on transgenesis for improving efficiency of production are also described. In the second paper, Dr. Suzuki reviews the current status of freeze-drying spermatozoa for genetic storage and producing offspring from the rehydrated spermatozoa through ICSI. He describes the possible long-term preservation of freeze-dried spermatozoa at ambient temperature, and indicates that the higher temperature (4°C) induced DNA damage in stored freeze-dried spermatozoa as shown by the comet assay. The third paper by Dr. Kikuchi *et al.* focuses on both ICSI and *in vitro* fertilization (IVF) in pigs in terms of the physiology of fertilization. Sperm nuclear remodeling during IVF and ICSI, and recent advances are discussed. In the last paper, Dr. Ushijima reviews bovine ICSI and its application. The generation of viable embryos is considered difficult in bovine ICSI.

ICSI has various applications in many species and comparative studies enhance not only our understanding in ova research but also related technologies. I thank all authors for their excellent contributions to this mini-symposium of the Journal of Mammalian Ova Research.